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New generation of information technology and development trend

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In recent years, the concept of “new generation of information technology” frequently appeared in the media. A new generation of information technology, not only refers to some branch of the field of information technology such as vertical upgrading integrated circuit, computer, wireless communication, more important is the intergenerational change of information technology refers to the overall platform and industry. Over the past 10 years, the mobile Internet, social networking, cloud computing, big data for the characteristics of the third generation of information technology.

The new generation of information technology development is not the focus of information technology upgrade, it is the information technology horizontal infiltration and fusion to manufacturing, finance and other industries, the main direction of information technology research will be from product technology to service technology. Thus, the RISTI – Revista Iberica de Sistemas e Tecnologias de Informacao presents actual papers on main topics of journal specialization to address and focus new innovative in information technologies. The Vol. 2016, No. E10 has selected 40 extended articles presented at the panel discussion on Information Technology Innovation and Computer Engineering in January 2016 in Beijing China, which aims to more deep insights about the “new generation of information technology”.

We gratefully appreciate the authors for their scholarly contributions, and all the included contents were anonymously reviewed by distinguished experts to maintain academic excellence and integrity. We assure our readers that RISTI – Revista Iberica de Sistemas e Tecnologias de Informacao will serve as a key exchange platform for publications in information science & technology field. The authors and readers can count on the journal.

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Vehicle Terminal System Design of Wisdom Logistics

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Abstract: As the important component of wisdom logistics, research and development of vehicle terminal is the key for promoting logistics information construction, in which various data information of transport vehicles and goods is acquired in real time through utilizing wireless sensor networks of ZigBee Technology. Meanwhile General Packet Radio Service Wireless Communication Technique whose abbreviation is GPRS transmits locating information of Global Positioning System with abbreviation GPS and operation and status information of vehicles and goods to do management thus realizing the whole-process monitoring, tracking and positioning on logistics transport vehicles during driving process, guaranteeing security of logistics transportation and implementing optimal dispatching.

Keywords: Wireless sensor networks, GPS, GPRS, Vehicle terminal, ZigBee

1. Introduction

Wisdom logistics vehicle terminal system is utilizing certain key techniques to realize real-time acquisition of vehicles and goods information, analyze information to make decision and lead information flow to be faster than material flow. At present, vehicle systems like Radio Frequency Identification Technology with abbreviation RFID, GPS Technology, GSM/GPRS technology, Bluetooth, ZigBee Technology and Wireless Sensor Network Technology with abbreviation WSN play important roles in which tracking and monitoring on goods information during logistics process and research and application of goods' automation and networking become hot spots.

Reddy, A.V.D.G., Dhadyalla and others propose a kind of wireless network Bluetooth vehicle gateway based on bus protocol of Controller Area Network whose abbreviation is CAN (Reddy, 2013). Tan-Hsu Tan came up with one type of medical vehicle gateway on the basis of sensor setup, web-cam, 2.4 GHz ISM frequency band RF module, ZigBee, GPS, Google Maps and WiMAX Mobile Network, whose system could display traffic information in real time, which would be applied to emergency medical services thus significantly improving

service quality of emergency medical system (Tan, 2012). Through doing research on shortcomings in GPS Technology of vehicle monitoring system, Tao N proposes a type of vehicle GPS monitoring system on the basis of GPRS network (Tao, 2007). K. Hwang puts forward an intelligent vehicle communication system based on super-network system including vehicle internal network and external network communication, which covers three aspects of vehicle bus network, vehicle and road communication. It also provides some solutions for specific key points (KI, 2003). Zonghua Gu and others develop a sort of vehicle gateway software platform on account of virtualization technology (Zonghua, 2012). Qu Liangdong, et al design and realize one kind of embedded Linux vehicle gateway on the basis of double stack of IPv6 and IPv4, which realizes communication among CAN, Local Interconnect Network with abbreviation LIN, Global Positioning System and information network through CDMA wireless network. It utilizes embedded ARM—Linux operation system and S3C2410 embedded CPU centered on ARM920T, which uses multi-threading technology and buffer fast copy in upper main program. It also designs public data structure for upper data communication (Qu, 2008). Sun Zhaoxiang, et al design a kind of vehicle monitoring terminal system concentrating GPS Technology, GPRS Communication Technique and GIS Technology into a whole, which realizes functions of all-weather GPS, vehicle monitoring in real time, etc (Sun, 2015).

Nowadays part of vehicle terminal of transport vehicle monitoring is mostly applied in fields of vehicle tracking monitoring, safety operation regulation, vehicle scheduling navigation, etc. Aiming at different fields, different vehicle terminals are developed in which similar background system is established according to relevant terminal. Extreme resource waste happens without any universal vehicle gateway terminal.

This design proposes and realizes one sort of wisdom logistics vehicle terminal system being with ad hoc network and multi-modality. Acquire various data information of transport vehicles and goods through WSN based on ZigBee Technology. It transmits locating information of GPS and operation and status information of vehicles and goods to background server through GPRS wireless communication technology to do management thus guaranteeing in-transit safety supervision on transport vehicles and goods.

2. System Structure

The system mainly includes both parts of intelligent logistics vehicle terminal and logistics monitoring center whose structure is shown in Figure 1. It is seen from Figure1 that intelligent logistics vehicle terminal is mainly composed of Advanced RISC Machine (ARM) master controller, ZigBee wireless sensor networks, GPRS module and GPS module. Wireless sensor networks structure based on ZigBee consists of multiple sensor acquisition nodes in order to acquire micro-environment information of transport carriage including inside temperature, humidity, gases, smoke, carriage door opening, goods security, etc. Multiple sensor nodes' information converges to coordinator node and then is transmitted to master controller, which forms micro-environment wireless sensor networks in the carriage. Master controller i embedded gateway on the basis of ARM in which GPS module acquires latitude and longitude information of moving vehicles and the received micro-environment information with current location information of carriage is transmitted to logistics monitoring center through GPRS module.

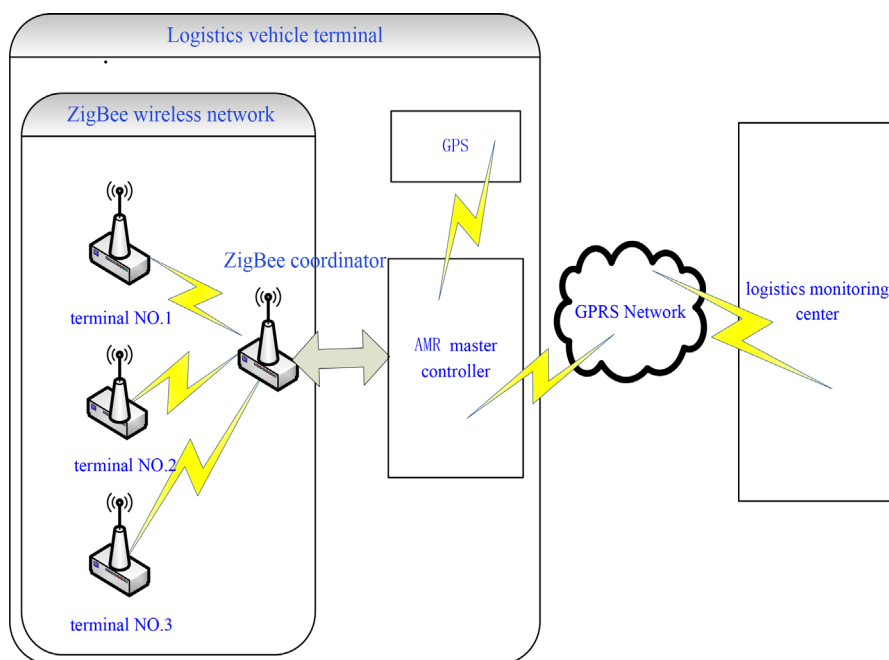


Figure 1 – Structure Diagram of System

2.1. Design of Vehicle Terminal Hardware

Logistics vehicle terminal is mainly composed of ARM master controller, ZigBee wireless transceiver module, sensor module, GPRS module and relevant peripheral circuit.

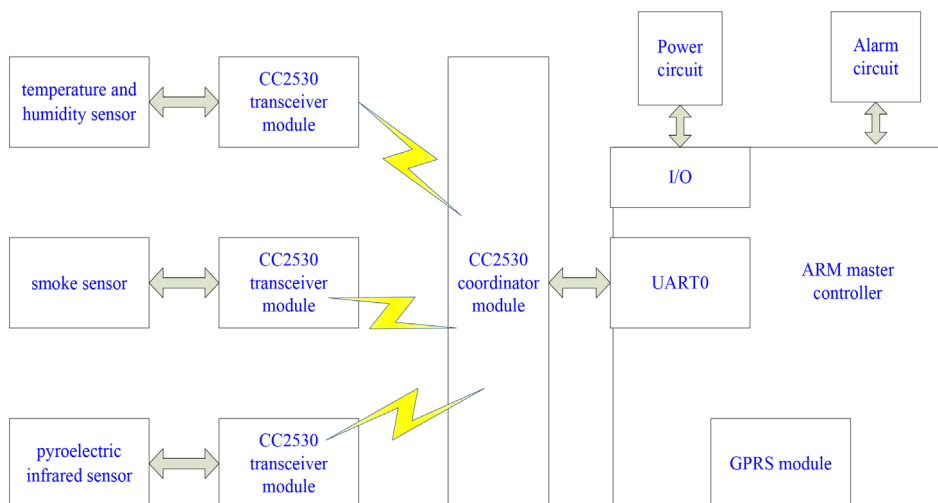


Figure 2 – Hardware Circuit Design Diagram of Vehicle Terminal

Relevant peripheral circuit includes alarm module, power and reset module, touch screen display module and so on. Hardware circuit design diagram of vehicle terminal is shown in Figure 2.

2.1.1. ARM Micro-controller Module

ARM microprocessor provides data transceiver interface for other modules and receives data information transmitted by other modules. After data processing, it sends response instruction to relevant modules. As the core of vehicle gateway, ARM module takes charge of control processing of the whole terminal equipment including receiving detected information from GPS and sensor and controlling GPRS module thus realizing data transmission. The number of peripheral interrupted by vehicle gateway is so large that the number of communication interface needs considering in the selection of microprocessor in which MDK1808 produced by Hangzhou Amy Electronics Co., Ltd is utilized. Its pin function planning is seen in Figure 3.

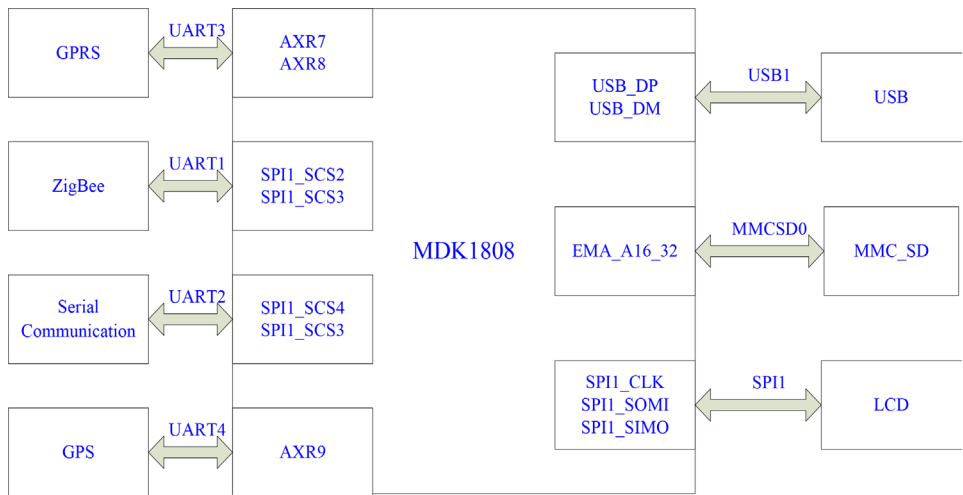


Figure 3 – Pin Function Planning of MDK1808

2.1.2. ZigBee Wireless Transceiver Module

Master chip of ZigBee transceiver module utilizes CC2530 Chip from TI Company. ZigBee coordinator module also takes CC2530 as core including power conversion module, RS-232 communication module and a small number of peripheral operating circuits, which mainly finishes data receiving and uploading functions with high power consumption and uninterrupted operation for a long time. Therefore master controller USB port takes charge of power supply for coordinator node.

System establishes ZigBee star network topology structure thus realizing wireless network with self-starting function which is based on Z-Stack. It includes one coordinator node and multiple terminal nodes. Coordinator is the core of the whole network,

taking charge of network establishment, network nodes' management and being in search of route messages among nodes. Terminal node is the unit to realize concrete functions. Coordinator node arranges different network addresses to all terminal nodes which collect data to coordinator node through wireless network. Coordinator node communicates with master controller by means of RS-232 serial port. After analyzing the received data, master controller determines which ZigBee node information comes from according to different network addresses. CC2530 Block diagram of the minimum system is shown in Figure 4.

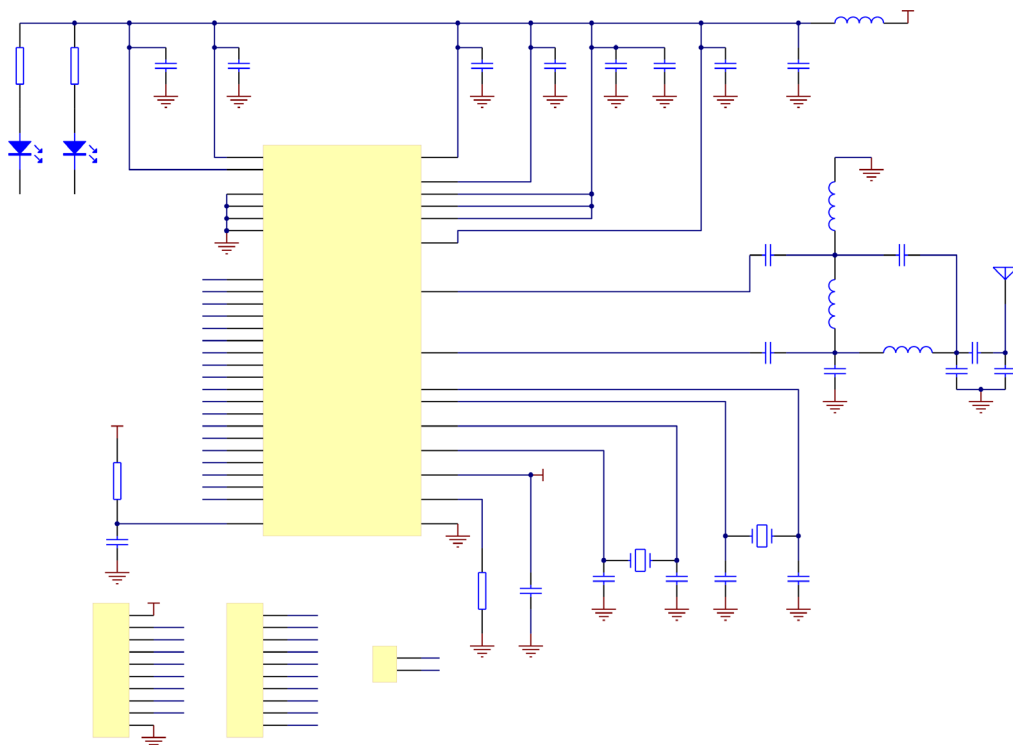


Figure 4 – Circuit Diagram of CC2530 Minimum System

2.1.3. GPS Module

This design utilizes GT-1513-SF integration module of Gotop Corporation, which keeps built-in high-performance and low-power consumption SIRFIII Chip. It has features of good positioning precision, super-sensitivity, ultra-low power consumption, built-in high-gain LNA and small size. Schematic design of GPS module is expressed in Figure 5. System receives positioning data from positioning satellite through GPS receiver. By means of calculation, it acquires latitude and longitude coordinate positions of moving vehicles which would be transmitted to logistics monitoring center through GPRS module.

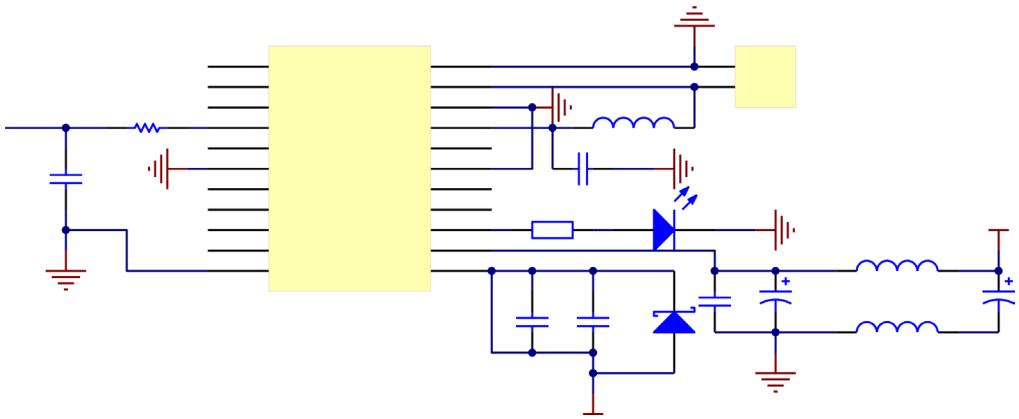


Figure 5 – Schematic of GPS Module

2.1.4. GPRS Module

GPRS (Han, 2015) is the key and basis of realizing remote wireless data transmission and real-time data communication, which is a kind of packet switch data bearer and transmission method developing on the basis of GSM (Jinfeng, 2011). After receiving monitoring commands from monitoring center, vehicle mobile monitoring terminal automatically sends positioning information to monitoring center through GPRS according to requirements. GPRS module is mainly controlled by the host control computer, which establishes connection with CMCNET and transmits data of this vehicle system to data center of company through GPRS network in real time. This design utilizes EM310 Module produced by Huawei Company. EM310 GPRS module provides one path of serial interface. It does information interaction with AM1808 MCU through UART serial port and receives control instructions. This UART serial port supports the highest baud rate of 115.2kbit/s and the lowest one is 300bit/s. This system utilizes 9600kbits/s baud rate. Within the supported baud rate range of EM310 UART serial port, it would do automatic identification without users' intervention (Li, 2011). Connection of EM310 serial port and MDK1808 is shown in Figure 6.

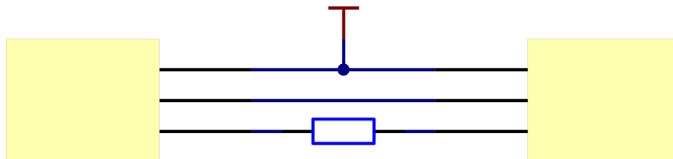


Figure 6 – Connection Diagram of EM310 Serial Port and MDK1808

EM310 module provides one SIM interface. Schematic of GPRS module is seen in Figure 7.

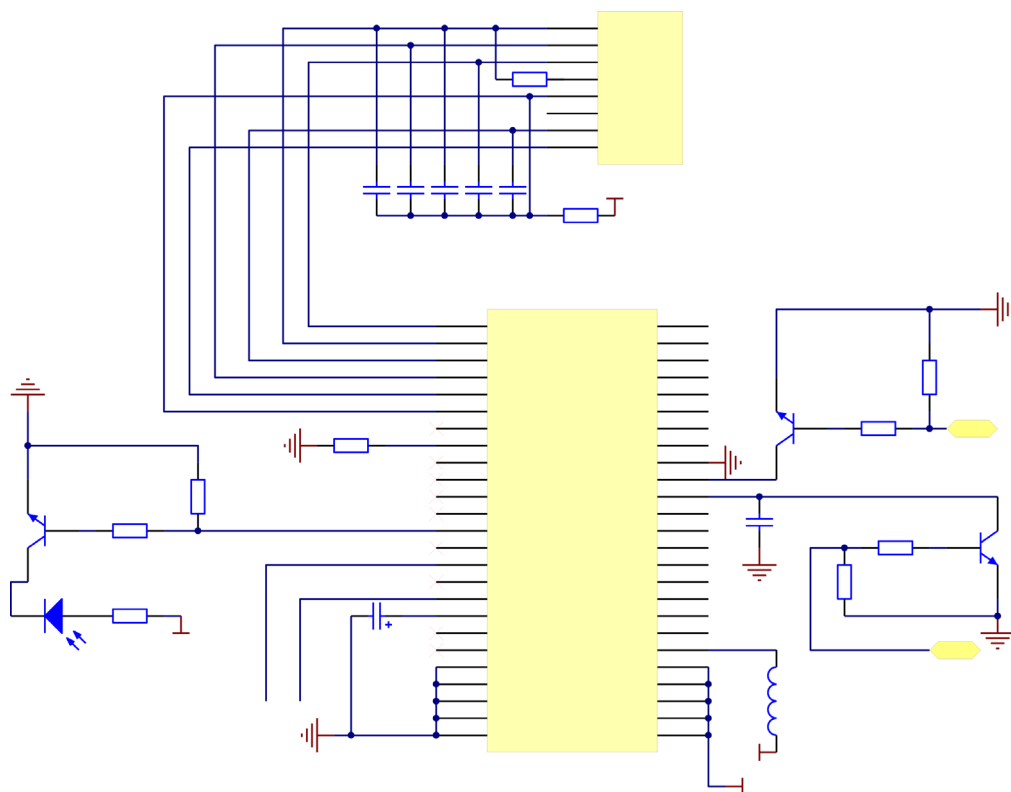


Figure 7 – Schematic of GSM/GPRS Module

2.2. Design of Vehicle Terminal Software

Design of vehicle terminal software mainly includes system power-up initialization, ZigBee data collection, GPS positioning information acquisition, GPRS messages transceiver, data processing, LCD display, etc. ZigBee coordinator, GPRS module and GPS module connect to the master controller through serial port. System applies multi-threaded serial monitor to realize transceiver of ZigBee data with GPRS message data and receiving of GPS data. After power-up initialization is finished, system establishes three serial monitor threads. When certain thread monitors serial data, it would do analysis and relevant processing. Aiming at carriage micro-environment information, alarm information and GPS positioning information, message should be reorganized in accordance with communication protocol and GPRS would be called to send message program thus communicating with logistics monitoring center. Figure 8 is flow chart of the main program of vehicle terminal.

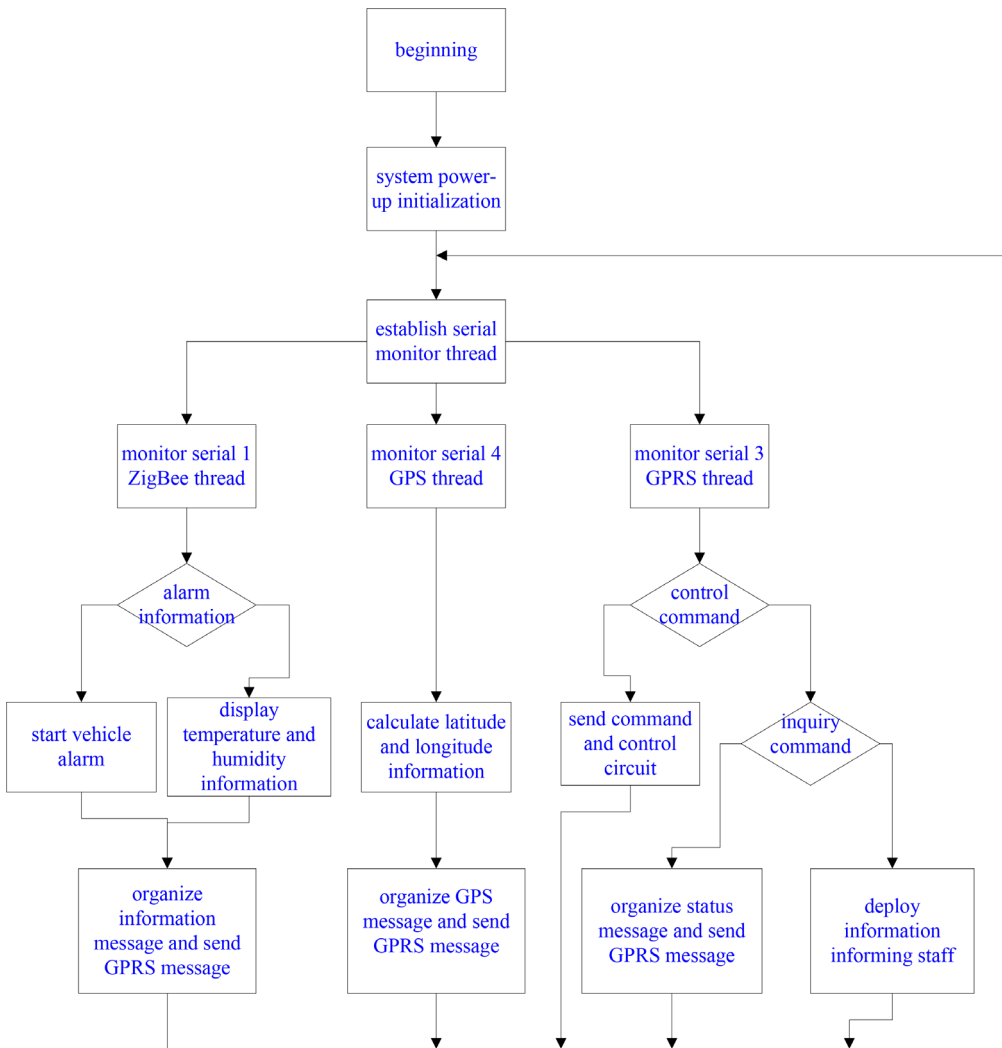


Figure 8 – Flow Chart of Main Program of Vehicle Terminal

3. System Test

Do connection among each node device and operate wireless sensor system. Then connect vehicle master control device to PC and run assistant test platform. The test uses three terminal node devices which are covered with shields to do simulation test. These devices are respectively 15m, 20m and 25m away from the host control device. By simulation test, data communication situations of each node device are listed in Tab.1. Experiment results show that communication packet loss rate (Huiping,

2010) is about 2% during normal operation of node devices, whose communication status is good. In practical condition, add data relay function of routing node device through utilizing signal permeability enhancement strategy so as to further reduce communication packet loss rate and guarantee security with reliability of data transmission in wireless sensor system.

Device Number	Communication Distance	Shield Attenuation (dBm)	Sending Number	Receiving Number	Packet Loss Rate
NO.1	15m	20-30	2935	2895	1.36%
NO.2	20m	20-30	2962	2901	2.06%
NO.3	25m	20-30	2873	2805	2.37%

Table 1 – Communication Situations of Node Devices under Simulated Environment

4. Conclusions

Taking wireless sensor networks as information collection method, having GPS Technology be positioning basis and leading GPRS network to be hosted network, this design takes full account of physical demands and establishes intelligent logistics vehicle terminal system. Wireless sensor closed loop networks in the carriage dynamically does collection and early warning on carriage micro-environment information, leading managers to know changes of vehicle situation information in real time thus timely taking effective measures to prove quality of products. Vehicle terminal and logistics center wireless networks realizes the whole-course monitoring and vehicle tracking with positioning during vehicle driving process, increases traffic security and finishes optimal dispatching.

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Research on the Experiential Teaching of College English Culture Assisted by Computer

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Abstract: To better adapt to the current development of science and information technology, education also keeps up with the times and progresses into a new stage of computer assisted instruction. Together with the increasing economic globalization, English culture has been valued by people. In this paper, through the study of experiential teaching in the computer assisted college English culture, the analytic hierarchy model is established, the weights of the index factors relating to the computer assisted instruction are gotten, and the expected values are obtained. After that, the neural network model is established and improved according to the actual situation. With the use of computer software MATLAB to achieve the purpose of exercise and drilling, the real values are achieved, which is very similar to the results obtained through the analytic hierarchy process. So with assistance of computers, the reasonable evaluation of experiential teaching of college English culture can be achieved. The research of this paper also lays a technical foundation for the comprehensive evaluation of other industries assisted by computers.

Keywords: Computer assisted teaching, English culture, AHP, BP neural network, MATLAB

1. Introduction

With the increasing popularity of such concepts as “global village”, “WTO” and a variety of world-class events in China’s development, effective communication has become the focus of today’s education (Benardos, 2007; Abreu et al., 2015). To a certain extent, the new technology has deeply influenced the development of education, communication and media. At the same time, the development of education has promoted the progress of people’s life, and accelerated the renewal of social civilization. Especially in the background of today’s rapid development of information technology, the use of new teaching tools has become a significant part of current teaching. Cross-cultural education is not only the requirement of social development in the twenty-first century, but also has become one of the major goals of college students’ teaching (Gao, 1998; Lino et al., 2016). Language is regarded as a tool for the exchange of spiritual and ideological elements, and provides the understanding and communication channel for our daily life. English, as a universal language, is an important medium to realize the efficient communication

between people all over the world. At present, eighty percent of the world's information is stored in English, more than half of the world's scientists can communicate in English, and fifty percent of the world's academic journals are published in English. Today, English is not only a communication tool, but also is an important means of national and international influence. English education is an educational program that can adapt to the international trend and help people communicate smoothly in their daily life and work. The English culture education for college students has made an important contribution to the cultivation of English and its related talents. The experiential teaching of college students' English culture can be realized by using the new technology, which is the most important of the current teaching methods. The era of digitization also puts forward higher standards for the education of college students (John, 2001). Students, in the context of English culture, get the effective knowledge and skills to strengthen the cultural and economic exchanges. Moreover, the English learning class in China's college also enables students to have some contacts with the western literature and culture. Thus, finding a suitable way for college students is inevitable in the teaching of College English in China.

2. The basic concepts of English culture experiential teaching

2.1. Study abroad

Since 1960s, the United States has been the first to study the experiential teaching. And as of 1980s, the United States carried out three conferences on thematic studies (Lin, 1998). In 1990s, the primary role of culture teaching in the education sector was established, while the main communication targets of interpersonal communication, interpretation and presentation were established. Meanwhile, other subject targets of cultural practices and goals of comparative language and culture were obtained. Based on those above-mentioned standards, they could get the information, emotional expression and exchange of views in the experiential teaching of English culture, while understanding the written and spoken communications, and cultural products. They agreed with others, understood the nature of language, and enriched themselves with lifelong learning. Now, the United States has made a thorough and comprehensive study on the experiential teaching, and has carried on the fruitful discussions at different levels.

European Studies of cultural experiential teaching began in the Second World War, especially after the establishment of the European Union, when international exchanges and cooperation were much closer. The teaching of communicative approach has become a new teaching method (Peng, 2010). The recent research in literature and language teaching was more and more thorough and proposed the following ability and objectives related to language, including comprehensive ability, communicative ability, declarative knowledge, survival skills, social linguistic competence and pragmatic competence. The aims are the cultural knowledge of the world, the strengthening of practical skills, the establishment of correct learning attitude and motivation, the improvement of language and communication awareness, the shaping of learning skills and satisfactory expression of all kinds of verbal communication tasks.

2.2. Domestic research

The experiential teaching in China is in a more cautious stage. There are also some books and papers on culture teaching in class. But the situation is more fragmented, as there is no systematic and overall planning. As early as in the Warring States period, the university education already emerged in our country. In the thirteenth century, Western Europe also produced a modern university (Lier, 2004). In 1980s, the relevant scholars of our country had made some researches and discussions about the experiential teaching, and put forward the content, principle and method of culture teaching. Although the study of English culture teaching has been put forward, the main difficulty is dialectical thinking, and there is no further research and discussion.

2.3. The relationship between language and culture

Language, which is regarded as one of the main channels to express feelings, exchange ideas and world views, is the product of human spiritual life, and plays an important role in the formation and development of culture. From another level, language is the product of culture, and it is the result of all cultural activities. The learning of a second language is extremely important for cultural exchange and knowledge obtaining. Experiential learning helps to deepen the level of cognition, and it is more direct and reliable (Angappa, 2008).

College English teaching, in fact, should be the integration of language teaching and culture teaching. The foreign language teaching in China is developing from the tendency of separate education to the integration of education, and now presents a new situation of the integrated teaching/learning of language and culture.

2.4. The challenges of Experiential English Teaching

As far as the students are concerned, most students don't realize the main purpose of learning English. In the process of English learning, the interest remains weak, and English has not been greatly improved. As far as teachers are concerned, they are not clear about what the teaching is, since there is no effective way and method of teaching to improve classroom efficiency and to meet the needs of the students. The study of English experiential teaching in our country is not thorough, so huge challenges lie ahead for experiential teaching. Meanwhile, the localization of English itself makes the emergence of a large number of "Chinglish". There are differences in the linguistic competence, communicative competence, and cross-cultural perspective.

2.5. The significance of experiencing English Teaching

The experiential teaching mode is beneficial to expand the students' learning horizon, promote the students' communicative competence and enrich the depth of communication. It can avoid cultural conflicts and master communicative ability. It also can foster the language awareness, enhance the sensitivity of culture, and strengthen the ability and awareness of cross-cultural practices. It is worth mentioning that the cultivation of language use and writing ability is of great significance. Autonomous teaching and case teaching in experiential teaching are important for students'

autonomous learning ability. English is one of autonomous learning language, and it is necessary to use experiential teaching method.

3. The establishment of model

3.1. AHP

AHP is established by the hierarchical structure model, contrast matrix is built, the index weight is calculated and consistency test is made to get the weight value of the index. And then the result is compared (Jacksens, 2011). Specific processes are as follows:

1. Target level division

Usually the level is divided into three layers. A represents the target layer, the layer B represents the middle layer, the layer C represents the underlying layer. The top level is actually the expected goal of research topics. The middle layer is actually one or some of the intermediate processes that are done according to the specific situation. The lowest level is actually the specific measures and perspectives.

2. The construction of layer B to the layer A contrast matrix

	1	2	3	4	5	6	7	8	9
importance	1	1.5	2	2.5	3	3.5	4	4.5	5

Table 1 – Scaling

3. The determining of judgment matrix

$$A = \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ a_{31} & a_{32} & \cdots & a_{3n} \\ a_{n1} & a_{n2} & \cdots & a_{nn} \end{bmatrix} \quad (1)$$

4. Weight vector $\varepsilon(A) = (\varepsilon_1, \varepsilon_2, \varepsilon_3, \dots, \varepsilon_n)$ is got.

$$\varepsilon = \frac{\sqrt[n]{\prod_{j=1}^n a_{ij}}}{\sum \sqrt[n]{\prod_{j=1}^n a_{ij}}} \quad (2)$$

5. Consistency check

RI represents consistency index.

program	index								
<i>N</i>	1	2	3	4	5	6	7	8	9
<i>RI</i>	0	0	0.42	0.85	1.11	1.26	1.35	1.48	1.51

Table 2 – RI Index distribution table

Maximum eigenvalue is:

$$\lambda = \frac{1}{n} \sum_{i=1}^n \frac{(A\varepsilon)_i}{\varepsilon_i} \quad (3)$$

Judgment matrix order

$$CI = \frac{\lambda_n - n}{n - 1} \quad (4)$$

Consistency ratio is got.

$$CR_A = \frac{CI}{RI} \quad (5)$$

The judgment matrix of the level B and the level C is as follows.

	A_1	A_2	$\dots$	A_n	Weights
	ε_1	ε_2	$\dots$	ε_n	
B_1	q_{11}	q_{12}	$\dots$	q_{1n}	$\sum_{j=1}^n \varepsilon_j q_{1j}$
B_2	q_{21}	q_{22}	$\dots$	q_{2n}	$\sum_{j=1}^n \varepsilon_j q_{2j}$
$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$	$\vdots$
B_n	q_{n1}	q_{n2}	$\dots$	q_{nn}	$\sum_{j=1}^n \varepsilon_j q_{nj}$

Table 3 – Right target layer and the second-stage evaluation of the weight value

B is two level evaluation index.

Two level index consistency ratio is:

$$CR_B = \frac{\sum_i^n \varepsilon_i CI_i}{\sum_i^n \varepsilon_i RI_i}$$

3.2 BP neural network

The artificial neural network is a processing unit of the neural network which is similar to the human brain, which can simulate the processing of the unit and information knowledge of the human brain. Neural network algorithm can be through the core of the application. It finds the rule of law from a large number of data and it has the characteristics of self-adaptation and self-organization.

1. The establishment of model

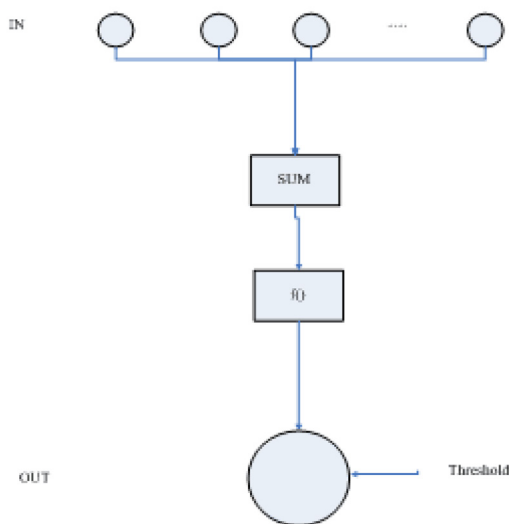


Figure 1 – Graph of BP Neuron Model Function Correspondence

In the above picture, BP neural network model is completed through a series of processes from input signal to the output signal. The process consists of a link to each process node, a function of the unit, and a nonlinear activation function. Among them, the nonlinear activation function is based on the limited value, and there is a threshold value.

The relationship equations between input data and output data are:

$$\beta = \sum_{m=1}^n \alpha_{mn} x_n \quad (6)$$

$$y = f(\beta_j - \lambda_j) \quad (7)$$

In the above equations, β represents function relation of input signal data. α represents weighted values of connecting neurons and each input signal source. x_m represents a large number of input data sources. y_m represents function relation of output signal data. f represents the relationship between the input signal data source and the output signal data source. β_j represents the output signal source that is got by input signal data source through function relation. λ is a threshold which is set in BP artificial neural network. The value is able to activate the input signal data source that exceeds the threshold value, and controls the data source to make the function to be further changed and to activate this relationship. The threshold is

$$f(x) = \begin{cases} 1, & x \geq 0 \\ 0, & x < 0 \end{cases} \quad (8)$$

2. Operation algorithm

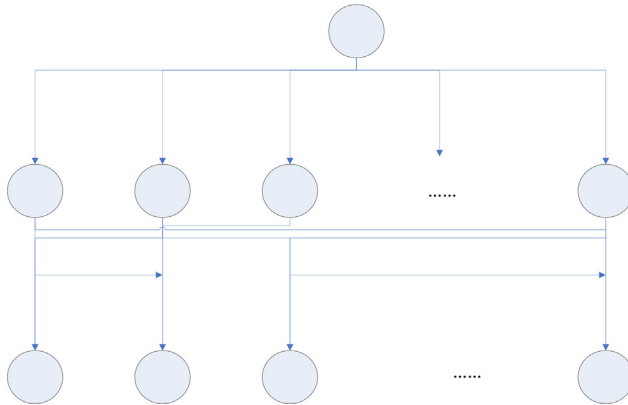


Figure 2 – Neural network topology diagram

In the above picture, the input layer, the hidden layer and the output layer are respectively from bottom to top. Connection weights are connected between each level.

3. Normal transmission process

In the input layer, the output data source of the hidden layer is:

$$y = f\left(\sum_{m=0}^n \alpha_{mn} x_{mn}\right) \quad (9)$$

In the above equation, variable data in the input layer is x , output variable data is y , m is the serial number of the input layer node, n is Serial number of implicit hierarchy data node. When the value of x is -1, the data source of the input layer is the data source of the output layer. In other words, the threshold is introduced in implicit level.

In the process of the input layer, the output data source of the output layer is:

$$v = \sum_{m=0}^n t_{mj} y_m \quad (10)$$

$$L = f(v_j) = f\left(\sum_{m=0}^n t_{mj} y_m\right) \quad (11)$$

In the above equation, v is the weight value of connecting the hidden layer and the output layer. When the value of y is -1, the threshold is introduced in output level.

4. Error correction transfer process

Calculation error of each layer

$$E = x_m^j (1 - x_m^j) (x_m^j - y_m^j) \quad (12)$$

The number of layers is the same as the number of verification.

If they are different, the calculation error exists in each layer.

$$E = x_m^n (1 - x_m^n) (x_m^n - y_m^n) \quad (13)$$

In the process of signal transmission and normal propagation, there will be a certain degree error. The error is expressed by error signal.

$$e = \frac{1}{2} \sum_{j=1}^n (r_j - L_k)^2 \quad (14)$$

Error signal to the hidden layer is expressed by the following equation.

$$e = \frac{1}{2} \sum_{j=1}^n \left[r_j - f\left(\sum_m t_{mj} t_m\right) \right]^2 \quad (15)$$

Error signal to the output layer is expressed by the following equation.

$$e = \frac{1}{2} \sum_{j=1}^n \left(r_j - f \left[\sum_{m=0}^n t_{mj} f \left(\sum_m \alpha_{mj} x_m \right) \right] \right)^2 \quad (16)$$

In the above equation, e is the function relation of the weight value that connects each layer. The computer operation neural network workflow is as follows.

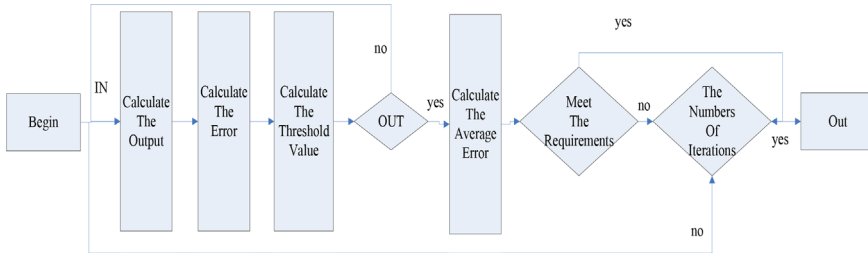


Figure 3 – The computer running flow chart of neural network to work

3.3. Error revision

1. Overall revision. The above requirements can not meet the above requirements, so the calculation is repeated. In the process of repeated calculation, the threshold is adjusted. The adjustment formula is as follows.

$$\partial_{ij}(v+1) = \partial_{ij}(v) - \Delta e_i^k x_j^{k-1} \quad (17)$$

2. Partial revision. Taking into account the existence of the BP neural network, the convergence rate is slow and prone to local errors and other issues, momentum factor is increased, partial problem is adjusted (Seifollahi, 2012). The problem can be solved by the traingda, traingdm function in the MATLAB software.

The formula for solving the local problem is as follows.

$$\Delta x(v+1) = \varepsilon \Delta x(v) + \gamma(1-\varepsilon) \frac{\partial e(v)}{\partial x(v)} \quad (18)$$

$$x(v+1) = x(v) + \Delta x(v+1) \quad (19)$$

In the above equation, v is the number of iterations in the computer calculation, γ represents values between 0 and 1, γ is momentum factor between 0-1, in this paper, the value of γ is 0.95.

To solve the convergence problem, the adjustment formula is as follows.

$$\gamma(v+1) = \begin{cases} 1\gamma(v), e(v+1) < e(v) \\ 0.5\gamma(v), e(v+1) > 1e(v) \\ \gamma(v), \text{others} \end{cases} \quad (20)$$

3. Weight revision. In order to overcome the serious deficiencies of the grey model and multiple regression, by the propagation of the learning algorithm in the opposite direction, the weights are adjusted as follows.

$$\gamma_{mn} = \gamma_{lk} - \alpha \frac{\partial e}{\partial \gamma} \quad (21)$$

There is the following equation.

$$\frac{\partial e}{\partial v_{mn}} = \sum_{j=1}^m \frac{\partial e}{\partial v_{mn}} \quad (22)$$

The correlation coefficient is determined.

$$X^2 = \frac{\sum_{i=1}^n (x_i - \bar{x}_i) \left(\hat{x}_i - \hat{\bar{x}}_i \right)}{\sqrt{\sum_{i=1}^n (x_i - \bar{x}_i)^2 \left(\hat{x}_i - \hat{\bar{x}}_i \right)^2}} \quad (23)$$

Among them, there are the following equations.

$$\bar{x}_i = \frac{1}{n} \sum_{i=1}^n x_i \quad (24)$$

$$\hat{\bar{x}}_i = \frac{1}{n} \sum_{i=1}^n \hat{x}_i \quad (25)$$

4. Case analysis

4.1. The determining of weights

There are many factors that affect college students' English culture experiential teaching, including the professional academic, individual learning ability and cognitive

consciousness, and so on (Muller, 2001). Adhering to the principles of comprehensiveness, emphasis, hierarchy, pertinence and feasibility, taking into account the index level and political ideology, political performance, moral accomplishment and behaviors related moral quality, learning attitude, learning achievement, professional skills, scientific and technological innovation and the professional quality of scientific research achievements, physical fitness, sports ability, activity related to style quality, the index system of college students' English culture is established.

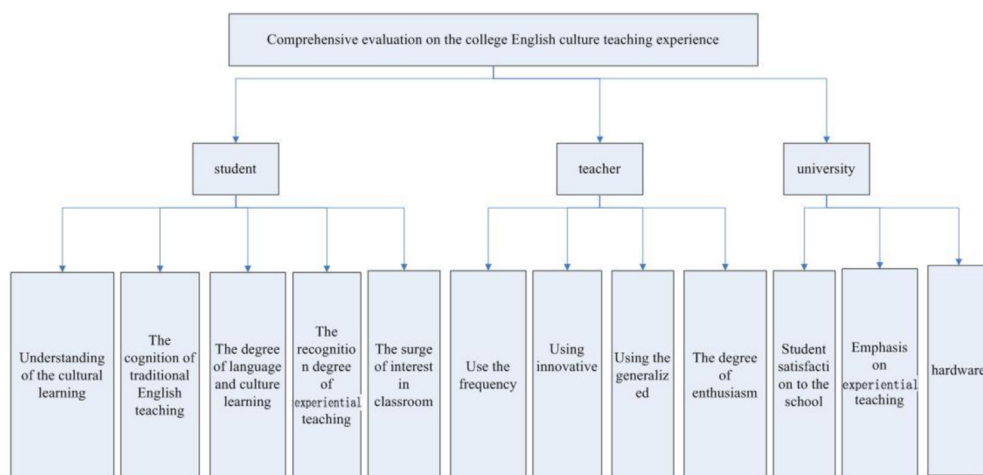


Figure 4 – experiential teaching index system

4.2. Judgment matrix

By MATLAB software, the comparison result of the judgment matrix is tested by the consistency test. The maximum eigenvalue of the matrix is obtained through the consistency check (Zhang, 2008). The judgment matrix is as follows:

A-B	B1	B2	B3	WEIGHT
B1	1	1/5	3	0.2634
B2	5	1	5	0.5989
B3	1/3	1/5	1	0.1653

Table 4 – A-B Judgment matrix

Through the operation of MATLAB software, the results are obtained.

$$\lambda = 3.6422, CI = 0.0325, CR = 0.0536 < 0.01$$

A-B	C11	C12	C13	C14	WEIGHT
C11	1	1/3	1	1	0.2346
C12	3	1	3	3	0.3689
C13	1	1/3	1	1/3	0.1453
C14	1	1/3	3	1	0.2341

Table 5 – B1-CJudgment matrix

Through the operation of MATLAB software, the results are obtained.

$$\lambda = 45422, CI = 0.0236, CR = 0.0287 < 0.01$$

A-B	C21	C22	C23	C24	C25	WEIGHT
C21	1	1/7	1/5	1/5	1/9	0.05978
C22	7	1	3	3	1/3	0.2653
C23	5	1/3	1	1	1/3	0.1542
C24	5	1/3	1	1	1/3	0.1325
C25	9	3	3	3	1	0.3999

Table 6 – B2-CJudgment matrix

Through the operation of MATLAB software, the results are obtained.

$$\lambda = 5.6784, CI = 0.0125, CR = 0.0115 < 0.01$$

A-B	C31	C32	C33	WEIGHT
C31	1	1/3	1/2	0.1657
C32	3	1	1	0.4432
C33	2	1	1	0.3654

Table 7 – B3-CJudgment matrix

Through the operation of MATLAB software, the results are obtained.

$$\lambda = 5.5263, CI = 0.0153, CR = 0.0121 < 0.01$$

A-B	C31
C11	0.0546
C12	0.0978
C13	0.0380
C14	0.5467
C21	0.0345
C22	0.1546
C23	0.0989
C24	0.0989
C25	0.2145
C31	0.0234
C32	0.0674
C33	0.0601

Table 8 – A-B-C Judgment matrix

4.3. Comprehensive evaluation

Normalized evaluation index scores have been evaluated as input signal data sources. Comprehensive evaluation weight, which is obtained by AHP, is regarded as output vector. By continuously calculating the weight of the score matrix and the weight of the algorithm in the neural network, an effective evaluation of the network is built. Then the real values of the neural network are taken into the exercise process. The obtained results are compared with the expected results. If the results meet the conditions, they will be retained. If not, the results will be dropped.

4.4. Normalization processing

The original data are normalized as follows:

$$PN = (P - MIN) / MAX - MIN \quad (26)$$

In the above equation, P is input value of College English Teaching. PN is input value of evolution. MIN is minimum input values of college experiential English. MAN is maximum input value of college Experience English.

The neural network model which is studied in this paper is three layer structure. Because there are 12 output sources, 12 input sources are added. According to AHP,

$$W = \sqrt{I + O} + E/2 \quad (27)$$

In the above equation, E is the number of neural network testing. W is layer number of hidden layer. I is layer number of input layer. O is Layer number of output layer. Through calculation, $W = 15$.

The 12 indicators are normalized.

4.5. MATLAB operation result and analysis

By testing the model,

$$vc = \frac{\sqrt{\frac{\sum (y_i - \bar{y})^2}{n-1}}}{\sqrt{\frac{\sum (\Delta_i - \bar{\Delta})^2}{n-1}}} \quad (28)$$

The above equation is variance ratio of application.

The Error value is got.

$$P = P\left((\Delta_i - \bar{\Delta}) < \mu \sqrt{\frac{\sum (\Delta_i - \bar{\Delta})^2}{n-1}}\right) \quad (29)$$

According to the above equation, the accuracy is got by using computer, and then it will be compared.

By the MATLAB software, the results between the real data value and the analytic hierarchy process are as follows:

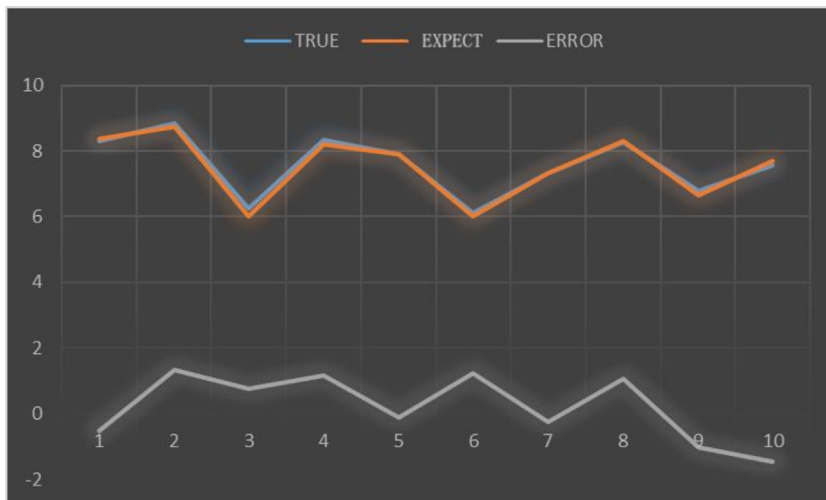


Figure5 – Analysis of MATLAB Operation Results

In the above picture, TRUE is real data source, EXPECT is expected data, ERROR is error between real data and expected data. From the picture, the real value and the expected value are almost coincident, error values are in $(-1, +1)$, the error is less. It can

be seen that the influence factor of the computer software on college English culture experiential teaching is similar to the result of the numerical analysis method and the result of AHP. The accuracy is high. Therefore, the computer software can accurately evaluate the college English teaching.

5. Conclusions

In the background of the current rapid development of the information age, it is very important to use computer to realize the application of work and life. On the problem of computer in the evaluation system, in this paper, the evaluation of college English culture teaching that is obtained by the analytic hierarchy process is regarded as the expected result. The error value is in the range of -1 to 1; in other words, the error is small. Obviously, computer software can realize the evaluation of experiential teaching of college English culture. This method is also applicable to other evaluation with the use of computer software.

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Numerical Investigation of Structural Responses for Three-Bladed and Two-Bladed Offshore Wind Turbines

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Abstract: The structural dynamics and response of four wind turbine configurations based on the model NREL 5MW offshore horizontal axis wind turbine (HAWT) are examined using Computational fluid dynamics (CFD) and Computational Structural Dynamics (CSD) analysis. The four configurations examined in this study were the three-bladed upwind and downwind 12 RPM wind turbines, and the two-bladed upwind and downwind 16 RPM, which all operated at 5 MW. Aerodynamic loads on the wind turbine blades and the tower were predicted using high fidelity Computational Fluid Dynamics (CFD) simulations. These high fidelity CFD aerodynamic loads (air-loads) were used as the input to the CSD code in the structural analysis in order to predict their system responses. The current CFD and CSD analysis compared both wind turbine configurations in order to gain insight into performance and aeromechanical responses of the offshore horizontal axis wind turbines. The numerical investigation indicated that the three-bladed upwind case showed the lowest amount of moments and deflections on both tower and blade, due to a lower rotational speed on the rotor, in contrast, the two-bladed downwind case revealed highest tower bending moments and blade pitch deflection.

Keywords: Computational Fluid Dynamics, Computational Structural Dynamics, CFD, CSD, Wind Turbine, Coupling

1. Introduction

Modern wind turbines fall into two basic groups, horizontal-axis and vertical-axis designs. Recently, many commercial wind turbines are using horizontal axis wind turbines (HAWT), which typically have two or three blades. However, most of them are three-bladed wind turbines. Compared to the three blades design, two-bladed rotors require a teetering hub in order to reduce excessive shocks on the turbine under strong winds. When operating at the same power level, one key disadvantage of the two-bladed wind turbines is that the bending moments of the blade hub and tower base are higher on each individual rotor blade, this may cause fatigue loads on the turbines (Josef, 2005). The two-bladed wind turbines weigh less than the three-bladed turbines by 30%, thus reducing the cost, furthermore the two-bladed design is relatively easy to transport and may not require on-site assembly (Alan, 1997).

Two orientations of wind turbines are upwind and downwind configurations. The upwind configuration operates with the blades facing the incoming wind. One advantage of upwind wind turbines is that there is no tower shadow effect since the tower is located behind the blades. On the other hand, the basic drawback of upwind designs is that the rotor and blades need to be made relatively stiffer compared to downwind wind turbines, so that the blades do not hit the tower during high wind speeds (Qiuying, 2014). In addition, to keep the rotor facing the wind, a yaw control mechanism is necessary for upwind wind turbines. Whereas the downwind configuration has the rotor downwind of the tower where the rotor rotates through the disturbed air produced by the tower's aerodynamic shadow. Downwind turbines do not typically need a yaw control mechanism if the rotor and nacelle have a suitable design to make the nacelle passively align with the wind. A more significant advantage of the downwind wind turbine is that the rotor blades can be more flexible since there is no danger of a tower strike, moreover the flexing blade can be less expensive to make and relieve stress on the tower during operating in high wind since some wind loads transfer to the blade instead of the tower. This means downwind wind turbines can weigh less than upwind. Since downwind blades can be more flexible, this means they are subjected to higher fatigue damage compared to upwind blades. The pressure fluctuations on the turbine may cause turbulence and increased fatigue on the turbine components.

Based on earlier findings, it was determined that the energy cost of the two-bladed wind turbine was somewhat lower than that of the three-bladed with a lower tip speed ratio. However, the three-bladed turbine with a tip speed ratio equal to that of the two-bladed presented the lowest energy costs. Another important determination made was that the offshore failure frequency of the three-bladed wind turbine is 0.11 compared to 0.07 of that for the two-bladed turbines (Bauchau, 1998). In this work, the tower and blade bending moments and deflections are analyzed based on the three-bladed and two-bladed; upwind and downwind wind turbines operating at 5 MW. The goal of this study is to compare and assess the aeromechanical performance and structural response for all the wind turbine applications. In the present study, numerical investigations of the National Renewable Energy Laboratory (NREL) 5MW reference wind turbine are carried out for the upwind and downwind (Jonkman, 2009), three-bladed 12 RPM and two-bladed 16 RPM configurations. The high fidelity CFD solver U2NCLE (Bauchau, 2006) and the CSD solver DYMORE (Sheng, 2013) are employed to study the aerodynamic and structural performance on the rotor and the tower. Both U2NCLE and DYMORE have an established history of applications in helicopter rotor and wind turbine related areas for aerodynamic and structural design and analysis (Roe, 1981; Ickes, 2014). The objective of this paper is to determine which wind turbine case demonstrates the best performance. The tower and blade base bending moments, as well as the out-of-plane and pitch deflections are considered and studied in this paper.

2. Computational Methods

2.1. Computational Fluid Dynamics Code: U²NCLE

The U2NCLE is an unstructured grid Reynolds-Averaged Navier-Stokes (RANS) solver using the finite volume formulation in the present study to compute the aerodynamic loads

for all wind turbine configurations (Sheng, 2009). It includes arbitrary Mach number preconditioning, as well as a free wake model and the Spalart-Allmaras, two equation k-epsilon turbulence models. The code has the capability to deform the computational grid during run time, and includes periodic boundary conditions and a wake model which make it well suited to perform efficient helicopter flow simulations. The detailed workings of the solver and more are described in this section, beginning with the governing equations. Unsteady time-accurate simulations are performed in the fixed reference frame where the main rotor is in relative motion with respect to the tower and nacelle. Implicit Newton iterations with Gauss-Seidel relaxation are used to march the unsteady solution. In the fixed frame, three to four Newton iterations and six to eight Gauss-Seidel relaxations are implemented with a prescribed time step corresponding to one-degree azimuthal rotation per time step. The 2nd-order spatially accurate Roe flux is utilized with Barth's slope limiter (Barth, 2003). A directional derivative viscous method is used to calculate the viscous flux. The turbulent viscous effect is modeled using the Spalart-Allmaras one-equation turbulence model (Spalart, 1991). Characteristic-variable boundary conditions with specified free stream wind velocities are applied at the far field boundaries in the computational domain.

2.2. Computational Structural Dynamics Code: DYMORE

The CSD code DYMORE2 is the name of a comprehensive code for rotorcraft and is developed at the Georgia Institute of Technology under the guidance of Dr. Olivier Bauchau (Sheng, 2003). The method these codes use for solving the system of equations which results from the system definition is the energy-decaying scheme which is unconditionally stable in part due to numerical dissipation of high frequency vibration modes. DYMORE models physical structures in the forms of beams, springs, cables, and other elements in its finite element library, and treats nonlinear geometrical effects exactly. The structural element library in DYMORE2 is adequate to model complex geometries, such as wind turbines and helicopter rotors. In this version, DYMORE2 employs an energy-decay scheme to ensure the convergence in the process of structural dynamics calculations.

2.3. CFD/CSD Coupling

In the present work, both CFD and CSD calculations are performed in order to provide aerodynamic and structural dynamic analysis for the NREL 5M wind turbines. The end goal of the analysis is to determine the structural loading, while using the higher fidelity CFD air-loads in place of the simplified air-loads native to the comprehensive code. Perhaps the first method that comes to mind is to apply the CFD air-loads directly to the structure in the CSD model and time-march the solutions in the codes together. The pure aerodynamic properties are obtained including aerodynamic forces, bending moments and torque on the rotor and tower, the power generated by the wind turbine, as well as the wake effects behind the tower. The structural dynamic calculations are then performed through the CSD code DYMORE 2 based on the unsteady CFD results. The converged CFD aerodynamic air-loads (forces and moments) at all radial stations of each rotor blade for a whole revolution were imported into the CSD code. For this particular implementation of the data sharing, the DYMORE code was modified so that it could read in air-loads appropriately instead of the delta air-loads typically used in the CFD/CSD loose coupling iterative methodology. The current work only considers the one-way coupling and the iterative CFD/CSD coupling between U2NCLE and DYMORE 2 was not used in the present

study. Future work should consider the iterative procedure in order to capture the true fluid-structure interaction, and associated aerodynamic and structural loads.

3. GEOMETRY AND MODEL SETUP

3.1. NREL 5MW Wind Turbine Geometry

The NREL offshore 5MW baseline wind turbine is a conventional three-bladed upwind variable-speed, variable blade-pitch-to-feather-controlled turbine. Figure 1 shows the profile of this reference wind turbine in both upwind and downwind configurations. The wind is going through the blade and tower with the speed of 11.4m/s in the x direction, and the bottom blade pointing to the ground in the z direction, which is considered as blade one at zero degrees azimuth for both three-bladed and two-bladed cases. As illustrated in Figure 2, each blade has a radius of 63 meters, which is composed of eight aerodynamic shapes, which include six airfoils and two cylinders with 13.3 degrees twist angle. The rotor has 2.5-degree pre-coning angle and 5-degree shaft tilt angle. The specific design of the airfoils, associated chord lengths, and aero-twist angles along the blade span direction can be found. The tower height is 87.6 meter, with the top and base diameter of 3.87 and 6 meters, respectively.

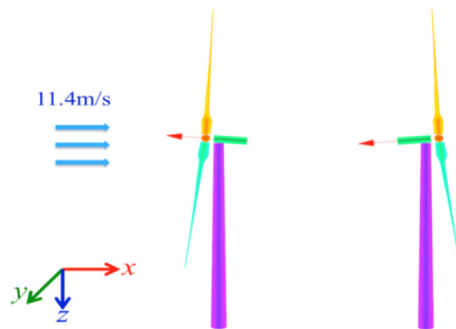


Figure 1 – Configurations of upwind (left) and downwind (right) wind turbines

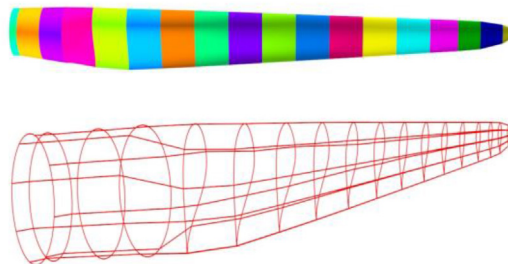


Figure 2 – Wind turbine blade shape with sketch view

All CFD computations were operated at the sea level atmosphere temperature of 15°C, with the pressure of 1.013×10^5 Pa. The NREL 5MW wind turbine has a diameter of 126 meters. The two-bladed wind turbine takes place at a rated rotating speed of 16 RPM, whereas the three-bladed operates at 12.1 RPM. The rated wind speed of 11.4 m/s was chosen in all computations. The pitch angle is zero degrees at 75% span location from the center of rotation corresponding to the rated wind speed. The blade tip Mach number is 0.2346 for the three-bladed configuration, and 0.3068 for the two-bladed. The Reynolds number is 689 million based on the blade diameter and the rotor tip speed for the three-bladed, and 908 million for the two-bladed wind turbine.

3.2. CSD Model Setup

Based on the physical wind turbine geometry and flow conditions of interests, deflections and structural loadings are computed using DYMORE2 in order to study the presence of system resonance, fatigue contributors, and the part physical interference. A CSD simulation of each case was run at the same geometrical and flow conditions with those in the CFD simulations for comparison purposes. Blade pitch was set to zero-degree collective at 75% blade radius. The performance of each configuration was predicted at the design operating conditions, and with no base motion. Figure 3 illustrates the topology of the three-bladed CSD wind turbine model. The tower and blades were all modeled as beams and meshed with 10 third-order finite elements, which are the main subjects of the computational analysis. Other important features in the system performance are the yaw mechanism (modeled as a spring/damper joint attaching the tower to the nacelle), the shaft (also a spring/damper element between the rotation joint and the main revolving joint), and the concentrated mass which is on the opposite side of the yaw joint from the blade assembly to represent the weight of the generator.

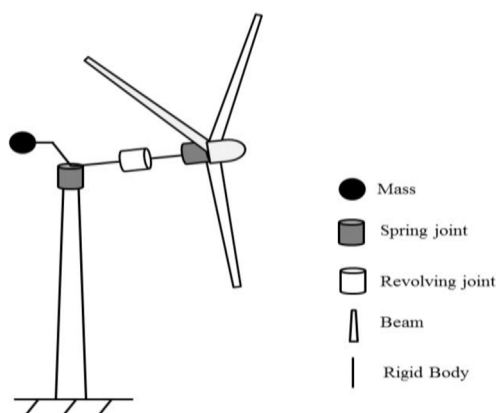


Figure 3 – Wind Turbine CSD model topology

The only difference in the CSD model topology between the three-bladed configuration and the two-bladed is the number of blades, and a teetering joint which was added to the two-bladed wind turbine for both upwind and downwind configurations. Two-bladed wind turbines generally have a teetering hub which mitigates the fluctuating loads, and lowers

the fatigue damage in the drive train. Another advantage of the teetering hub includes the reduction of uneven loads on the blades due to tower shadow. There is a minor difference in mass between the rigid hub of the three-bladed wind turbine and the teetering hub of the two-bladed wind turbine. This difference in mass will be neglected for the purposes of this study.

Property	Value
Blade Mass (kg)	17,740
Rotor Mass, 2bld/3bld (kg)	35,480 / 53,220
Nacelle Counter-weight mass (kg)	240,000
Hub Mass (kg)	58,780
Yaw mechanism stiffness / damping	9.028x10 ⁹ N-m/rad 19.160x10 ⁶ N-m/rad/s
Shaft stiffness / damping	867.6x10 ⁶ N-m/rad 6.215x10 ⁶ N-m/rad/s

Table 1 – Structure lumped parameter properties taken from Jonkman et al.

All wind turbine configurations used the same spring and mass values and locations, and were different only in the blade position relative to the tower and the number of blades. Concentrated mass and spring parameters were held constant for all cases for the purpose of comparing the dynamic behavior among them. The static condition of the wind turbine leaves a tower bending moment because of the nacelle weight distribution that tends to pitch the tower-top assembly rotor-side-down. In the three-bladed case the moment is 1.37×10^6 N-m and the two-bladed case has a moment of the same sense equal to 0.34×10^6 N-m. In all cases the rotor spin vector pointed into the incoming flow. As long as the results are viewed with knowledge of the incorrect setup, it is acceptable for the purposes of this work.

4. Structural Dynamic Analysis

Structural dynamic analysis was performed on the four wind turbine configurations mentioned earlier in this paper. The sectional aerodynamic forces and moments generated from the CFD converged solutions were imported into the DYMORE 2 code for the high-fidelity structural analysis. Simulation run times were between 16 and 19 minutes of wall clock time, using a single computer node. Transients associated with the simulation start-up were substantially gone from the DYMORE 2 results within 10 rotor revolutions. One hundred revolutions were performed in each simulation, with typical results for all cases being taken from revolution 98. For brevity, three-bladed upwind and downwind cases are denoted as 3UW and 3DW, and the corresponding two-bladed cases as 2UW and 2DW, respectively. Results are presented below in the order of rotor performance and blade hub moment, the tower base bending moment, and the wake impact, to gain understanding of aerodynamic loadings and interactions in the wind turbine systems.

4.1. Tower And Joint Dynamics

The towers and joints, being completely identical except for the teetering joint in the two-bladed wind turbine, are considered first. The magnitude and unsteadiness of the

tower out-of-plane displacement, as well as the primary bending moment of the base of the tower reveals differences in the fatigue-inducing loads to the tower. From a fatigue standpoint, the unsteady loading in these components is important in differentiating the four configurations.

As the displacements are shown in Figure 5, at different locations on the tower (50% up, 75% up, and at the tip of the tower) for the three-bladed cases and two blade cases, the two-bladed cases create a larger aerodynamic load and thus higher deflection magnitudes in the wind direction. The downwind cases have greater variations in displacement owing to the larger decrease occurred in the aerodynamic force drop. The primary frequency component present in the two-bladed cases is 4/rev, while the primary component in the three-bladed case is only 3/rev. The frequency of the primary signal is higher in the two-blade case compared with the three-blade case due to the absence of one blade mass on top of the tower. The damping rate of the two-bladed system is greater than that of the three-bladed system; this is a key parameter of a dynamic system and stronger damping gives the two-bladed configurations a strong advantage over three-bladed systems. Another key difference between the two configurations is that the tower experiences more deflection in the two-bladed downwind configuration compared to the three-bladed wind turbine, and also the value of deflection of upwind and downwind in two-bladed case have a distinct difference which is opposite to three-bladed case. This difference is attributed to the unsteady loads, and the fact that the two-bladed rotor mass is much less than the three-bladed. Although both configurations have the same hub mass, designing the two-bladed wind turbine with a rigid hub would be a better way to compare it to the three-bladed wind turbine.

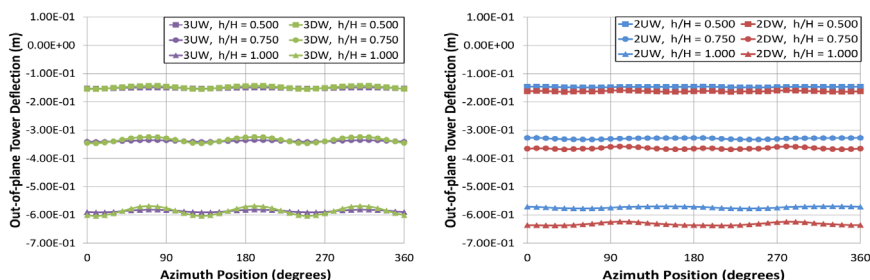


Figure 4 – Tower displacements for 3 blades and 2 blades at three different heights

It is apparent from Table 2 that both tower displacements for the two and three bladed wind turbines increases from 50% up to the tip gradually. However the two-bladed wind turbine produces greater tower deflections than three-bladed by 15% due to the higher RPM. Furthermore, for the two-bladed turbines operating at 16 RPM, the tower displacement is increased by 0.43 m and 0.45 m from 50% along the tower to the tip. Increased tower deflection means high structural loads to the wind turbine, which provides a major design challenge. That means the two-bladed wind turbine will suffer from higher structural loads than three-bladed wind turbine during the operation. To reduce this deflection the tower configuration must be altered.

Configuration	RPM	TowerDisp (h/H=0.5)	TowerDisp (h/H=0.75)	TowerDisp (h/H=1.0)
		Mean(m)	Mean(m)	Mean (m)
UW/3BLD	12.1	0.15	0.32	0.58
DW/3BLD	12.1	0.14	0.31	0.57
UW/2BLD	16	0.16	0.33	0.59
DW/2BLD	16	0.17	0.37	0.62

Table 2 – Tower Displacement in different location

The bending moment's results are shown in Figure 6 at the base of the tower. The three-bladed cases showed lower moments than the two-bladed cases, especially compared to the two-bladed downwind configuration. From the discussion above, this is attributable to increased normal force on the rotor acting at the tower height moment arm for two-bladed case. The variations are 10% of the mean value in the downwind cases, meaning that fatigue analysis of this tower-turbine arrangement should be carefully considered. Critically, none of the configurations have a moment that changes sign due to the nominal variation, which would put the fatigue effect at the highest level. Important differences between the cases are evident in Figure 5, which were omitted in the aerodynamic analysis. Namely, the total aerodynamic effects are combined with weight effects of the nacelle that create different moment magnitudes and directions in each configuration. The aerodynamic hub loading acts at the tower height moment and is the primary contributor to the base bending moment; the unbalanced nacelle moment is small in comparison. The result of the combination is that each setup has a unique fatigue stress ratio that translates into slightly different fatigue stresses and maintenance profiles for the different configurations.

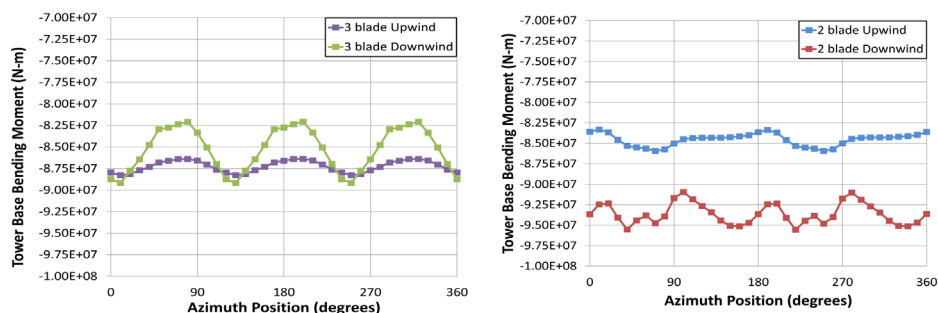


Figure 5 – Fore/aft tower base bending moments for 3 blade and 2 blade cases (CSD)

When comparing Tables 3 and 4, it is clear that the results of the tower base bending moments acquired from CSD have almost the same trend with that from CFD, but the variation of the magnitude has a little different. It is evident from Table 3 that two-bladed downwind wind turbine has the highest peak and mean values for tower bending moments than other three configurations. The two-bladed wind turbines produces higher base bending moments than the three-bladed cases which is due to the higher RPM. Another significant key parameter to notice is that the percentage difference

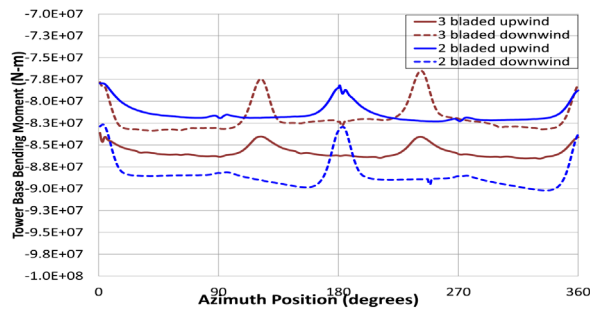


Figure 6 – Fore/aft tower base bending moments for 3 blade and 2 blade cases (CFD)

between the mean and the peak values of the downwind three-bladed is the highest out of all. Additionally, two-bladed wind turbines gets more tower bending moments than that of three-bladed wind turbine. The higher tower bending moments means wind turbines will endure more loads during operation.

Table 4 compares the peak and the mean values of the tower base bending moment obtained from CFD analysis. For the same rotor speed at 12.1 RPM, the three-bladed wind turbines in upwind have higher aerodynamic loads than in downwind on the tower. However, when increasing the rotor speed to 16 RPM, the two-bladed turbines reach almost the same level of base bending moment compared to the three-bladed turbines at 12.1 RPM. In general, the two-bladed downwind case gets the highest mean value and variation of magnitude than that for other three cases. To quantify the effect of the weight, a structural dynamic analysis has to be performed which includes the combination of all aerodynamic forces and structural masses of wind turbine component.

Configuration	RPM	Base Moment (mean) [N*m] *10 ⁷	Base Moment (peak) [N*m] *10 ⁷	(Peak-Mean)/ Mean (%)
UW/3BLD	12.1	8.75	8.64	1.25
DW/3BLD	12.1	8.51	8.22	3.40
UW/2BLD	16	8.48	8.36	1.41
DW/2BLD	16	9.41	9.08	3.51

Table 3 – Comparison of Tower Base Bending Moments(CSD)

Configuration	RPM	Base Moment (mean) [N*m] *10 ⁻⁷	Base Moment (peak) [N*m] *10 ⁻⁷	(Peak-Mean)/ Mean (%)
UW/3BLD	12.1	8.58	8.36	2.62
DW/3BLD	12.1	8.19	7.65	6.65
UW/2BLD	16	8.14	7.79	4.29
DW/2BLD	16	8.85	8.26	6.74

Table 4 – Comparison of Tower Base Bending Moments(CFD)

Considering the tower, the configuration that presents the lowest varying component of the tower base moment is the three-bladed upwind case. The two-blade upwind case has dynamics which swings the base moment to nearly one half that of the three-bladed case; another indicator of undesirable dynamics at work. The low mean value of the two-bladed downwind case is attributable to the fact that the nacelle weight distribution opposes the aerodynamic load from the rotor, whose nacelle-pitching moment comes from the slight upward nacelle pitch, as shown in Figure 6. The three-bladed upwind configuration showed the least fatiguing condition for the beam bending moment. The three-bladed and two-bladed downwind cases loaded the tower the most among all setups. Based on the simulation, these configurations have shown the most negative attributes in terms of tower and blade bending moments. A combination of nacelle weight distribution and aerodynamic loads drive these outcomes.

4.2. Blade Dynamics

Blade dynamics were analyzed for all cases using the CFD air-loads on the rotor blades and DYMORE 2 internal aerodynamics modeling for the tower. Before presenting the comparative results that used these air-loads, the difference between CSD aerodynamic models and higher fidelity CFD-based air-loads will be described along with their effect on the resulting model dynamics. Because a CFD simulation is much more computationally expensive than a CSD simulation, it is important to justify its use and understand the scope of its utility.

Although all wind turbine configurations produce the same amount of power, the loads on the base of the tower and blades are significantly larger on the two-bladed wind turbine. This is because the blades are rotating faster in the two-bladed wind turbine. Figure 7 shows the comparison of the blade hub bending moment for both configurations. The bending moments fluctuate more for the downwind cases due to the uneven loading. The two-bladed wind turbine design reduces weight and cost by one rotor blade, but on the downside the blades experience more bending and fatigue loads that may result in lower power output compared to the three-bladed wind turbine, Figure 8 illustrates the blade unsteady loading variations over one rotor revolution calculated by CFD, this indicated that the downwind turbines generate a larger peak-to-mean variation than the upwind cases. This variation is 30% in the downwind turbines to 5% in the upwind turbines. Furthermore, the upwind bending moments are always larger than those in downwind cases.

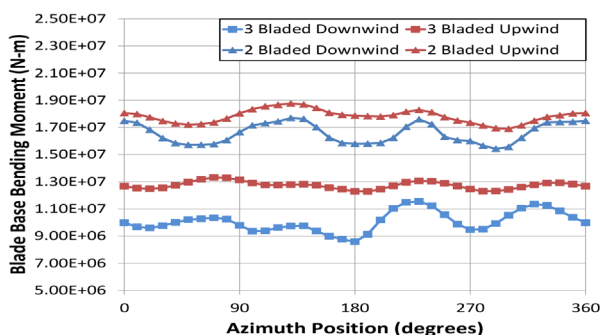


Figure 7 – Blade base bending moments: comparison between 3 bladed and 2 bladed loads (CSD)

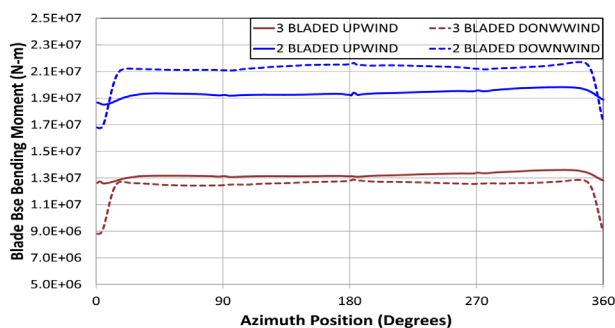


Figure 8 – Blade base bending moments: comparison between 3 bladed and 2 bladed loads (CFD)

When comparing Tables 5 and 6 it is apparent that the results of the tower base bending moments attained from CSD present almost the same trend with that from CFD, but the values of mean and peak bending moments from CSD are smaller. Table 5 describes that two-bladed upwind develops more blade bending moments than other three configurations, peaking at 1.82 N*m. The two-bladed wind turbine produces more blade bending moments than the three-bladed case due to the higher RPM. Another significant key parameter to notice is that the percentage difference between the mean and peak values for the downwind three-bladed is the highest out of all.

Both mean and peak blade bending moments are shown in Table 6 for all wind turbine configurations. It is obvious that the main factor of variation of the blade bending moment is the rotor speed. Furthermore, the bending moment of two-bladed wind turbines is consistent with three-bladed wind turbines when operating at 12.1 RPM, although the two-bladed turbines have a little higher hub bending moment (10%) than the three-bladed turbines. When the two-bladed turbines operate at 16 RPM, the blade bending moment increases by 46-71% in the upwind and downwind cases, respectively, compared to the three-bladed turbines operating at 12.1 RPM.

Configuration	RPM	Blade Moment (Mean) [N*m]*10 ⁻⁷	Blade Moment (Peak) [N*m]*10 ⁻⁷	(Peak-Mean)/Mean (%)
UW/3BLD	12.1	1.34	1.21	8.01
DW/3BLD	12.1	1.26	0.87	9.52
UW/2BLD	16	1.82	1.73	4.44
DW/2BLD	16	1.69	1.58	6.67

Table 5 – Comparison of Blade Bending Moments (CSD)

Blade pitch is another indicator of the degree to which aerodynamics would be affected by deformation-based changes. Figures 11 captures the deflection-induced blade pitching angle changes for the three-bladed and two-bladed setups, respectively. The three-bladed cases both show a mean deflection of about 0.5 degrees, with a +/- one degree variation, while the two-bladed cases show means ranging from 1 degrees to

Configurations	RPM	Blade Moment (Mean) [N*m]*10 ⁻⁷	Blade Moment (Peak) [N*m]*10 ⁻⁷	(Peak-Mean)/Mean (%)
UW/3BLD	12.1	1.38	1.26	4.5
DW/3BLD	12.1	1.29	0.88	29.6
UW/2BLD	16	1.94	1.85	4.6
DW/2BLD	16	2.12	1.67	21.2

Table 6 – Comparison of Blade Bending Moments (CFD)

1.5 degrees, and variation of 1.2 degrees. Following the common system behavior, a 3/rev signal features prominently in the three-bladed downwind setup and a 4/rev signal in the two-bladed downwind setup. The swings are important in affecting the angle of attack along the length of the blade. Additionally, the swings seen in the downwind pitch deflection results are relatively small but rapid, meaning that there could be an important aerodynamic effect as a result of deflection.

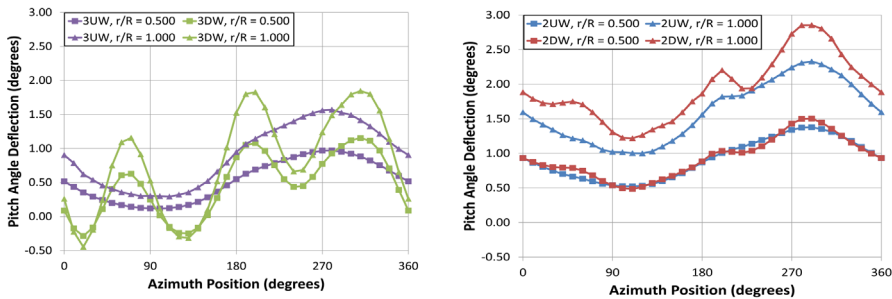


Figure 9 – Pitch displacement history for 3UW (purple) and 3DW (green) configurations at two blade locations

Table 7 shows blade tip pitch displacement of all wind turbine configurations. In general, the downwind configurations presented the highest variations in magnitude, this is owed to the unsteady loads and the presence of the tower. The mean pitch displacements for the three-bladed upwind and downwind configurations were much closer than that of the two-bladed.

For considerations in future studies, one important finding here is that the blade deflections computed by DYMORE2 are large enough that employing an iteratively coupled process may be necessary to ensure that the air-loads are properly captured. Because the rotor configurations were structurally similar across the four different model setups, no qualitative difference in blade dynamics was observed. Finally, the downwind blades showed slightly lower mean out-of-plane and pitching deflections than the

Configuration	RPM	Pitch Disp (Mean) (deg)	Pitch Disp(Peak) (deg)	(Peak-Mean)/ Mean(%)
UW/3BLD	12.1	1.0	1.6	60
DW/3BLD	12.1	0.9	1.7	88
UW/2BLD	16	1.6	2.3	43
DW/2BLD	16	1.9	2.8	47

Table 7 – Comparison of blade tip pitch displacement

upwind counterparts. Of course, lower deflections mean the aerodynamic performance will be near to what was intended with the under-performed configurations. With the rotor hub set 5 m upstream of the tower, a 5° nacelle pitch and a 2.5° coning angle, the tower clearance is 11.2 m at the blade tip. Some computed deflections are above 8.0 m and are a tower strike risk. Blade properties and design considerations must be taken into consideration to lower these values.

5 Conclusions

Four NREL 5MW offshore wind turbine configurations were numerically investigated using the high-fidelity CFD and CSD codes, U2NCLE and DYMORE2, which included the upwind two-bladed 16 RPM and three-bladed 12 RPM designs, and the downwind two-bladed 16 RPM and three-bladed 12 RPM designs. Aerodynamic analyses were performed on the rotor power and blade bending moment, the tower base bending moment, and the turbine wake flow on a separate paper. Structural dynamic analyses of the same wind turbines were performed in the present study using the high-fidelity CFD air-loads on rotors and internal aerodynamic models of the CSD code on the tower. The coupling between the CFD and CSD air-loads resulted in more accurate and precise results. The following concluding remarks are given in the current study:

1. The number of rotor blades had the largest impact on the wind turbine performance. To match the rated power as the three-bladed turbines, two-bladed turbines have to increase the rotor speed, resulting in sizable increases of blade bending moments and displacements comparing to the three-bladed counterparts.
2. The wind turbine rotor orientation had a smaller impact on the mean rotor power and mean blade bending moment, but the downwind turbines produced the largest impulsive loads on the rotor blades and the tower, because of the tower shadow through which the downwind blades pass.
3. The three-bladed upwind configuration showed the least fatiguing condition for the tower bending moment, and the second least fatiguing environment for the main rotor shaft. The three-bladed downwind case loaded the tower the most among all setups, and showed a very large swing in shaft deflection.
4. The out-of-plane tip blade deflection for the two-bladed configuration, both upwind and downwind were above 8 meters. This value is quite big and must be lowered by altering the blade properties.

5. A drawback of the two-bladed wind turbines is that the tower and blade base bending moments are higher than in the three-bladed setup. This can lead to faster blade fatigue and loss of power level.
6. CFD-based simulations captured the critical aerodynamic phenomena that were lost on the internal aerodynamics of the CSD code. Thus, inclusion of the CFD air-loads is important for an accurate evaluation of the dynamic excitation and subsequent system responses.

Future efforts should investigate the change of blade properties to lower the blade deflection and bending moment for the two bladed wind turbines. Inclusion of the uneven inflow that results from the Earth's boundary layer could be an important design consideration and should be studied in order to understand the difference between offshore and land-based wind turbine dynamics.

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Architecture and Design Methodology of On-chip Debug Module for Multi-cores System

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Abstract: This paper not only proposes an architecture description but also presents design methodology of on-chip debug module aiming at multi-cores system. Through the internal priority register setting, different cores can be set with or without different priority level, by which the different debugging structure can be realized. Internal arbitration mechanism either handles the competition between different master cores having the same priority level to access the same slave cores, or decides the access order for different master cores with the different priority level. All these techniques are integrated to make the on-chip debugging operation more efficient and flexible.

Keywords: on-chip debug, arbitration, priority setting, multi-cores system

1. Introduction

Due to the development of integration technology, more and more electrical system consists more than one highly integrated microprocessor (cores) (Ranger, 2007; A Ben, 2010; Rusu, 2014). Along with such development, the complexity of the whole system and increasing levels of integration results in novel challenges for the development of debugging methods. For single microchip system, some dedicated circuits which having on-chip debug function would be used to gain access to some of the processor's internal state, and the information will be communicated via serial interface such as JTAG(KD, 2003; M., 2000).

Current on chip debug focus on single core system, cannot respond to the development of multi-cores system. This paper propose a high performance on-chip debug solution, consisting of architecture and design methodology, which not only including traditional on chip debug features for single core but also having some specific features for multi-cores system. The debug support has been developed to support a number of 8-bit, 16-bit, and 32-bit microcontrollers. The essential issue is the trade-off between generality and performance. Generality provides reusability, and while performance (delay, cost, power, etc.) is achieved. The final objective is with such module, a full and more flexible multi-cores debug system with high performance would be built and used easily.

2. Debug support realization

2.1. How to realize on-chip debug

The typical on-chip debug device is using some dedicated facilities to gain access to some of the processor's internal state, and these devices usually a serial debug interface (like JTAG) to communicate between the processor and the host computer (Zhang, 2013; Wang, 2011). In contrast to it, this paper presents one method which only some SFR (special function register) needed to realize the main debugging functions such as single step operation, breakpoint, etc. The definition of such SFRs determines the debugging mode, that under which conditions the debugging function will be triggered.

Once pre-setting conditions are satisfied, the operation of processor is paused and move into debugging mode, the control of system will be transferred to the on-chip debug module. During the debugging mode, the information that required would be recorded and sent out. After the debugging work finished, some external stimulus sent to microprocessors to make it work continually from the paused point. The additional pins would remain hidden otherwise and be controlled by the software developer.

2.2. Arbitration mechanism design

For multi-cores system, the microprocessors may run independently, therefore, the arbitration mechanism is critical for some cases which more than one microprocessors send debugging request to the same target microprocessor. The internal on-chip arbitration mechanism is proposal to ensure that only one master have access to the target microprocessor at any one time. The main principles of judgment as follows:

1. The internal on-chip arbiter perform the function of observing the debugging request from different master microprocessors and deciding which one is the highest priority master.

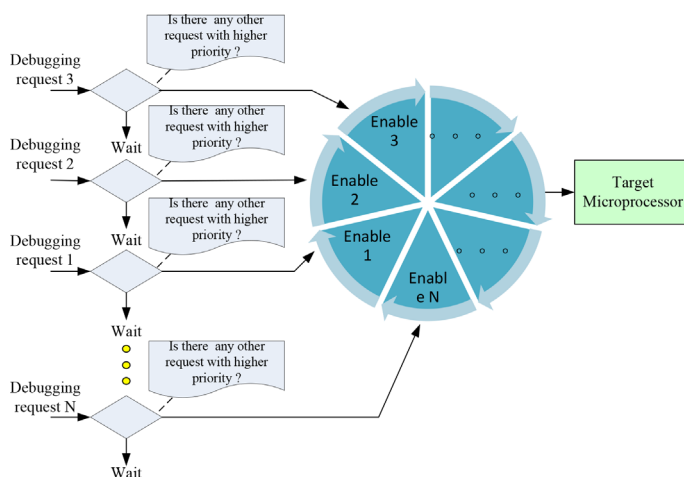


Figure 1 – Internal arbitration mechanism

2. If the requests with different priorities: the request with higher priority win the control of the target microprocessor, the request with lower priority should be wait till the higher finished;
3. On the other side, if the requests with the same priority: According to the classical Round-robin arithmetic (M, 1996; S, 2009), the internal Round-Robin mechanism would be applied that the request would get the equal opportunity to get the control of the target microprocessor. If one request wins, the others should wait the debugging finished.

As Figure 1 shows the Round-Robin switch selects the request from different microprocessors which having the equal priority one by one, after the judgment if there is higher priority exist. The other debugging request should be forced to keep in waiting state if any request having higher priority exists, and the cycle repeats.

3. Usage and setting of priority

3.1. why priority setting needed

The Select the system topology is the first step in designing a multi-cores system cause the performance of multi-cores system depend heavily on the strategy of selecting the structure of multi-cores system.

As (William, 2004) describes, the topology is largely choose based on the cost and performance. The cost and performance are determined by the number of cores and the complexity requirement to realize the system, therefore, different multi-cores system has the different topology.

Different applications based on multi-cores system leads to different structure requirements, thus the primary target of our design is providing a flexible on-chip debug module which would be adjusted according to the multi-cores system architecture.

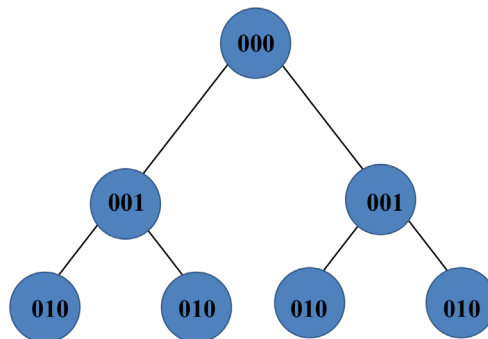


Figure 2 – Tree structure after priority setting

In our design, one agile method – different priority setting was used. The overview of processing of different priority setting as follows:

1. Firstly, all the cores are regarded as equal before the priority setting, therefore, from the perspective of debugging, now the whole system is flat, no master cores or slave cores.
2. Then through the internal priority register setting, the cores under debugging can be divided into different groups with different debugging priorities. Apparently, for cores with lower priority, the higher one is act as master which control the debugging processing.
3. After priority setting, from the perspective of debugging, the whole system becomes hierarchy now. One issue arises when more than one cores with the same priority sending debugging requests to the same slave core, in such cases, some arbitration mechanism are needed which is described in the “arbitration” section.
4. The number of bits pre-defined in debugging special function register decides how many possible combinations on priority levels we have in our multi-cores system debugging process. For instance, if 3 bits were used, then we would have 8 possible priority levels which from 3'b000 to 3'b111.
5. With debugging priorities setting, the different cores can be get different or the same priority level; therefore, the debugging structure can be freely adjusted according to the practical applications. Take tree structure as example, as depicted in Fig4, this suggests a model in which some individuals (salve cores) are grouped at the bottom as leaves, with their “root” at the top.
6. And for the special case if all the cores having the same priority, then the network structure would be built up. The debugging transfer will be realized efficiently and freely between all the cores based on the routing mechanism.

3.2. Definition of debugging special function register

On-chip debug system constructs the integrated entity that comprises hardware and software together. The on-chip debug capability provides functions as breakpoint, single stepping, and external breaking, etc. Either internal or external breaking is treated as a special form of interrupt.

When implemented, the on-chip debug logic is part of the actual microprocessor silicon, the on-chip debug system provides the means to set the internal or external breakpoints, checking the internal states of the cores, and single step through coding the special function registers.

The definition of special function register for on-chip debug includes three mainly parts as follows:

- Enabling/Disabling on-chip debug system;
- On-chip debug mode setting;
- Debugging priority setting;

The format of command includes all the above information that is sent from master cores as depicted by Figure 3.

The debugging mode decides which debugging function is selected among internal breakpoint, external breakpoint, single stepping or other debugging functions. If internal breakpoint mode is select, the source between special SFR or particular address comparing with target value set in breakpoint register can be further selected. And the

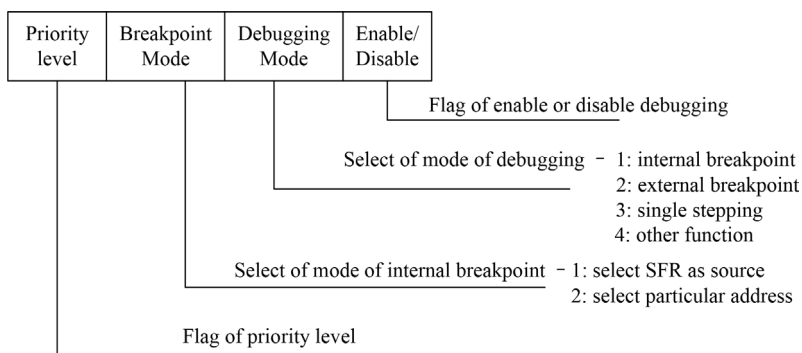


Figure 3 – Debugging command format

last but the most important part is flag of priority level which gives a clear sign of priority level, and the principle is as the number increase, the priority level decrease, which means all zero get the highest priority.

4. The debugging Operation process

4.1. Hardware structure

The on-chip arbitration is designed to be used as a central multiplexor; such structure was widely used such as ARM protocol [10]. Based on the internal arbitration mechanism,

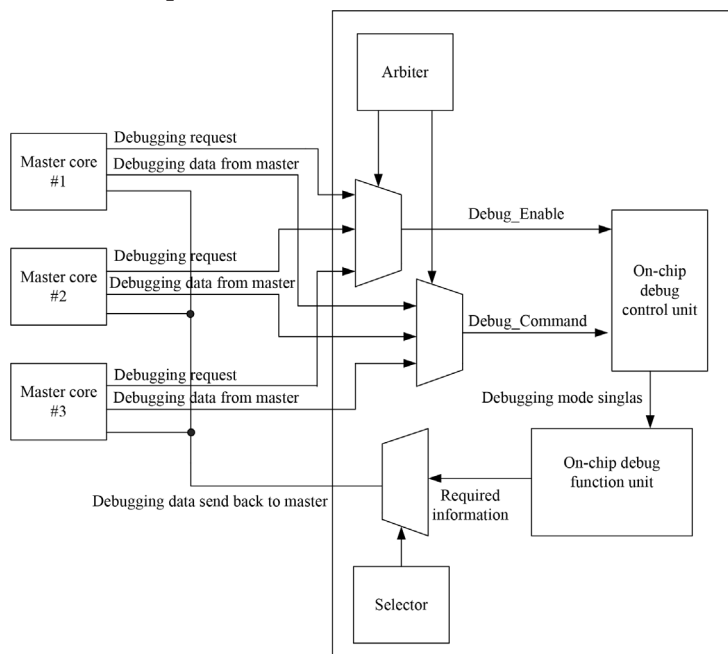


Figure 4 – Hardware structure

the hardware structure as Figure 4 shows, all the master cores (microprocessors for example) drive out the debugging requesting singles and debugging commands indicating the debugging transfer they wish to perform and the on-chip arbiter of slave core determines which requesting is granted. Figure 6 illustrates the hardware structure required to implement the on-chip debugging aiming at multi-cores system with three master cores and one slave core.

4.2. Overview of debugging operation process

From the perspective of debugging, the microprocessors in multi-cores system can be categorized into two types – debugging core or target core, the debugging core act as master and the target core as slave in the system. The protocol is designed to be used with a central multiplexor interconnection scheme. Using this scheme all the debugging cores (masters) drive out the control information indicating what's debugging work they wish to perform to the central arbiter, then through the internal mechanism, the arbiter determines which master get the control of the debugging of the slaves.

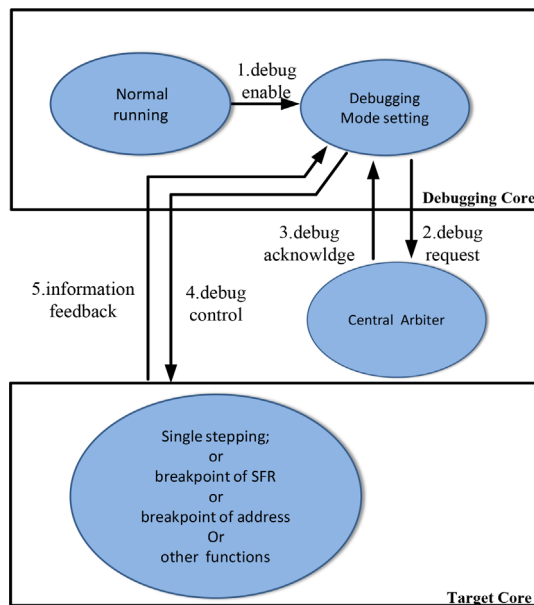


Figure 5 – Debugging operation process

As Fig. 5 shows the detailed operation process of debugging, the completely debugging process having 5 steps:

1. Step1: If the required debugging conditions triggered, the normal operation of debugging core (as master in the whole debugging process) is paused, and the system is getting into debugging mode;
2. Step 2: Through the setting of debugging mode, the debugging control information is available which including address of target cores (slave), and is drive out to the arbiter;

3. Step 3: Before the debugging work commence, the debugging core must be granted. This process is by the debugging core asserting a debugging request to the central arbiter, the role of the central arbiter is to control which master access to the target core (slave). For the detailed arbitration scheme, please refer to section of “Arbitration mechanism design”.
4. Step 4: A granted debugging core starts the debugging work by driving the debugging control information to the target core. The control information leads the target processor into debugging mode such as single-stepping, breakpoint of SFR, breakpoint of address, etc.
5. Step 5: The significant advantage of on-chip debug is to provide an efficient way to know the real-time state of processor under debugging. After the target processor is forced into debugging mode, the operation of processor is paused, and the specific area such as some SFRs, Memory, etc. is recorded. And these information are send back to debugging core which decide the next step.

5. Simulation result

The experimental multi-core system platform was implemented which having four 8051 microprocessors.

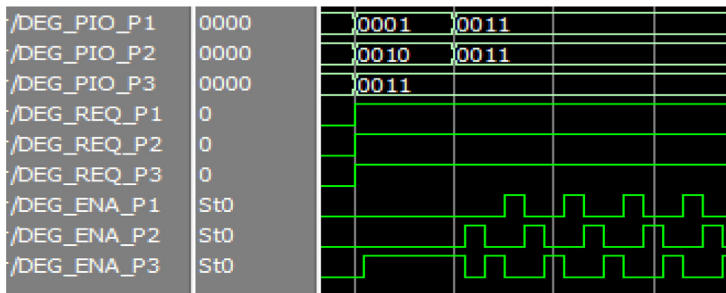


Figure 6 – The arbitration test

5.1. Priority setting and arbitration test

During test, three microprocessors were acting as master which sending out the debugging request and one microprocessor as slave inside which the internal arbitration function unit decides the order of debugging procedural.

The simulation result in as Fig.6 shows that if debugging request with different priority level to the same slave, then the microprocessor with higher priority level wined the competition; and if priority level are the same, then the debugging request followed by the round-robin order one by one.

5.2. Verification of on-chip debug function

The value of breakpoint register is set as AAH; the value of ACC register is 00H; DBG_CMD which is the instruction register to designate the operation mode, values 41H here.

According to instruction register, the operation mode is set as SFR breakpoint mode; the breakpoint of SFR is ACC; the deferent SFR is ACC.

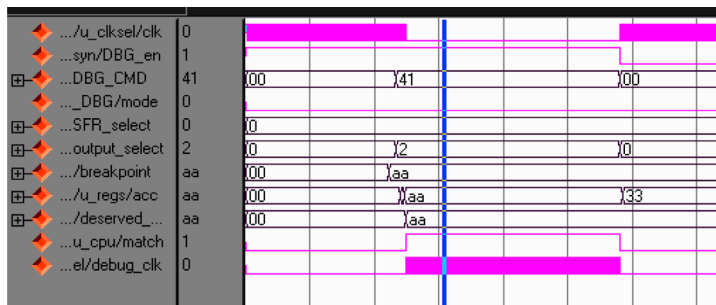


Figure 7 – On-chip debug function test

We can conclude from Fig.7 that when the pre-defined condition is satisfied (in this case, it means When the value of ACC matches the value of the breakpoint), the on-chip debug function triggered, and the debugging process begins.

6. Conclusion

From the available results it is possible to conclude that the proposed on-chip debug module is an efficient and flexible solution for verifying and validating multi-cores system. Besides characteristics of on-chip debug which can also be presents on single-core system, efficient management and communication of debugging procedural between different cores is realized by the priority setting and internal arbitration mechanism. And with these methods, the debugging structure could be freely choose and modified according to actual applications.

The simulation results show such on-chip module can easily be implemented to multi-cores system with 8051 microprocessor. Such compliance provides a common basis for development and debugging methodology.

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Empirical Analysis on the Influencing Factors of Price Fluctuation in Xinjiang Unginned Cotton Trading from the Weather Perspective

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Abstract: Agricultural products trading price has obvious regional characteristics, the subsidy policy changes with the region, wheat, corn, cotton, soybeans and other major producing areas of the transaction price has become the key to determine the policy subsidy funds. Cotton price target to carry out the pilot reform work in Xinjiang in 2014, cotton trading price become the core factor to cotton subsidies. In order to study the factors affecting the price fluctuations of cotton trading price, we choose the meteorological environment as an important variable, and starting from the factors of trading volume, trading level, cotton trading intermediary and regional difference. Based on the empirical analysis, the result shows that meteorological environment has significant impact on the trading price of cotton, intermediary transactions standardization is conducive to seed cotton trading price stability, the southern and Northern Xinjiang regional differences showed obvious difference in price, quality and seed cotton trading volume and trading prices showed obvious positive correlation.

Keywords: Transaction price, Transaction intermediary, Regional difference, Meteorological environment

1. Introduction

Chinese region formed different main agricultural areas, the agricultural products transaction price is the focus of each area of concern in the field of agricultural production, agricultural products prices not only by the influence of various economic factors, changes in weather conditions influence on the agricultural product transaction price exists objectively (Nelson, 2014; Fernández, 2015). But the existing research mainly focused on the economy the factors and the social environment influence on the prices of agricultural products, the price fluctuation caused by meteorological environment changes and not too much attention (Ferris, 2005). The meteorological environment has obvious regional characteristics, in order to explain the problem, this paper selects Xinjiang and its main crop seed as the research object of this paper.

With the 2014 target price reform pilot in Xinjiang since the implementation of cotton trading price fluctuations, increase cotton farmers' transaction risk. Found in the actual investigation, the target price reform pilot work carried out after the correlation between

the purchase price and the cotton seed cotton ginning factory trading level to further enhance the quality of cotton and cotton is not only affected by the growth period (from emergence to the first mature boll opening, growth period, about 120 days) on meteorological conditions, in the cotton boll opening period (from the beginning to the end for receiving flowers opening boll period) between the meteorological environment will also affect the quality of cotton. If the influence of various factors ultimately reflected in the price changes, then the degree of meteorological environmental impact on the trading price of cotton is? Due to the vast area of Xinjiang, there is a huge difference between the north and South Xinjiang natural environment and human conditions, in the cotton trade links, have spawned a variety of intermediary organizations, and Seed cotton intermediary transactions whether there is conducive to seed cotton trading price stability? Whether the cotton trading price formation in South and North Xinjiang regional differences are obvious different? In order to study the above problems, the Xinjiang cotton price data using October 2014 to December, and combined with the detailed meteorological observations form data samples; first determine the related indexes influencing factors of cotton prices, with the meteorological environment (temperature, rainfall, wind level), the quantity of the trade, intermediary, Xinjiang, North and South cotton trading level; then through the construction of the influence degree of the quantile regression model and OLS regression model for quantitative analysis of various factors in the model; finally based on the analysis results of summing up cotton transaction price operation characteristics, and combined with the target price reform pilot opinions put forward countermeasures to improve the subsidy plan.

In the field of agricultural economy, the previous studies mainly focus on the impact of economic environment on agricultural production, often ignoring the natural environment and agricultural price fluctuations in the link between. Most of the literatures focus on the analysis of the trading price of cotton (Goreux, 2007), the interaction mechanism between the factors related to research and Chinese cotton market price fluctuations, the international cotton price changes China found leading cotton price change; research on the Xinjiang cotton market is mainly concentrated in the income, industrial competitiveness, comparative advantages, environmental advantages and technical conditions etc.; research on the cotton target price reform work, some scholars of the existing pilot target price reform problems and suggestions are given a systematic explanation, and to estimate the price of cotton from the cotton price target, cost rate of return angle simulation.

The foreign research focused on macro meteorological environmental impact on agricultural production (Goodwin, 2005; Meyer, 2008), Nelson et al based on agricultural production model from the angle of the influence of the weather, a comparative analysis of the measurement model and the parameters of the existing research, introduces the result of climate change and potential determinants, and focuses on the analysis of the model parameters in the past in the study of interpretation ability (Plato, 2005; Olga, 2009). Francisco & Blanco by the economic impact of climate simulation, empirical research on the global and European analysis, found that the overall results of existing research in spatial memory than the small area in significant differences, and these differences make the model explain ability.

To sum up, the research on the price fluctuation of bulk agricultural products is less affected by the weather. As the main producing district China production prices of

agricultural products and other regional disparity is an objective existence, and regional characteristics of agricultural product price fluctuation is strong, in order to make the interpretation of the model parameters are stronger, we will study the area down into specific regions of Xinjiang, and its main crops of cotton as the starting point.

2. Data sources and model construction

2.1. Data sources

The observation data are mainly concentrated in the various prefectures in Xinjiang County, effective transaction data from Xinjiang 24 counties, 13 counties in southern and Northern 11 counties, obtained the transaction data is 1140, the basic information of each variable are shown in table 1. The time for sample data collection was: “October 3, 2014” to “December 14, 2014”.

variable	classification	count	Percentage	mean value	S.D.
transaction price of cotton	2.7-4.15 yuan/kg	32	2.80%	5.96	1.08786
	4.15 -5.3 yuan/kg	227	19.90%		
	5.3 -5.96 yuan/kg	341	29.90%		
	5.96 -6.7 yuan/kg	442	38.80%		
	6.7 -9.34 yuan/kg	98	8.60%		
Cotton trading volume	0-16777.58kg	761	66.80%	25609.65	47470.66
	16777.58kg-25609.65kg	104	9.10%		
	25609.65kg-35423.06kg	57	5.00%		
	35423.06kg-600000kg	218	19.10%		
North and South Xinjiang	South =1	740	64.90%	0.65	0.477
	North =0	400	35.10%		
Intermediary	Yes(Producer)=0	476	41.80%	0.58	0.493
	No(Brokers, growers + cooperatives, companies, processing plants)=1	664	58.20%		
Cotton trading level	3128=1	933	81.80%	3.01	0.585
	3129=2	55	4.80%		
	2128=3	20	1.80%		
	2129=4	91	8.00%		
	Long-staple cotton =5	41	3.60%		
Temperature		1140	100 %	12.81	6.58206
Rainfall weather	Yes=1	1010	88.6%	0.114	0.31799
	NO=0	130	11.4%		
wind power	Greater than 3 level=1	313	27.50%	0.2746	0.44649
	Less than 3 level=0	827	72.50%		
Total		1140			

Table 1 – Basic data information

2.2. Model building

1. Variable settings

Temperature($temperature_i$): In general, the cotton picking needs to continue for a long time, in this period of time, the weather outside environment change will affect the quality of cotton grade, when the temperature is too high, the seed cotton in cottonseed oil will lead to cotton, yellowing, reduce its quality level; therefore, the suitable temperature is conducive to cotton picking and smooth transaction for.

Rain($rain_i$): Cotton fiber is very sensitive to water, when the rain and snow weather, if you are not able to remove moisture timely, can also cause cotton color yellow, the lower the quality, but in the cotton picking period, in the rain and snow weather situation, showing sporadic characteristics, even if there is rain, has little effect on the quality of cotton in grade sunny conditions. If there is persistent rain and snow weather, it will seriously affect the recovery process of the seed, causing a serious impact on the level of cotton. Observation rainfall weather value is only 130 in the overall sample, accounted for only 11.4%; and the total sample of 740 data concentrated in the southern region, so the rain and snow weather effects on seed cotton price need to combine the model results further illustrate. But we need to pay special attention to explain, because for rain, snow and other weather data sample ratio of only 11.4%, in this case, will affect the farmers to sell seed cotton ginning factories and processing progress, in reducing the supply situation, cotton ginning factory in order to meet the processing capacity, with the objective to raise prices will.

Wind power rating($wind_i$): When the blowing sand and floating dust weather, the emergence of a large number of impurities in cotton fiber, the impurity removal requires a lot of procedures, but also cannot be guaranteed to be completely removed, when the impurity rate is high, the quality of cotton grade decreased; when the wind level is too high, there will be a variety of debris, increase the content of heterogeneous fiber cotton fiber, reduce the quality of cotton; through the actual investigation found that wind has three levels, the effect gradually highlights. Therefore, the wind is higher than the “3” situation is set to “1”, the other is set to “0”.

Transaction intermediary($agency_i$): Found in the actual investigation, some farmers by means of transport, their own conditions and other factors, often need the help of “intermediary” finished cotton trading, there are four main types of transactions subject to the actual observed: brokers, farmers + cooperatives, companies, processing factory. Seed sell process, in the name of the company, factory purchase intermediary will help farmers to complete the transaction process, and directly to the fields of seed acquisition. “Farmers to plant cotton sold” and “to the fields of acquisition between quantity and price in the transaction are significantly different. Therefore, this article only defines the behavior of farmers to sell the cotton ginning factory as a “non intermediary”, define the behavior of the acquisition process for “intermediary exists”. The definition of “producer” transaction completed by itself as a “non intermediary” transactions subject to other definitions for the behavior of the “intermediate seed acquisition”.

Regional differences between the north and the south(nj_i): Xinjiang cotton area is far higher than the northern, southern and Northern Xinjiang due to different natural conditions, social structure and national situation, the southern and Northern cotton

trading prices appear bigger difference. Through the analysis of statistical data, the average price in the transaction is 6.15 yuan /kg, the average transaction price in the 5.61 yuan /kg, Xinjiang cotton trading price was significantly higher than that of Xinjiang, and this is related to the southern and Northern Xinjiang cotton quality difference, southern drought, special natural environment more conducive to improving the quality of cotton.

Cotton trading ($grade_i$): Effect of high grade cotton to cotton trading price of the large cotton trading price formation was significantly higher than other grades of long staple cotton, low grade cotton effects on seed cotton price is uncertain. Through the cross analysis found that the same length of different grades of seed cotton price gap is smaller. In addition to cotton outside, the average transaction price of 2128, 2129, 3128, 3129 seed cotton was 6 yuan /kg, 5.79 yuan /kg, 5.96 yuan /kg, 5.71 yuan /kg, of which 2128 and 3128 grade cotton average transaction price gap is not big, the 2129 and 3129 seed cotton trading price is close to that in the case of different grades of cotton the same seed cotton, cotton length average transaction price is close to the cause of this phenomenon is the main reason for the acquisition process of cotton ginning factory “deeply demand” is a common phenomenon.

Cotton trading volume ($volume_i$ and $lnvolume_i$): The target price mechanism, ignored specific transaction price subsidies for farmers to get the amount and individual farmers, all farmers to obtain subsidies standards, resulting in subsidy funds allocated to make the number of transactions in larger groups benefit more, the price of this part of the population is higher than the average market price of the price recovery period, a large number of transactions the utility will get subsidy funds trading groups was significantly higher than the number of transactions in small groups.

2. Model building

Based on the above analysis, the dependent variable is the seed cotton trading price situation, construction factors affecting seed cotton price analysis model for this transaction:

$$price_i = a_0 + a_1 lnvolume_i + a_2 temperature_i + a_3 rain_i + a_4 wind_i + a_5 agency_i + a_6 nj_i + a_7 grade_i + \varepsilon_i \quad (1)$$

In this paper, OLS regression analysis and quantile regression analysis are used in the study, and their coefficients are compared. The study found that OLS regression analysis can't be used to describe the distribution of the trading price of cotton. Quantile regression method from different points on the analysis of the problem, a more detailed description of the conditional distribution, the analysis of the results of the interpretation ability is stronger. In order to investigate the influencing factors of cotton trading price on different quantiles, the quantile regression model is established as follows:

$$Q_q(price_i | X_i) = X_i' \beta_q \quad (2)$$

In formula (2), the independent variable X_i , β_q is the coefficient vector; $Q_q(\text{price}_i|X_i)$ the conditional quantile corresponding to the points ($0 < q < 1$) in a given situation. The corresponding coefficient vector is achieved by minimizing the absolute deviation:

$$\beta_q = \arg \min \left\{ \sum_{i: \text{price}_i \geq X_i' \beta} q | \text{price}_i - X_i' \beta_q | + \sum_{i: \text{price}_i < X_i' \beta} (1-q) | \text{price}_i - X_i' \beta_q | \right\} \quad (3)$$

In the actual process of analysis, this paper adopts bootstrap algorithm technology intensive quantile regression coefficients were estimated, and the sampling frequency is set to 400, that is to say by constantly with confidence interval sampling and sample, thus to infer the coefficient.

3. Empirical result analysis

3.1. Quantile regression results

This paper uses the bootstrap method to the seed cotton trading price quantile regression. The coefficient of sample variables in each quantile show different characteristics, so this paper chooses 9 percentiles, respectively is 0.1, 0.2, 0.3, 0.4, 0.50, 0.6, 0.7, 0.8, 0.9, 0.90, for comparison, also lists the results of OLS, as shown in table 2.

3.2. Quantile regression results chart

In order to further explain the effect of various factors on cotton trading prices, coefficient changes will be quantile regression by Figure 1 lists in detail, and combined with the analysis in figure 1.

3.3. Quantile regression analysis

1. Cotton trading volume. With the increase of quantile, the number of transactions on the trading price of seed cotton influence showed the first decline after rising “type U” trend, the trade expansion is obvious in cotton trading price promotion function. In the 10 to 80 quantile, influence the number of transactions on transaction price is relatively stable, after 80 quantile the coefficient fluctuated, in the 90 sub sites near the coefficients show the trend of rapid rising and falling rapidly, at sites close to 100, the number of transactions on the trading of cotton seed cotton effect the price increase decreased rapidly. Through the actual investigation found that the main reason is: after picking cotton can be stored in cotton ginning factory, such as high transaction price in cotton trading settlement, farmers are very sensitive to changes in the price of cotton trading, with cotton trading prices rise, farmers will be considered in its own right price a lot of seed node transaction, which makes the farmers have certain selectivity to the seed cotton price, the transaction price is high cotton trading volume will be significantly increased; another reason is the high price of cotton at the site are basically the goods long staple cotton, strong rigid demand leads to the high price.
2. Meteorological environment

Quartiles		LOG(VOLUME)	TEMPERATURE	RAIN	WIND	NJ	AGENCY	GRADE	C	Pseudo R ²
OLS	coefficient	0.120912	0.054739	0.183379	-0.305942	0.572888	0.29571	0.100008	3.557393	0.2807
	SE	0.015769	0.004259	0.094068	0.064899	0.062987	0.05699	0.026544	0.154941	
q=0.1	coefficient	0.05681**	0.074992***	0.404495***	-0.214908***	0.402302***	-0.208914***	0.013201	3.514	0.2792
	SE	0.024746	0.00648	0.103236	0.059638	0.080282	0.057271	0.027364	0.29438	
q=0.2	coefficient	0.026469*	0.061015***	0.308952***	-0.191293***	0.306515***	-0.155622***	-0.041294	4.298676	0.2221
	SE	0.014161	0.004008	0.091279	0.04082	0.063369	0.044388	0.035192	0.168611	
q=0.3	coefficient	0.011966	0.060707***	0.312196***	-0.22915***	0.271158***	-0.059459	0.048777	4.469895	0.1937
	SE	0.012744	0.002858	0.081715	0.046264	0.050944	0.045271	0.036838	0.121685	
q=0.4	coefficient	0.028964**	0.057113***	0.280425***	-0.178569***	0.229625***	-0.04757	0.060303***	4.484092	0.1732
	SE	0.011827	0.003631	0.060914	0.041242	0.059591	0.043138	0.021156	0.106781	
q=0.5	coefficient	0.040185***	0.050331***	0.220739***	-0.217817***	0.174658***	-0.028537	0.034532*	4.698237	0.1489
	SE	0.011453	0.003558	0.059982	0.034737	0.041291	0.035997	0.017921	0.110496	
q=0.6	coefficient	0.039368***	0.045746***	0.217696***	-0.29455***	0.184386***	-0.009471	0.045768**	4.876557	0.1207
	SE	0.008118	0.003941	0.054238	0.034629	0.042728	0.040758	0.022453	0.101686	
q=0.7	coefficient	0.046691***	0.037553***	0.202834***	-0.286281***	0.243207***	0.049635	0.033107	4.991757	0.0959
	SE	0.01178	0.004446	0.064145	0.046681	0.048133	0.0581	0.023596	0.12487	
q=0.8	coefficient	0.093341***	0.034277***	0.181155*	-0.190993**	0.463689***	0.327679**	0.013218	4.626266	0.0929
	SE	0.030174	0.006999	0.09525	0.076678	0.085979	0.134582	0.083917	0.327733	
q=0.9	coefficient	0.223057***	0.022772*	-0.048428	-0.132091	1.013556***	1.100304***	0.099958	3.654523	0.3008
	SE	0.037655	0.01221	0.185814	0.13853	0.120641	0.18342	0.075786	0.239389	

Note: *, **, ***, respectively, expressed in the 1%, 5%, 10% level significantly; the estimated value through the bootstrap method to get the 400 iteration

Table 2 – Cotton price quantile regression coefficients

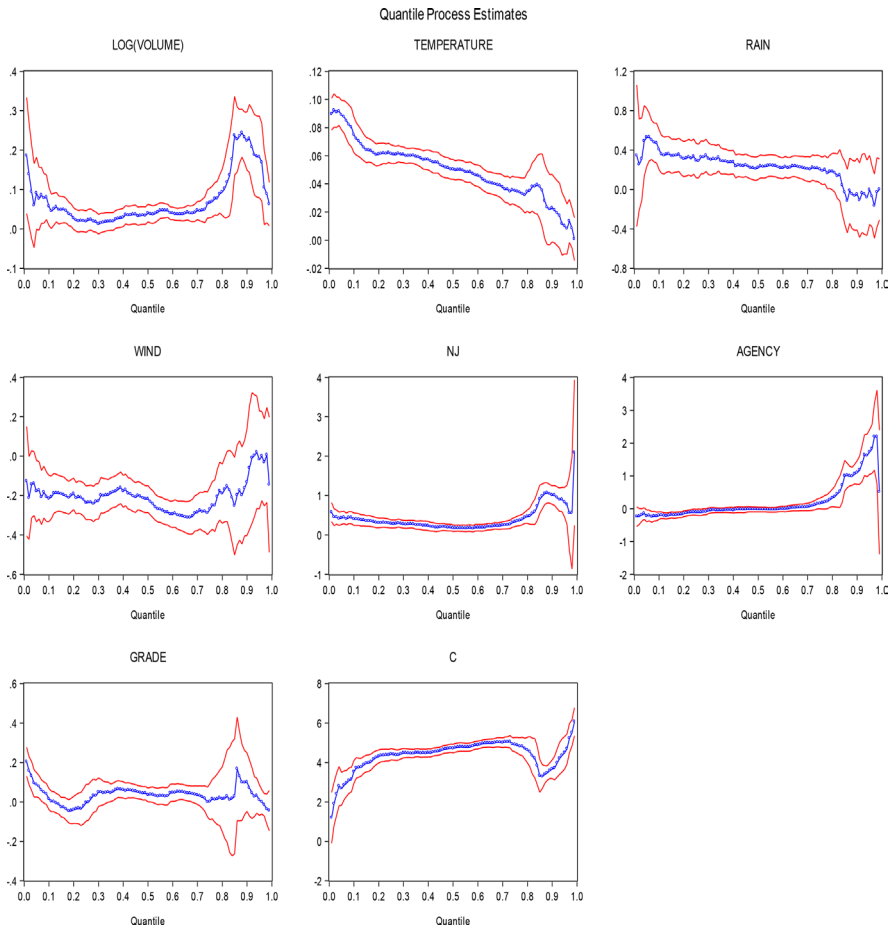


Figure 1 – Cotton price quantile regression coefficients

Temperature change. The quantile results can be seen, temperature on the positive effect of cotton trading prices significantly, and the degree of the influence with quantile increased, the trading price of cotton showed that with the increase of temperature on the degree of influence in reducing price volatility. In the cotton trade in the process, the effect of temperature on seed cotton price is relatively stable, and the coefficient between 0 to 0.1, and no negative, show in Xinjiang during the cotton picking temperature is suitable, basically not on cotton trading price formation negative effect.

Rainfall weather. Quantile regression results and empirical analysis of the deviation, generally, rainfall will cause damage to the Seed cotton level, thereby reducing the transaction price of cotton. The model results show that in the 80 sub sites before the rain will not form a negative impact on the trading price of cotton, but showing a positive effect; in the 10 sub sites before the positive

effect is stronger; between 10 and 80 percentiles, the effect is relatively stable, shows a downward trend in 80 points; after the site, there is a strong volatility, and negative effects. The reason is more complex, mainly lies in: one is in the period of cotton picking, the amount of rainfall in Xinjiang is relatively small, even if the rain weather, the duration is short, the moisture absorption of cotton Co., in a short period of time can bring rain water evaporate, little effect on cotton quality grade; two period in cotton picking, sporadic rainfall on the air in the dust, sand and other granular materials and some fibers have a certain effect, has certain effects on reducing impurities around; three is rain weather, will delay the cotton picking and sell, restrained seed supply and processing capacity of cotton ginning factory every day fixed, when the influence of rainfall weather on its processing ability is formed, cotton ginning factory will ensure its processing capacity by adjusting the cotton trading price way.

Wind power rating. The higher the level of wind, sand and dust in the air, the fibers and other impurities will be more easily into the seed, is equal to the impurity content in raising seed cotton, the wind level is higher than three, the effect will gradually highlight, and the model results also show that in the 90 sub sites before the wind to the trading price of cotton with a persistent negative, the coefficient of floating down in the -0.2, show that Xinjiang windy weather is not conducive to the cotton trade, and in the 90 quantile, the negative impact tends to zero, and then a sharp decline, close to -0.2, the main reason is that the high price is the main cotton sample sites.

3. Whether there is intermediary. In the previous 70 quantile, influence degree of Seedcotton intermediary transaction price is relatively stable, through actual investigation will be ginning factory in cooperation with brokers, cooperatives, companies and other intermediary priority transactions, and the priority is to achieve to suspend trading of farmers. Began to volatility in the 90 sub sites in the vicinity of the regression coefficient, the reason is that the turnover of all the cotton processing factory as "cotton", resulting in high transaction sites the main influence on cotton trading price effect is very big.
4. North and South Xinjiang. With the increase of quantile, "South Xinjiang" has more significant impact on the trading price of the cotton. In the 80 sub sites before the influence of seed cotton price in Xinjiang is relatively stable, at 80 points after the site began to volatility, indicating high prices at the site of the area affected by the strong. From the descriptive statistical analysis of the data found in the trading price of cotton farmers facing in North and South Xinjiang had significant differences, and the Southern is higher than the north. By calculation, the average price in the transaction in South Xinjiang is 6.15 yuan /kg, the average transaction price in North Xinjiang is 5.61 yuan /kg, South Xinjiang cotton trading price was significantly higher than north Xinjiang, the quality difference between the Southern and Northern Xinjiang is the main reason, the special natural environment conducive to improve the quality of cotton grade in south Xinjiang, the price is high at the high quantile has the strong correlation with regional advantages in Xinjiang.
5. Cotton trading level. At the low point of cotton trading level, the influence on cotton trading price is uncertain, which is mainly manifested in: before the 30

quantile, cotton trading level coefficient did not pass the significance test, before the 80 quantile, the regression coefficient fluctuate around 0. Show the level two and level three cotton before 80 quantile, the transaction price gap is not big, the phenomenon is caused by lowered the price of the acquisition of seed cotton ginning factory. With the level of cotton trade increased, cotton trading level positive effect on cotton trading prices began to rapidly increase, such as near the 90 quantile the impact of level of cotton seed on cotton trading transaction price was significantly increased, the reason is the high grade cotton (long-staple cotton) has more significant impact on the trading price of cotton.

6. The results of high points

The regression coefficients of all the variables in the quantile model appear high volatility after 85 points, the main reason is that in high sample site data is mainly for the Long-staple cotton. Long-staple cotton has special grade, special cotton planting area (mainly in Awati) and higher subsidies (subsidy standards (production part) is 1.3 times the other grades of cotton), higher consumer demand and other factors, because the cotton trading price is mainly affected by the impact of consumer demand, the role of other factors is limited, and showed a fluctuation features often violent, and the impact of factors other than the south north Xinjiang, the point is more closer to the quantile 100, the coefficient is close to 0, the reason is that the demand for Long-staple cotton remain at the higher level; and all the long-staple cotton samples are from south Xinjiang, The southern border of North and south, so with the improved of point quantile for the variable "North and South Xinjiang", the effect degree of increase is very large.

4. Conclusion

From the above research we can see that the changes of the meteorological environment not only affect the formation of cotton growth, will also affect the formation of cotton prices, temperature, wind, rainfall and other meteorological environment should not only be taken into account in agricultural production, the formation of prices of agricultural products in the ring section also needs to be attention. Intermediary organizations will exist in the business process of any agricultural products are, in the cotton trade in the process of existence is particularly wide, intermediary effect on the trade of agricultural products prices and cannot be generalized, need from the social environment to analyze the necessity and rationality in the cotton trade in the process, by the large number of seed cotton trading and the distribution characteristics of cotton ginning factory, resulting in some cotton farmers need the help of intermediary organizations to complete the transaction (cotton seed handling, transportation etc.). Therefore, the existence of Xinjiang cotton trading process intermediary organization has objectivity.

Influence of regional differences on any agricultural products cannot be ignored, the agricultural production, processing and consumption are not in the same area, the space position changes on the price of agricultural products is stronger, in this analysis we can see that the southern and Northern Xinjiang cotton trading price in the obvious differences, regional differences zoom into the country after the more obvious. Therefore, agricultural subsidy policy cannot be generalized, according to different regional characteristics to

develop measures and schemes of the. The number and quality of agricultural products trade has decisive effect on the prices of agricultural products, from the analysis of the results can be seen, the number of transactions affect the trading price of cotton can be clearly analyzed, but the effect of cotton trading level influence on cotton trading price is not expected strong, the main reason is that in the process of cotton trading the “deeply demand” phenomenon, not only is the seed cotton, for other agricultural products, this phenomenon is widespread in the transaction process. Therefore, agricultural products trading links also need supervision and regulation.

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Research on Network Curriculum Resources Recommendation System based on MVC Technology

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Abstract: Over the past few years, massive open online courses (MOOC) this teaching form is accepted by universities around the world, many MOOC institutions has been established; the application of wireless network has brought great influence to the traditional teaching. In this paper, the author research on network curriculum resources recommendation system based on MVC technology. Too much network resources will cause information overload, resulting in the user is difficult to choose the right course. The proposed system can solve the problem of information overload. The system can recommend course to users according to the personal information, interest hobby, and past browsing history. Interested course can be recommended to the user, this system be will used for students personalized recommendation, help students choose the network learning resources.

Keywords: Open online courses, Spring MVC, System development, Course recommended

1. Introduction

At present, the computer network has been in every corner of the world, information technology, network has become the trend of the times and the future development trend. Over the past few years, massive open online courses (MOOC) this teaching form is accepted by universities around the world, many MOOC institutions will be established, to provide the required technical support and teaching support (Anna, 2009; Gonçalves et al., 2015). MOOC is quietly changing people's learning and life style, the popularity of wired networks, the use of wireless networks has brought a huge impact on the traditional teaching (Balram, 2008; Calvo, 2010). MOOC has brought great convenience to our study; homes will be receiving higher education of the top. At present, MOOC is still in the stage of development, there are still a variety of problems, in which information is a very important issue. Internet information has open transmission, wide range and other characteristics, making the number of information explosion (Diefes, 2013; Fatima, 2013). In the face of the information explosion, users easily lost direction, unable to choose, so as to be unable to complete the original goal. Information overload and the user's cognitive ability and knowledge structure constraints, resulting in users cannot correctly understand and use the information.

Study on the aspect of knowledge, because the amount of information theoretical knowledge than single carrier information other information, and has the characteristics of receptor cycle longer, resulting in information overload problem in MOOC system is more prominent. Information mainly from the course too much leads to information overload, which leads to the choice of the user (Meiramova, 2015; Alfiya, 2015). But users in course selection, mainly through the teachers course introduction to understand the curriculum, but teachers in curriculum is to describe their own point of view, but not in the course of course introduces their lack of information, the information is one-sided or even lead to misleading. The proposed system can solve the problem of information overload (Borrego, 2007). If according to the personal information, in particular user preferences, has the option of using the recommendation system of curriculum and curriculum evaluation will feature, the user may be interested in the course recommended to the user, can according to user personalized recommendation, helps the user to choose, can better serve customers (Susan, 2012; Oscar, 2015). With the continuous progress and development of MOOC, various MOOC platforms continue to emerge, users, course related data increasing, make full use of the data, let them play their value, to provide users with better services, solve the information overload brought “difficult choice”, has become more and more important.

2. Related technology

2.1. Spring MVC

MVC Spring belongs to the spring framework of a follow-up products, is a lightweight framework in J2EE. Frame design fully reflects the MVC mode of thinking, to achieve the various levels of decoupling and provides a full function of the MVC module. MVC

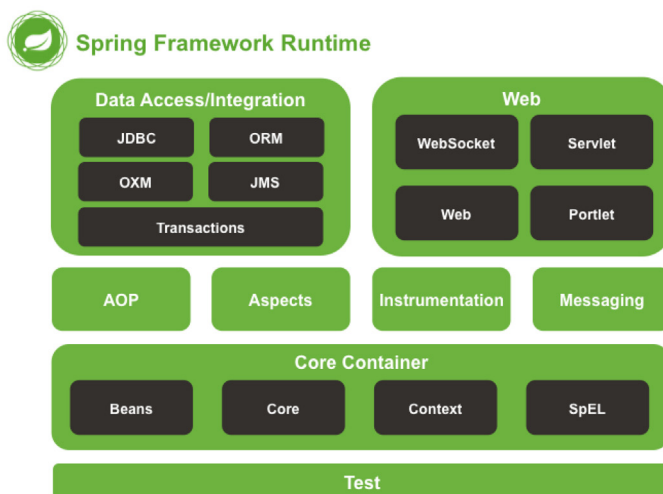


Figure 1 – Spring framework

Spring greatly simplifies the developer development, reducing the amount of code. MVC Spring development process, the main application of the contract is greater than the configuration programming, greatly reducing the number of code in the configuration file. Spring MVC front controller using Dispatcher Servlet; application controller by processing mapping and view resolver; page control and action processor by the Controller interface method, Controller instance requires developers to automatically according to the application demand.

MVC Spring allows us to design a very simple and clear, functional, clear and simple Web layer. Compared to other frameworks, MVC Spring has the following advantages:

1. MVC Spring is Framework Spring follow-up project, the design is the initial spring framework and integration (such as including IoC containers, AOP, etc.), which can be seamlessly connected with the Spring.
2. MVC Spring role is clear, clear division of labor and the expansion is quite flexible, can be very easy to achieve the program code and functional extensions. Spring MVC will be divided into the role: Dispatcher Servlet, HandlerMapping, Handler adapter, controller, View resolver, Validator, Command, form object provided to the form and submit the display object.
3. MVC Spring provides a strong agreement greater than the configuration of contractual programming support, reduces the configuration, you can use the annotation alternative configuration, greatly reducing the number of configuration files.
4. MVC Spring without third party plug-ins can be simple to carry out unit testing; the use of Spring test class can achieve a simple Mockiet test.
5. MVC Spring provides a powerful JSP tag library to simplify the development of JSP; tag library supports flexible localization, theme resolution, etc.

2.2. Authority management framework ApacheShiro

ApacheShiro is an open source Java security framework for Apache. At present, more and more people use Apache Shiro, because it is relatively simple and practical, compared with the common Spring Security Spring Security, although not powerful, but in actual use of many complex functions is not necessary, so in the realization of the system using a small and simple Shiro is enough.

1. Subject

The subject, from which we can know that the subject can be any entity that interacts with the application, is an abstract concept. Specific as long as the main body can meet the requirements of the interface to achieve the language and form constraints.

2. Manager Security

Security manager, equivalent to MVC Dispatcher in the Servlet Spring or Struts2 in the Dispatcher Filter, is the core of Shiro. All specific rights and privileges will be controlled through the Manager Security, it is responsible for authentication and authorization, session management, cache management and other operations.

3. Authenticator

Is responsible for the authentication, Subject authentication, and can be extended, if Shiro provides the default authentication is not appropriate, you can customize the implementation; if need to achieve their own custom authentication strategy (Authentication Strategy), by means of strategy.

4. Authorizer

Authorization is user access control, also known as access controller, license is mainly used to determine whether the subject has the right to conduct the appropriate operation, through the authorized users to verify the user will get the appropriate account permissions, access to the specific functions of the application.

5. Realm

Realm is an abstraction of the security entity data source, which can be used to obtain a secure entity source. One or more entities can exist in the application. Realm scalable and adaptive, you can use JDBC to achieve, you can also use LDAP to achieve, can also be implemented in memory, and so on. It should be noted that although Shiro provides the default Realm implementation, but generally does not conform to the application of user / privilege storage format storage, so we need to implement their own Realm.

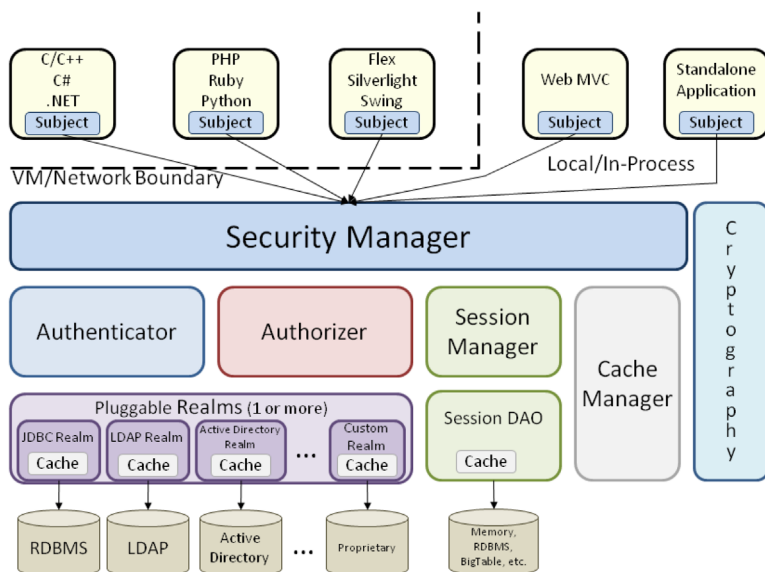


Figure 2 – ApacheShiro architecture

3. Network course recommendation

3.1. Course recommendation technology

In order to improve the ease of use of the system, make the system more humane, close to the user, we need to conduct curriculum recommendations for users. First of all, we need to collect information about the course and students' information, and then use the algorithm to dig the data, finally according to the results of the algorithm to recommend the course for the students. Decomposition model provides a high reliability solution for important problems such as recommendation systems. However, it is a very professional problem to use the decomposition model to predict the problem, which requires a lot of professional knowledge. Usually, we need to build the model first, then use the machine learning algorithm to recommend, and the algorithm is also a big problem. Machines Factorization is a simple and general solution, which can be used to simulate the matrix decomposition model from the original data. In this way, the decomposition machine combines the characteristics of the general characteristics of the project and the matrix decomposition model in the estimation of the interaction between the large-scale classifications of variables. This system mainly uses the stochastic gradient descent method in LIBFM to recommend the course.

Suppose that the data of the prediction problem can be formalized as $n \times p$ matrix, which is similar to the definition of SVM and linear programming in machine learning. All of the decomposition machines are nested in the X vector of the P input D dimension of the interaction parameters. When $d=2$ is used, the decomposition machine model can be defined as:

$$y(\bar{X}) = w_o + \sum_{j=1}^p w_j x_j + \sum_{j=1}^p \sum_{j'=j+1}^p x_j x_{j'} \sum_{f=1}^k v_{j,f} v_{j',f}$$

Where k is the decomposition dimension, it can also be understood as the dimension of the hidden relationship vector, in the decomposition machine, as long as the K is large enough, it can be said that any interaction between the variables of the relationship. Since any 1.5 positive definite symmetric matrix can be decomposed into VV^T . If W is a matrix representation of the relationship between the decomposition of the machine, because the relationship is mutual, so W is symmetric, because the decomposition machine does not use diagonal elements, $J > J$ equation, the diagonal elements can be arbitrary value, as long as the diagonal elements is large enough, W is likely to become semi definite matrices. In practical application, there are $p \times K$, because the decomposition machine can use low rank matrix W , so the decomposition machine can also be used to estimate the interaction parameters in the case of sparse data.

First, we need to transform the decomposition model into the general form of the decomposition machine, assuming there are two categories of variables, user variables U and project variables I . In this way, the decomposition of the machine is converted to a matrix decomposition model:

$$\hat{y}(\bar{x}) = \hat{y}(u, i) = w_o + w_u + w_i + \sum_{f=1}^k v_{u,f} v_{i,f}$$

If there are three types of data, such as U, I, and T (label), the model is transformed into a tensor model:

$$\hat{y}(\bar{x}) = \bar{y}(u, i, t) = w_o + w_u + w_i + w_t + \sum_{f=1}^k v_{u,f} v_{t,f} + \sum_{f=1}^k v_{i,f} v_{t,f}$$

In solving the above problems, the stochastic gradient descent method is widely used, because it is very simple and the effect is very good, has low algorithm complexity and space complexity, the optimal loss function, the derivative least squares regression function for:

$$\frac{\partial}{\partial \theta} l^{LS}(\hat{y}(\hat{x}|\Theta), y) = 2(\hat{y}(\hat{x}|\Theta) - y) \frac{\partial}{\partial \theta} \hat{y}(\hat{x}|\Theta)$$

3.2. System requirement analysis

According to the survey, the system needs to meet the following requirements:

1. To meet the needs of different levels of students and teachers in the curriculum system. The main users of the curriculum system are divided into two kinds, one is the release of curriculum information, the provision of teaching resources; the other is to obtain knowledge, to learn and to share the learning experience of the majority of students. System needs to provide accurate, comprehensive and valuable course information for students; teachers can input information on the curriculum, and showing the course page key contents of the curriculum, to share valuable information in the course.
2. Need to classify and store the information of the course and students, to realize the persistence of information, to realize the data sharing, and requires the system to be able to take advantage of the existing data for students to recommend courses.
3. In order to attract more students to participate in the course of learning, and to meet the needs of learners, the platform not only needs to support the copy of the file mode, also need to support video playback and other multimedia files.
4. For different users need to use different strategies to manage, for students and teachers to assign different permissions, each role can be operated by different modules.

The course information module mainly deals with the course related information, which is the most basic module of the system. The curriculum information module includes four main modules, including curriculum arrangement, curriculum concern, curriculum recommendation and curriculum. The following is a description of the functional requirements of each sub module.

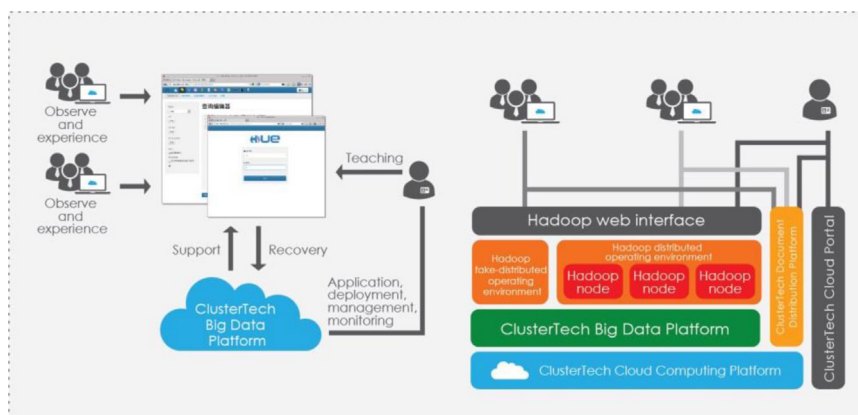


Figure 3 – Online course system

Course scheduling system: for the user to search function: users can provide courses in the search box enter the search keyword search results after the course, click to enter the list of courses, also can through the system filter function course screening results list. The curriculum system provides courses to sort the list of courses are sorted, sorting a variety of courses, including some way: sorted by start time, end time to sort, according to the duration of the course scheduling, scoring and ranking according to the curriculum. There are four ways of ascending and descending is two, the default sort system based on user input keywords, consistent with the keyword ranking, under the same circumstances on the high score.

Course details: the course of the teacher editing page to other users to present detailed information, other users through detailed information to understand the course, and then make a choice. Course details page information mainly includes course name, course category, course description (teacher edit), and user comments, etc.

Course attention: in order to enhance the user experience, the user can browse the course details page when you can add interest to the course of interest. Over the course of the process details page, if the user is interested in the course, but not sure whether it will join the course or the contents of the course has not been released, at this time, the user can add to the course curriculum pays attention to sustained attention. Added attention to the course will be in the student user's personal page to list form to show, to avoid the user to search for the redundant operation.

Course recommendation: course recommendation is the use of user information to recommend the use of course selection. The information of this system mainly comes from the students and teachers. Students after the login will be evaluated on the course, these data and the recommended curriculum related, you can use the decomposition model to model, and then calculate the prediction score, according to the high score ranking to recommend.

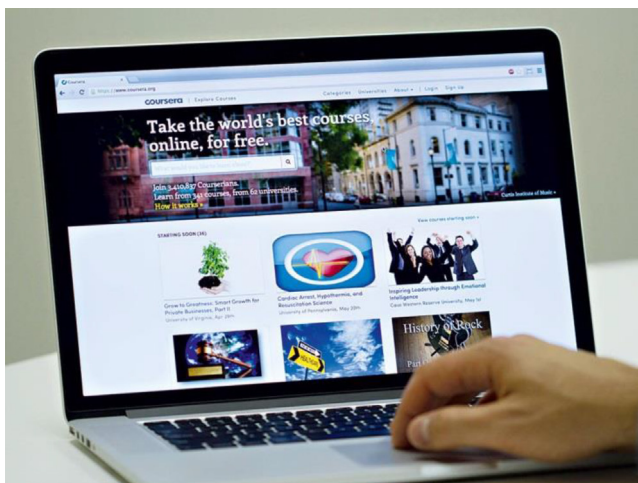


Figure 4– Online course search

4. Online course system design

The current mainstream network application framework for the B/S framework in B /S framework, the system has no specific client, the core functions of the system implementation focused on the server, unified user using the browser as the client, only need to change the server in the system to change the function of the realization of this design simplifies the system upgrade and maintenance and use. In addition, the user's client only need to interact with the program through the browser, there is no need to have a dedicated network software and hardware environment, so B/S also has a stronger adaptability, can be applied to large-scale cross platform users. According to the system requirement analysis, the system design should meet the following requirements:

1. Scalability: the development of the system, the system needs to be expanded or modified, at this time, it is necessary to ensure that the system is easy to expand, so the design of the system coupling degree is as low as possible.
2. High availability: refers to the system running on the line, there will not be an exception or error can be stable operation, which requires the system has a certain fault tolerance.
3. Ease use: Refers to the user to have an intuitive understanding of the user, it is easy to operate, no special training teaching can be used, you need to do the flat system.
4. High concurrency: The concurrent access system can withstand a certain amount and real-time processing of user requests; ensure that there is sufficient number of concurrent users at the same time to meet the requirement of online.

Curriculum system architecture using the current mainstream J2EE framework, the application of WEB using MVC three layer architecture construction, the use of Spring to achieve MVC, Spring MVC can greatly reduce the amount of code, the developer

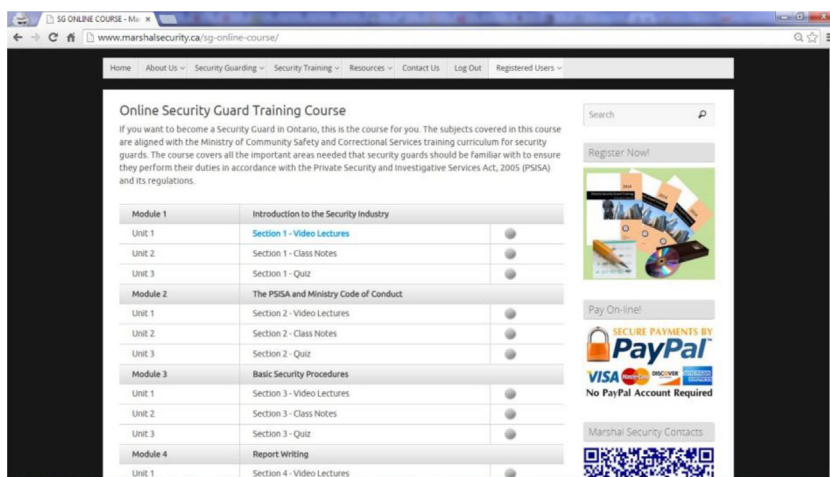


Figure 5 – Course system

is liberated from the heavy work of programming, allows developers to focus on the complex business logic implementation.

1. Client design

In addition to the basic HTML, CSS, and JS, the system uses AJAX (asynchronous JavaScript and XML). AJAX is a technique in a certain way to play the role of organization including the use of XHTML and CSS standardization work together (HTML5 and CSS3), DOM to realize the dynamic interaction, XMLHttpRequest will use the Query package after the asynchronous send request and read the data, finally use the JavaScript binding and processing server the data returned. As the biggest difference between AJAX and the previous technology is asynchronous read data, to achieve the user action and server response to asynchronous.

2. Presentation layer design

Presentation layer and client interaction, to accept the client's request and data, and call the business layer services to deal with the request and data, and finally the results obtained from the server to return to the user. Performance layer is mainly to play the role of front-end control scheduling, the system's performance layer using MVC Dispatcher Servlet Spring as the front controller.

3. Business layer design

The business layer is responsible for processing the request and data from the presentation layer, calling the persistence layer service to achieve the system's real business logic rules. In the process of system implementation, business logic is often changed, in order to facilitate the maintenance and expansion of the system, it is needed to implement the application of the business layer decoupling, which requires the use of multi-level

computing model in the business layer. In the specific implementation process, need business logic and low level according to the demand of the system will be a high level of data access logic separation, high level logic using low-level implementation, but also for the lower upper logic is completely transparent, finally deployed to multilayer calculation model.

4. Persistent layer design

The persistence layer is responsible for accessing data from one or more databases, using ORM to map the table record of the relational database to the relationship between the persistent objects of the application. Currently in the J2EE architecture is commonly used in the development of the persistence layer JDBC and ORM framework, the use of JDBC to achieve lasting layer, the need for developers to write their own business domain entity class corresponding to the persistence layer code. According to the needs of the use of ORM framework can completely meet the system needs, but also reduce the amount of code, based on these considerations, the system choose to use Hibernate product ORM as a data persistence layer framework.

5. Conclusion

With the continuous development of MOOC, people's way of learning has changed greatly; more people come out from the traditional teaching classroom, and put into the MOOC learning army. In this context, this paper uses LibFM to realize the large-scale curriculum platform, to better serve the learners, teachers can through this system is convenient to share resources, learners can obtain sufficient learning resources through the network. The course is done online, real-time and low, no good system together with the improvement of user needs, may need to use some processing methods of high real-time, can consider the flow calculation framework. Moreover, the data of different structures and features may need to be adjusted to improve the accuracy of the algorithm. The system supports many functions such as course search, information query, user login, course review and so on. The system provides search and filter functions, users can quickly find the needs of users to participate in the review, through the course, treatment recommendation technology for mining user evaluation information, according to the different users with simple personalized recommendation, convenient for the user to choose.

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Study on the Construction of Multi English Teaching Model based on Computer Cloud Technology

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Pages: 73–83

Abstract: With the development of cloud computing, network cloud technology is changing people's working ways and learning methods, especially in the field of education. In this paper, the author analyzes the construction of multi English teaching model based on computer cloud technology. Through the cloud platform and multimedia teaching, cloud technology could promote students' autonomous learning as a cognitive tool. At the same time, according to the theory of multiple teaching, each student has their own advantage in the field of intelligence, so that teachers should carry out English teaching according to the characteristics of students' intelligence. Practice has proved that the multiple English teaching models can effectively improve the students' learning interest and obtain a better learning effect.

Keywords: Information technology, Cloud platform, Multi English teaching, Autonomous Learning

1. Introduction

Information is the world trend and the development of society, with the network technology and multimedia technology as the core technology, cloud technology has become the creative tool of expanding human ability, network cloud technology is changing at an alarming rate of people's work, learning and the way of thinking and way of communication, which makes our education is facing a severe the challenge (Anna, 2009; Fatima, 2013). The essence of technology and curriculum integration is under the guidance of advanced educational ideas and theories, especially under the guidance of "leading subject" teaching theory. And these tools are comprehensive application in the teaching process, as a combination and integration of teaching resources and the teaching elements and teaching arrangement (Hu, 2012; Alfiya, 2015). On the basis of the overall optimization of the aggregation effect, so as to promote the traditional teaching methods of fundamental change, that is, to promote the teacher centered teaching structure and teaching mode of change, so as to achieve the goal of cultivating students' innovative spirit and practical ability. In short, cloud technology and curriculum integration, not simply to cloud technology as a demonstration tool to help teachers teaching, but to achieve the integration of cloud technology and discipline teaching (Kim, 2014). It requires to be highlighted as the integration of the active factors of the status, and in order to achieve the information between man and material, the network between the virtual world and the real world of integration.

College English is a compulsory course for all universities in our country, teaching time, hours, and credits for many teachers and students put in more hours, but the effect is difficult as people would like, dumb English phenomenon is still very prominent (Krstev, 2014; Oscar, 2015). This shows that there are many problems in College English Teaching in China, which has lagged behind the development of economy and society, and must be reformed. Gardner (1983) proposed Intelligences Multiple, referred to a new theoretical perspective for the reform of College English teaching. The multi-intelligence has characteristics as integrity, situation, development, diversity; this is consistent with the purpose of College English teaching (Susan, 2012). Multi intelligence development process is the quality of the training process. English teaching is an important part of quality education, it pays great attention to the student ability, it can help enrich the activities of multiple intelligences to arouse students' interest and improve the teaching effect, thus in the process of teaching English, cultivating students' intelligence (Lino et al., 2016).

2. The application of cloud computing in English Teaching

With computer technology and network technology as the main body of the development of modern educational technology, for the English teaching has created a good external environment. In order to construct a scientific practical model of creative thinking, to explore the new teaching mode of the cultivation of innovative thinking in our teaching practice, the creative thinking of some attempts in the application of English classroom teaching. Through the computer to participate in classroom teaching to change the teaching mode, improve the quality of teaching, stimulate students' curiosity and imagination, so as to achieve the purpose of cultivating students' creative thinking. As a new IT technology, cloud computing is considered to be the third revolution in the field of IT after PC and Internet relay. The concept of cloud computing has been the attention of various fields, Google, IBM, Amazon and Microsoft and other large IT companies have established their own cloud computing platform, providing related cloud computing services. Cloud computing in terms of price, efficiency and flexibility and other advantages also attracted attention of many small and medium enterprises, according to the survey, the Gooroo company in the UK, there are 54% small and medium enterprises plan to use cloud computing, of which 12% enterprises have already use cloud computing services.

Cloud computing provides three levels of service:(1) infrastructure services (IaaS), composed of the underlying hardware or virtual machine resources, providing computing, data storage and network communications, and other resources;(2) platform that serves (PaaS), built on top of the cloud infrastructure, cloud application developers to provide a platform for the development of a variety of cloud applications;(3) software as a service (SaaS), all kinds of application services based on cloud platform development. Cloud computing has 3 basic characteristics: first is the infrastructure on the large-scale low-cost server cluster; the second is the application and the underlying service collaborative development, to maximize the use of resources; third is through a cheap server redundancy, high availability of the software.

After many years of construction, our country has made great achievements in the field of educational information. All colleges and universities have established their own campus network, digital library and other modern education information infrastructure. However,



Figure 1 – Cloud computing

Separation of Responsibilities

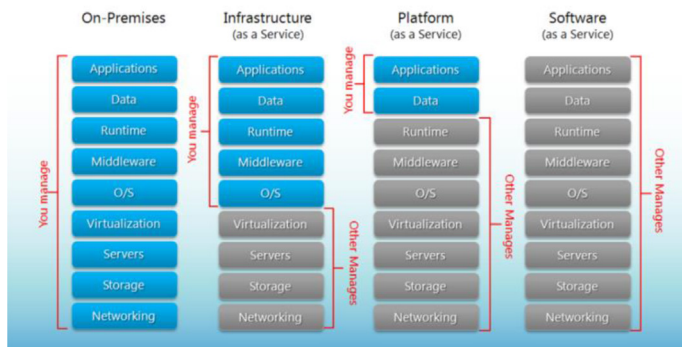


Figure 2 – Cloud computing services

the binary system of educational investment and the development strategy of the pilot schools cause the imbalance of the development of the educational information industry in china. Now, there are the following problems in the general education information system in China.

- Uneven distribution of teaching resources:** The famous university has better resources (including teachers, laboratory and computer equipment etc.), and most local colleges, due to limited funds, are often faced with aging equipment, lack of laboratory resources. For primary and secondary schools, the urban and rural basic education in the construction of campus network, education information resources allocation and information technology courses, etc. also has a huge gap.

- **Teaching resource update speed is slow:** The rapid development of technology, all kinds of employment competition intensified, requiring schools to provide the most new laboratory for students, computer equipment and related courses, improve the students' abilities, in order to adapt to the development of the new situation, to the schools and institutions of higher education information construction has brought great pressure.
- **Low sharing of teaching resources:** The development of modern distance education, as well as the expansion of the joint scope of university courses, makes the curriculum and other software resources to achieve a certain degree and a certain range of integration. However, between the middle and primary schools, universities and primary and secondary schools, the degree of sharing of resources is still limited; the hardware resources are still unable to achieve integration.

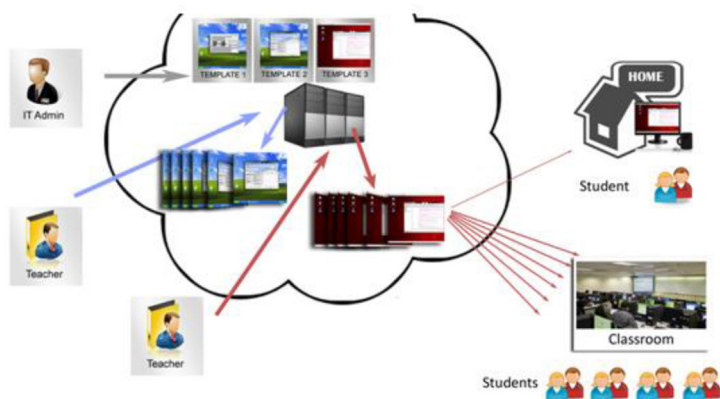


Figure 3 – Cloud technology education platform

Education cloud computing migration technology in the field of education is the basic structure of the future of education information, including all hardware and software to educational information computing resources, the virtualized computing resources, to provide computing resources in the form of services to educational institutions, education practitioners and students. To effectively realize the sharing of resources and make full use of various resources, with each layer of cloud education provides a description of the establishment of education cloud resources index database, the user can accord the needs of the application in education cloud resource index database retrieval. Because of the cloud resources to a large there is a link between resources, education resources index database in the cloud so people can understand, should also be machine understandable, in order to improve retrieval efficiency and accuracy of the use of resources, characteristics of Semantic Web describing ability of resources and can be understood by the machine will be one of the optional current technology.

3. The application of multiple theory in English teaching

3.1. Multiple intelligence

Multi intelligence development processes the quality of the training process. English teaching is an important part of quality education, it pays great attention to the student ability as listening, speaking, reading and writing translation, it can help enrich the activities of multiple intelligences to arouse students' interest and improve the teaching effect, thus in the process of teaching English, cultivating students' intelligence. Intelligence is the ability to solve a particular problem or to create a product that is valuable for a particular culture or society. The traditional view of intelligence is too narrow, and the intelligence is limited to the language and mathematical logic, the neglect of human development has the same important role in other aspects.

1. Linguistic intelligence: Refers to the ability to use language to express and appreciate the deep meaning of the language, that is, the ability to use oral and written language creatively. A strong language and intelligence of the students with words to think, they are very good at reading, writing and discussion to learn. They generally have a large vocabulary of words that can be used in both verbal and written communication.
2. Logical-mathematical intelligence: It is the ability to use numbers and reasoning to calculate, to think about propositions and assumptions, and to perform complex mathematical calculations. The students logical mathematical intelligence strong love mathematics and abstract patterns of thinking, they often consider the problem clearly, with the help of logic and abstract symbols of learning, has a strong desire to explore, dare to accept the challenge of solving problems.
3. Musical intelligence: it refers to the ability of people keen sense of pitch, melody, rhythm and tone, and the ability to express thoughts and feelings through music. Music melody intelligent students are very sensitive to the rhythm and melody, they are good at learning through music and lyrics
4. Visual-spatial intelligence: It refers to the ability of people to feel and express the color, shape and space position, including the ability to express emotions and thoughts by means of visual and spatial concepts. Spatial intelligence enables people to sensation and perception to the internal and external image, love graphic thinking, imaginative, able to reproduce, change or modification of mental image, not only can make their own free space in the space, can effectively adjust the object, but also create graphic information or explanation.
5. Interpersonal intelligence: it refers to the ability to effectively understand and interact with others. Interpersonal intelligence strong people understanding, understanding of others' mind, move quickly, can stand in someone else's position on the thinking and understanding, to suggest that distinguish different interpersonal relationship
6. Intrapersonal intelligence: Is about to understand themselves, their constraints and ability to identify the differences and similarities between ourselves and others, can be aware of your inner emotions, intentions, motivations, temper and desire, is good at using this knowledge to guide their own life. Self aware

intelligent students are most effective when they are given sufficient time to allow their quiet and independent work.

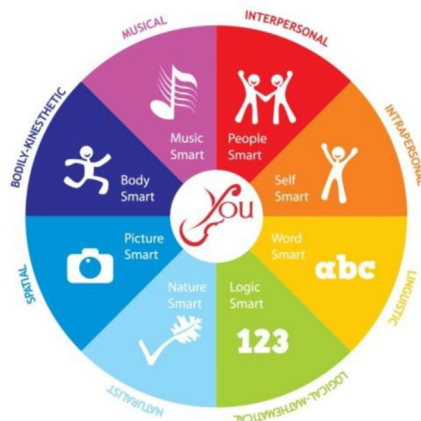


Figure 4 – Theory of multiple

3.2. Multiple teaching

The students know the importance of learning English, in the learning process, most of the students are very interested in learning English, but they are confused on how to learn English, English autonomous learning consciousness is poor, I do not know where to start, not to mention according to their own actual conditions to determine learning goals, make learning plans, choose suitable learning strategies and method, their self-monitoring learning process and project progress, self-assessment of learning effect and goal attainment. It can be seen that most of the students' subjective desire to learn English is good, but the actual action is often negative. From the perspective of learning efficiency, students from middle school to university has been putting a lot of time and effort to learn English, but it seems to pay the price and the results of a disproportionate. From the learning method, most of the students only know by rote, not mastery learning methods, dull, only the use of intelligence and other intelligence did not play a role. If things go on like this lead to low learning efficiency, lose interest in learning. In listening class, for example, because English is not the mother tongue, it is very difficult to understand the English language, and caused the difficulty of hearing and understanding of the reasons are many, both the reasons for students, but also the teacher's question. As far as students are concerned, the basic knowledge of language is not complete, and the quality of their own language is not high, and the interference of mother tongue influences the speed of listening.

The theory of multiple intelligences that everyone has their own way of learning, everyone has different degrees of eight kinds of intelligent relatively independent,

each student has their own advantages of intelligence, have their own learning styles and methods, the school does not exist poor students, all students with their learning characteristics, learning styles and the development direction of talents. The question of whether the student is not clever or not, but the question of what is clever and how to be clever. Therefore, education should be based on a variety of intelligent comprehensive development of each person on the show, creating a variety of intelligent scenarios for students, give everyone the choice of diversification, make its advantages, so as to stimulate the intellectual potential of each person, the full development of each person's personality.

4. College English multiple teaching mode innovation

4.1. The necessity of multiple English teaching

The impact of China's education has long been influenced by Spielman's intelligence theory of two factors, only pay attention to the cultivation of linguistic intelligence and logical mathematical intelligence of students, ignoring the development of other intelligence, teaching evaluation also focuses on the two intelligent. Such educational theory is not conducive to the all-round development of students. Specific to the College English teaching, because of the lack of the theory of multiple intelligences to master, most teachers still use English teaching mode and a single strategy, only pay attention to imparting language knowledge and neglect the cultivation of comprehensive ability of using language, but neglect the training of multiple intelligence. The teaching evaluation form is unitary, has not paid attention to its integrity, the situation, the development, the multiplicity and the development. Multi intelligence development process is the quality of the training process. English teaching is a main field of quality education, it pays great attention to the student five ability, it can help enrich the activities of multiple intelligences to arouse students' interest and improve the teaching effect, thus in the process of teaching English, cultivating students' intelligence. Therefore, the integration of multiple intelligences theory and English teaching is possible. In the current practice of quality education, there are often the misunderstanding of "additional" "quality education", that is, the gap between classroom teaching and quality education. Teachers in the classroom are still in the traditional exam oriented teaching methods to impart knowledge, and the provision of "active class" to cultivate the quality of students. This method itself is a misunderstanding of the "quality", and it is impossible to achieve the purpose of cultivating students' ability in all aspects. In fact, the quality of students is reflected in all aspects, Chinese class should cultivate quality, math class should cultivate the quality, and English class should also cultivate the quality. The key lies in the teacher to what kind of theory as the guide, how to carry on the teaching design. The rational integration of multiple intelligences theory and English teaching will not only improve the activities of English teaching and learning, but also will be one of the effective means to promote the quality education. Therefore, it is necessary to instruct English teaching by multiple intelligence theory.

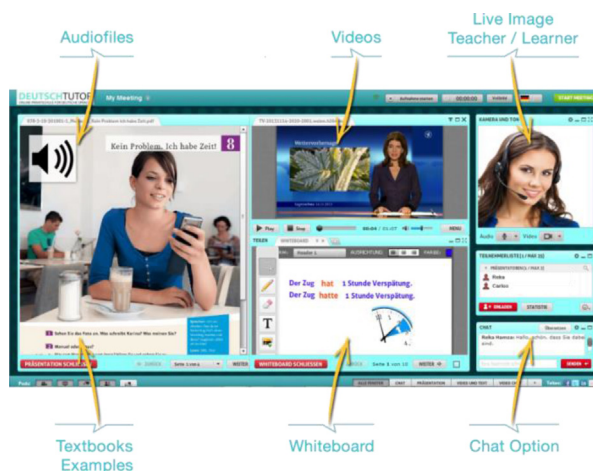


Figure 5 – Video English teaching

4.2. Principles of multi-English teaching

First of all, the theory of multiple intelligences is a complete set of theoretical system. At present, the research works about the theory of multi-intelligence so far more than 40 of them, from various perspectives and angles to build the theory of multiple intelligences. From another level, a relatively complete theoretical system can guarantee the teaching research from the beginning to stand in a relatively high starting point, making it more practical value and significance. Secondly, the theory of multi-intelligence is consistent with the concept of quality education in our country. Quality education advocates the cultivation of students' comprehensive quality, and the theory of multiple intelligences advocates developing students' multiple intelligences. At the same time, the theory of multiple intelligences provides a theoretical basis for the quality education in our country. To this end, we need to explore a new classroom teaching mode and strategy which can be used in the actual teaching situation, and the combination of multiple intelligences and College English teaching.

- Human oriented principle:** Multiple intelligence theory pointed out that each student has its own advantages in the field of intelligence, but its combination and play a different degree, everyone in the school is fertile. What we should be concerned about is not which one is more intelligent, but which one is more intelligent. The traditional intelligence theory is based on the human's language intelligence and mathematics logic intelligence, and the multiple intelligences are different ". Our education must really do for all students, efforts to develop the advantage of every student's intelligence, enhance the weak intelligence of each student, intelligent scene, for students to create various weaknesses, stimulate individual potential, the full development of each individual, and for each student to succeed to lay a good foundation.

- **Teach students in accordance with their aptitude:** The theory of multiple intelligences is the pursuit of the “individual centered”, the development of effective curriculum programs to adapt to different smart structures, and create opportunities for the development of each student’s personality. In the range of possible, teachers should carry out teaching according to the characteristics of students’ intelligence. The theory of multiple intelligences to overthrow the ability of language and mathematical logic ability as the core of the traditional view of intelligence, that “everyone has their own advantages in areas of intelligence, have their own learning styles and methods, there is no difference in the school, all students had their own intellectual characteristics, types and development direction of the learning talents.
- **Coordinated development:** First of all, teachers should find the differences between the students in the teaching, to understand the intelligence structure of the students, and treat all kinds of intelligence should be treated equally, to coordinate the development, not favour one more than another. Actively found strong intelligence of students and to guide. Because each student has a number of intelligent, real teaching objectives should be comprehensive, coordinated, and should also highlight the advantages of each person on the basis of intelligence, in-depth creative learning.
- **Multidimensional and multidimensional evaluation:** Evaluation is an important link in education and teaching activities, which plays an important role in promoting and improving students’ learning motivation and effectiveness. The development of the theory of multiple intelligences requires a new evaluation system in the meaning of cultural activities. It inspires us in the evaluation of students, focus on the evaluation of each student has good intelligence, from multiple angles, intelligent students, adopt proper evaluation, strengthen the student’s strengths, and promote the coordinated development of the intelligent.

4.3. Multiple teaching methods in College English

The teaching method is used to complete the task of teaching, including teachers and students method of learning, is established in the guidance of teaching thought and theory, structure and activities of relatively stable teaching activities of the program, it is the use of teaching theory, and teaching practice summary. According to the differences of students’ basic differences, each student has a strong and weak intelligence, College English teachers should adopt flexible teaching methods to meet the needs of different students in the course of teaching.

- **Communicative teaching approach:** Communicative teaching method is to use language as a communicative tool to teaching, focusing on cultivating students’ communicative ability. Communicative approach advocates communication and cooperative learning strategies, communicative activities or activities to emphasize role-playing, group or cooperative learning activities, these activities provide English language environment for students. In the College English teaching, teachers can design various teaching activities according to the specific situation of teaching content and students, should

consciously cultivate students' communicative competence in an important position, to create a method of real language environment, not only stay in the understanding of the material, the more fully using the related text, sentence, scene, guide students in communicative activities in English, in class or after class, the role, retelling texts, dialogue, discussion and other forms of teaching

- **Autonomous learning:** Autonomous learning includes five aspects, the determination of learning goals, the determination of learning content and learning progress, the choice of learning methods, monitoring the learning process and evaluation of learning effects. The learners voluntarily assume responsibility for their own learning, to manage their own learning behavior, according to their own actual conditions to determine learning goals, make learning plans, choose suitable learning strategies and methods, monitoring the learning process and project progress, self-assessment of learning effect and goal attainment. It can be seen that the process of autonomous learning is the process of learner self-management and self-responsibility.
- **Task based Teaching:** TBLT represents the modern language teaching language learning real context, and it agree without prior without previous consultation of College English reform direction, it is emphasized that students should be in the real situation of the task driven, in the process of completing the task or solve the problem, in the environment of autonomous and cooperative learning activities, and in the discussion session the atmosphere. This method is catalyzed by students meaningful language use, to create a conducive learning environment to support language acquisition, internalization, but also cultivate their communication, management, coordination, innovation ability and consciousness and solidarity spirit of cooperation

5. Conclusions

The advantages of multiple intelligences theory reflect the possibility and superiority of the guidance of College English teaching. People-oriented, individualized, coordinated development, multi-dimensional evaluation principle is the theory of multiple intelligences in College English teaching, College English teaching is also the guiding principle. The multiple intelligences teaching also put forward the corresponding request to the teacher. Teachers should set up "individualized" teaching concept, adopt flexible teaching methods. Teachers should set up the view of professional development, the professional development is a lifelong learning process, is the process of teachers' ability and emotional maturity, and constantly improve the process of teachers self-confidence and improve teaching ability. Teachers should also make good use of media teaching multiple intelligences, give full play to all kinds of intelligent students, and improve the teaching effect. At the same time, teachers should set up multi-dimensional and multi-dimensional evaluation of students, and evaluate the students'. Under the guidance of multiple intelligences theory, scientific and reasonable design of College English teaching, multiple intelligence development of them, arouse their learning motivation for active learning and cooperative learning, so that students will receive information transformed by a kind of intelligence to intelligence, and ultimately improve the efficiency of their learning purpose.

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Institutional Investors, Overseas M&A and Shareholder Wealth: Evidence from the Chinese Stock Market

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Abstract: This paper investigates overseas M&A events initiated by the listed enterprises in China from 2006 to 2013. An empirical study about the influence on the shareholder wealth in several windows of overseas M&A events was conducted from two aspects, namely, the holding shares of institutional investors and the fluctuation of shareholding ratio. The empirical results show that the higher the shareholding ratio of institutional investors is, the better the shareholder wealth effect after overseas M&A will be; the frequent transactions conducted by the institutional investor before and after the overseas M&A event obviously lower than the shareholder wealth in the overseas M&A enterprises. From the heterogeneity of institutional investors, if the shareholding ratio of the pressure sensitive institutional investors is higher, the lower transaction frequency is more beneficial to improving the wealth of overseas M&A shareholders. However, if the shareholding ratio of pressure resistant institutional investors is higher, the higher transaction frequency will contribute to a reverse result.

Keywords: institutional investor, overseas M&A, shareholder wealth

1. Introduction

Cross-border M&A is a method for the enterprise to grow fastest when the market economy develops into a certain stage. After 2000, under the guidance of ‘going out’ strategy, the overseas M&A by Chinese enterprises have got a qualitative leap no matter on the scale or the number. According to the data from Zero2IPO Group, it shows that the trading volume of the overseas M&A conducted by Chinese enterprises from 2000 to 2010 increased to 28.1 billion dollars from 470 million dollars; the average compound growth rate reached 45%. In 2013, our country issued “Driving the Vision and Action of Jointly Developing a Silk Road Economic Belt and a 21-century Maritime Silk Road”. Under such background, more Chinese enterprises speeded up the pace of overseas M&A to realize the “going out” strategy. In 2014, the gross trading amount of the overseas M&A by Chinese enterprises increased to 56.9 billion dollars. In 2015, the overseas trading amount of Chinese enterprises reached 111.9 billion dollars which firstly

broke through 100 billion dollars and created a new high in history. Hainan Airlines Group successfully wholly acquired Swissport Company, the largest air-ground service and freight transport supplier in the world, at the price of 17.5 billion dollars, which improved its air service in the international market. It firstly stepped into Fortune 500 companies and became the example for overseas M&A of Chinese enterprises centering on “One Belt and One Road” layout in advance.

However, according to the report recently published by BCG, though the momentum of overseas M&A by Chinese enterprises is very strong, the completion rate of overseas M&A by Chinese sellers doesn't reach 70%. Even though the overseas M&A are completed, only 30% of M&A by large-scale enterprises can create values, which is far lower than the foreign enterprises' completion rate of 50%. How to improve the performance of overseas M&A by Chinese enterprises? What are the main influencing factors? The scholars try to do analysis from the angles of international experience, cultural distance, corporate value, the relative scale, geographical distance, exchange rate, payment, concentration ratio, legal system, nature of the target enterprise, financial situation, policy supporting degree, etc. There are few domestic scholars analyzing the shareholder wealth of overseas M&A companies from the aspect of institutional investor. In this article, it selected 541 overseas M&A events from 2006 to 2013 in China to analyze the influence on the wealth of overseas M&A enterprise from the holding shares of institutional investors, the fluctuation of shareholding ratio, and the heterogeneity. In this article, on the basis of existing research literatures, it did improvements below: (1) Selecting the fluctuation of shareholding ratio instead of simple shareholding ratio can more directly reflect the emotion and choice preference of institutional investors; (2) Classifying the institutional investors in details and investigating the diversity of different categories of institutional investors exerting functions, which is different from the general analysis before and makes the research result full of guiding significance.

2. Literature Review and Research Hypothesis

Along with that the team of institutional investors constantly grows, the ratio of the corporate shares they hold is continuously increasing. According to statistics, on March 2015, the ratio of shares hold by Chinese institutional investors has reached 40%; they have become one of important strengths in the stock market. Taking into consideration of self-interest, more and more institutional investors participated in the corporate governance. At present, the domestic and foreign scholars don't get a consistent view on the study result about the relation between the institutional investors and shareholder wealth. After studying different samples, Del Guercio (1999), Gillan (2000), Starks et al. (2000) didn't find that the enterprises on the focus list of institutional investment commission presented to be positive in the market, and even didn't find the obvious relevance. Karpoff (2013) did a study on the shareholder wealth of companies that the institutional put forward the proposal of corporate governance, and found that the shareholder wealth nearly didn't change. More scholars found that the shareholders would actively participated in the action of corporate governance for their own benefits through the methods such as utilizing voting right and submitting proposals to improve the corporate governance status and increase shareholder wealth. Through studying the annual investment portfolio reports from 1981 to 2002, Murat Binay (2005) found that

the institutional investors could well manage their customers' assets and bring excessive values for their companies. Mitsuru Mizuno (2010) collected samples of 189 Japanese listed companies from 2004 to 2007. After study, it is found that the institutional investors in Japan greatly improved the corporate governance level since 2000, and the long-term value of company was also substantially improved. Peng Ding (2013) utilized the data of companies listed on Shenzhen Stock Exchange from 2005 to 2008 in the study, and found that it presents to be a "U-shaped" curvilinear relation between the holding shares of the institutional investors in the state-owned company and the corporate performance, but in the non-state-owned company, it presents to be a positive linear relation between the holding shares of institutional investors and the corporate performance. However, in the studies of Bo Xianhui and Wu Liansheng (2009), it shows that along with that the ratio of shares hold by the institutional investors constantly increase, the surplus management level of non-state-owned company is obviously declining. Lu Hui, et al. (2012) took the companies listed in the Shenzhen and Shanghai A-share markets from 2007 to 2010 for examples and adopted the structural equation model in the study. It is discovered that the institutional investors participating in corporate governance can't directly promote the corporate performance, and the institutional investors is very likely to play a positive role and also a negative role. While another part of scholars found that an obvious positive relation exists between the institutional investors and shareholder wealth. YJ Tang and YY Song (2010) utilized the data from 2003 to 2007 in China as the sample in the study, and found that the institutional investors in China participating in corporate governance improved the corporate performance. In the study, Li Weian and Li Bin (2008) found that the institutional investors can lower the agency cost of listed company, and that it presents to be a positive relation between the ratio of shares hold by institutional investors and the market value. Lu hui, Xiao Jing Zhang wei (2012) utilized the data from 2007 to 2010 in China, the results show that Asset Management Association of China would choose the company with excellent accounting performance and play a role in improving the accounting performance of company. Yuan Rong et al. (2010) test the impact of institutional ownership by investment banks and mutual funds on firm performance in China using a sample of 1104 publicly listed companies for the period of 2001-2003. They find that equity ownership by mutual funds has a positive impact on firm performance. Thus, the following assumptions were put forward in this article:

Assumption 1: Positive Correlation between the Holding shares of institutional Investors and the Shareholder Wealth of Overseas M&A Company

From the analysis above, we can see that the domestic scholars didn't reach a consensus on that the institutional investors can bring positive wealth to the shareholders of enterprises. Most studies all are based on the angle of the holding shares of institutional investors and didn't further analyze the influence on the shareholder wealth by the changes of shares hold institutional investors. In theory, comparing with individual shareholders, the ratio of shares hold by institutional investors is higher. Thus, that the institutional investors announce to sell or purchase the stock of that enterprise in the overseas M&A event will transmit different information to the stockholders in the security market. That is, when the institutional investors think highly of the future development of an overseas M&A enterprise, they will purchase the stocks of that enterprise. On the contrary, when they don't think highly of the future development of an overseas M&A

enterprise, they will sell the stocks of that enterprise. This kind of investment preference will be transmitted to the individual investors through the institutional investors. It will consequently influence the emotion of investors and affect the stock price, and finally influence the wealth of shareholders in the overseas M&A enterprise. Gabaix (2006) thought that the transactions conducted by a large number of institutional investors would lead to the fluctuation of stock price. In the study by Greenwood (2009), it shows that the young fund manager prefer “selling into corrections”. Comparing with the senior fund manager, when it is predicated that a slumping point will appear in the stock market, his herb behavior is more obvious, which encourages the fluctuation of stock market. Through study, Yao Dequan, et al. (2010) found that it presents to be a negative correlation between the emotional fluctuation of institutional investors and the returns of stock, which shows that the Chinese institutional investors also have irrational transaction behaviors. It further confirmed that the “risk compensation” effect exists in our stock market.

Assumption 2: Negative Correlation between the Variable Ratios of Shares Hold by Institutional Investors and the Shareholder Wealth of Overseas M&A Enterprise.

3. Research Design

3.1 Assessment on the Shareholder Wealth of Overseas M&A Enterprise

3.1.1 Screening of Overseas M&A Samples

In this article, we selected all overseas M&A events occurred in Shenzhen and Shanghai from January 1, 2006 to December 31, 2013. All the data mainly come from the RESSER financial research database system developed by Beijing RESSET Technology Co., Ltd., and the CSMAR series of research database system developed by Shenzhen GTA Information Technology Co., Ltd. (GTA) according to the standards (CRSP & COMPUSTAT) for international database. On this basis, it screened the data according to the research needs. The data that don't meet the following screening conditions will be eliminated: (1) the M&A announcement event is complete; (2) the overseas acquiring company (acquiring party) is a listed company; (3) the registration place of the overseas M&A targeting enterprise is in the People's Republic of China; (4) considering the particularity of financial enterprise, only keep the samples of non-financial enterprises; (5) if the M&A events occurred in the same one enterprise, the time interval for acquisition shall exceed over 3 months, or they would be deemed as the same one M&A event; (6) delete the unsuccessful overseas M&A events and only keep the successful M&A samples. Through screening, we got 541 effective overseas M&A sample events in total. Table 1 is about the annual distribution status of the overseas M&A events by Chinese enterprises.

3.1.2 Event Study Framework

In this article, it studied the shareholder wealth of Chinese M&A companies with the event method frequently used by the foreign scholars, and selected the first official announcement of overseas M&A as the event, that is, treating the first announcement day

Year	Number of Overseas M&A	Percent of Overseas M&A	Industry Classification	Number of Overseas M&A	Percent of Overseas M&A
2006	17	3.14	Construction	40	7.39
2007	34	6.28	Industrail machinery	377	69.68
2008	66	12.20	Utilities	76	14.05
2009	41	7.58	Business	28	5.18
2010	67	12.38	Others	20	3.70
2011	87	16.09	Total	541	100
2012	118	21.81			
2013	111	20.52			
Total	541	100			

Table1 – Distribution of Overseas M&A

as the zero day. The window phrase generally selected in the foreign classical documents is between 5 days before announcement date and 5 days after announcement date. However, considering the announcement information in Chinese stock market may be leaked in advance, and the speed of digesting the overseas M&A information including stock price obviously falls behind the mature markets of American and European developed countries. Therefore, in this article, it would extend the window phrase of event, and select the period from 20 trading days before the first announcement day to 20 trading days after the first announcement day as the window phrase to more rationally evaluate the market's reaction to the overseas M&A events. On this basis, it selected six window phrases which separately are $[-1, 1]$, $[-5, 5]$, $[-10, 10]$, $[-20, 20]$, $[2, 20]$ and $[-20, -1]$, and selected $[-120, -21]$ as the clean period. After the estimation on the sample stock of each enterprise, it got α_i and β_i . The detailed steps are as follows:

Firstly, calculate the daily excess return rate with the formula below:

$$AR_{it} = R_{it} - E(R_{it}) \quad (1)$$

In the formula (1), AR_{it} indicates the excess return rate of stock i on the day t; R_{it} indicates the actual return rate of stock i on the day t; $E(R_{it})$ indicates the normal return rate of stock i on the day t.

$$E(R_{it}) = \alpha_i + \beta_i R_{mt} \quad (2)$$

In the formula (2), R_{mt} indicates the return rate in market index.

According to the formula (1), add the excess returns of stock i in each day during the overseas M&A event period. The accumulative long-term returns of stock i in the normal trading days during the period of $[T1, T2]$ can be calculated with the formula below:

$$CAR_{it} = \sum_{t=T_1}^{T_2} AR_{it} \quad (3)$$

And then, calculate the average long-term returns and average accumulative excess returns occurred during the overseas M&A event period of all sample companies. As the stock returns of a single company may be disturbed by the other events that are not overseas M&A events. In this article, it did de-noising processing to better eliminate the interference by adopting the data of large-number companies to get the average value.

The daily average excess returns of Portfolio P of N equal-weight stocks on the day t:

$$AAR_{pt} = \frac{1}{N} \sum_{i=1}^N AR_{it} \quad (4)$$

The average accumulative excess returns of Portfolio P of N equal-weight stocks in the period of [T1, T2]:

$$CAR_{pt} = \sum_{t=T_1}^{T_2} AAR_{pt} \quad (5)$$

3.1.3 Results of CAR

Variable	N	Mean	Median	Mix	Max	Sd
CAR[-20,-2]	541	0.000670	0.0138	-11.83	0.600	0.529
CAR[2,20]	541	-0.0178	0.0154	-19.02	0.576	0.832
CAR[-1,1]	541	0.00887	0.00567	-1.689	0.251	0.0934
CAR[-5,5]	541	0.00324	0.00985	-8.690	0.587	0.387
CAR[-10,10]	541	-0.0136	0.0185	-18.78	0.541	0.819
CAR[-20,20]	541	-0.0291	0.0268	-28.93	0.759	1.263

Table 2 – Characteristics of CAR of Overseas M&A

From Table 2 we can see, the average value before the overseas M&A announcement day is positive; the average value before the overseas M&A announcement day is negative. The CAR value in the short period [-1, 1] and [-5, 5] is positive. Along with the extending of window phrase, CAR value gradually declines. When the window phrase is [-10, 10], the CAR value turns to be negative; when the window phrase increases to [-20, 20], CAR value becomes smaller. On the whole, it can bring wealth for the shareholders in the short period before and after the overseas M&A announcement day. But as time goes on, this kind of influence will gradually weaken, and bring loss to the wealth of shareholders.

In order to further explain the tendency of CAR changes, Figure 1 is an overall tendency chart of CAR and AAR in 41 days in the window phrase [-20, 20]. From the Figure 1, it can be seen that the CAR value in the overseas M&A enterprise always presents to be in a declining tendency. It goes down to the lowest value on the sixth day before

the overseas M&A announcement day, and then goes up and reaches the peak value on the second day after the overseas M&A announcement day, and then presents to be in a declining tendency on the third day after overseas M&A announcement day. From the overall tendency, CAR value obviously presents to be in a “N” shape, which shows that the “abnormal returns” do exist in the acquiring enterprise before and after the enterprise announces the overseas M&A events, that is, the shareholder wealth of acquiring enterprise has “abnormal transactions”.

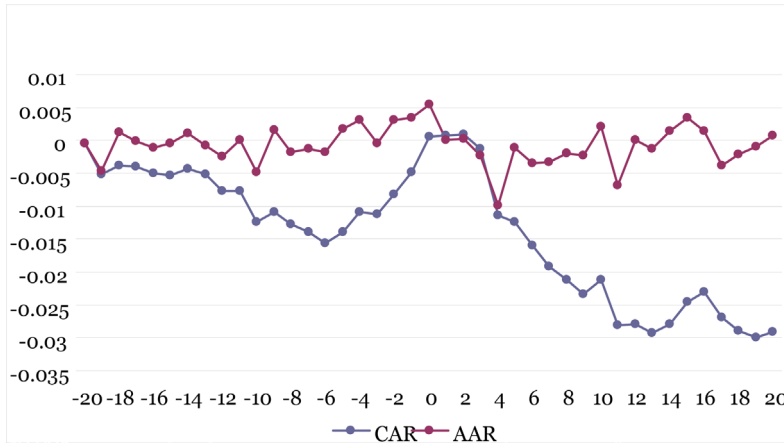


Figure 1 – Trend of CAR, AAR value

The scholars thought that in aspect of participating in corporate governance, a part of institutional investors mainly enter or quit enterprises with the method of “voting by feet” in the short period. They will not involve into the corporate governance or decision making of the invested enterprises. At this time, the institutional investors play a role of “value selector”. However, the past analysis generally focused on the holding shares of institutional investors, and ignored the influence on the corporate performance by the changes of shares hold by institutional investors. In order to further investigate the influence on the shareholder wealth of the overseas M&A enterprise by the investment preference and investment behaviors of institutional investors, we treat the fluctuation range of shareholding ratio among institutional investors as the basis for classification. For the shareholding company of the institutional investors whose changes of shares are bigger than median (including equal to), $index_1=1$; for the shareholding company of the institutional investors whose changes of shares are less than median, $index_1=0$. Through analysis in Figure 2, it can be seen that a negative influence exists between the overall changes of shares hold by the institutional investors and the shareholder wealth of overseas M&A enterprise. In other words, the bigger the changes of shares hold by the institutional investors are, the smaller the effect of shareholder wealth in its overseas M&A enterprise will be. On the contrary, when the changes of shares hold by the institutional investors are lower, the effect of shareholder wealth in its overseas M&A enterprise will be bigger.

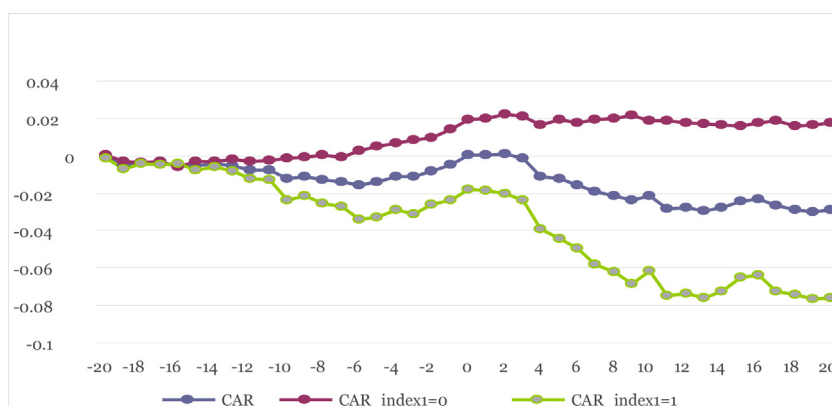


Figure 2 – The relationship between change of institutional investors holdings and shareholder wealth of overseas M&A

Next, we will see if the fluctuation of shareholding ratio among heterogeneous institutional investors will also produce an effect on the shareholder wealth of overseas M&A enterprise or not. Same as above, we still divide the institutional investors into pressure resistant type and pressure sensitive type according to the different natures of institutional investors. In this article, it firstly treated the fluctuation of shareholding ratio among pressure sensitive institutional investors as the basis for classification. For the shareholding company of the institutional investors whose fluctuation of shareholding ratio is bigger than median (including equal to), $index2=1$; for the shareholding company of the institutional investors whose fluctuation of shareholding ratio is less than median, $index3=0$. Through analysis in Figure 3, it can be seen that a negative relation exists between the fluctuation of shareholding ratio among pressure sensitive institutional investors and the shareholder wealth of overseas M&A enterprise. That is, the bigger the fluctuation of shareholding ratio among the pressure sensitive institutional investors is, the smaller the effect of shareholder wealth in its overseas M&A enterprise will be. On the contrary, when the fluctuation of shareholding ratio among the pressure sensitive institutional investors is smaller, the effect of shareholder wealth in its overseas M&A enterprise will be higher. Similarly, we treated the fluctuation of shareholding ratio among pressure resistant institutional investors as the basis for classification. For the shareholding company of the institutional investors whose fluctuation of shareholding ratio is bigger than median (including equal to), $index4=1$; for the shareholding company of the institutional investors whose fluctuation of shareholding ratio is less than median, $index4=0$. Through analysis in Figure 4, it is not hard to find that a positive relation exists between the fluctuation of shareholding ratio among pressure resistant institutional investors and the shareholder wealth of overseas M&A enterprise, which is in contrast with the relation between the fluctuation of shareholding ratio among pressure sensitive institutional investors and the shareholder wealth of overseas M&A enterprise. In other words, the bigger fluctuation of shareholding ratio among the pressure resistant institutional investors, the higher effect of shareholder wealth. On the contrary, when the fluctuation of shareholding ratio among the pressure resistant institutional investors is smaller, the effect of shareholder wealth in its overseas M&A enterprise will be lower.

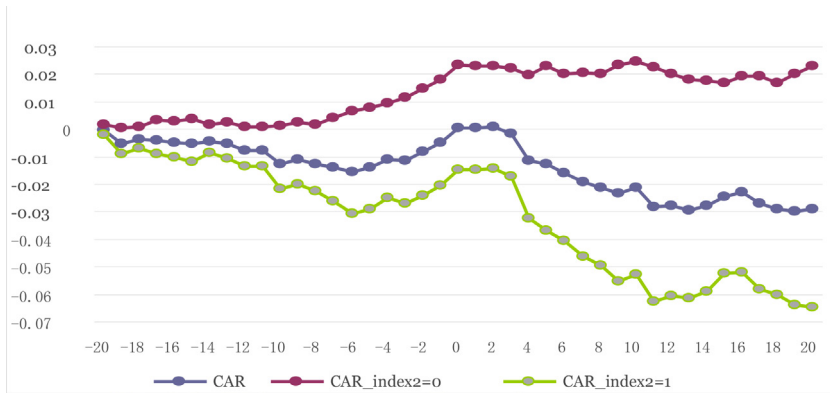


Figure 3 – The relationship between the changes of proportion of pressure-sensitive institutional investor and overseas M&A shareholders wealth

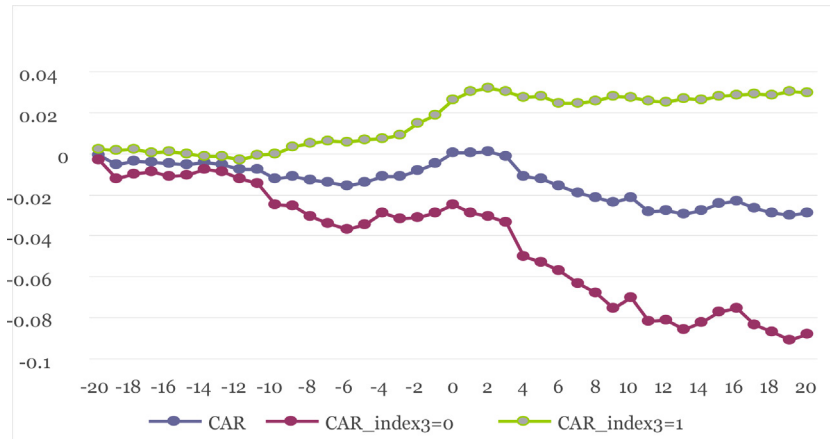


Figure 4 – The relationship between the changes of proportion of pressure-resistant institutional investor and overseas M&A shareholders wealth

3.2. Selection of Regression Models and Variables

Actually, the value of corporate value may be the results of many reasons. The cross-border M&A involves different countries and areas. Factors such as different economic and legal backgrounds, cultural diversity, value of the enterprise itself, governance structure of enterprise and financial situations all will bring different influences on the shareholders of cross-border M&A enterprises. In this article, it controlled these factors to make the results more reliable. According to the past empirical studies, the relevant variables mainly include total assets, net asset value per share, Tobin Q value, ROA, return on asset, net cash flow of each share activity, asset-liability ratio, tangible asset-liability ratio, the shareholding ratio of the first major shareholder, the shareholding ratios of the top 5 shareholder, national shareholding ratio, etc.

	Variable	Variable Description
Observed variables	INS	Total shares held by institutional investor/common share quantity
	SEN	Total shares held by pressure sensitive institutional investor/common share quantity
	RES	Total shares held by pressure resistance institutional investor/common share quantity
	CINS	$(\text{Total shares held by institutional investor/common share quantity})_t - (\text{Total shares held by institutional investor/ common share quantity})_{t-1}$
	CSEN	$(\text{Total shares held by pressure-sensitive institutional investor /common share quantity})_t - (\text{Total shares held by pressure-sensitive institutional investor /common share quantity})_{t-1}$
	CRES	$(\text{Total shares held by pressure-resistance institutional investor/common share quantity})_t - (\text{Total shares held by pressure-resistance institutional investor/common share quantity})_{t-1}$
Control variable	TQ	Enterprise market value/total assets
	ROA	Net income/total assets
	INV	$\text{EBIT}(1 - \text{income tax})/\text{invested capital}$
	LNA	Ln Total assets
	NAPS	Shareholders' equity/Total equity
	CAF	Investment activity cash flow per share
	ALI	Total liabilities/Total assets
	TAL	Total tangible assets/Total liabilities
	FS	Total shares held by the first largest shareholder/Common share quantity
	H5	Herfindahl index of the five largest shareholders
	STA	National shareholding ratio

Table 2 – Variable definition table

Description: (1) t means the quarter of Overseas M&A announcement ;t-1 means before quarter of Overseas M&A announcement

2. Values of all control variables are obtained from the value at the end of last year of listed company overseas M&A announcement.

4. Empirical Results

4.1 The Relation between the Shareholding of Institutional Investors and the Shareholder Wealth of Overseas M&A Enterprise

In this article, it adopted multiple regression models to study the relation between the shareholding of institutional investors and the shareholder wealth of overseas M&A enterprise. The calculated results are seen in Table 3. From Table 3, we can see that among 6 models, the minimum goodness-of-fit value R^2 is 0.275; the maximum goodness-of-fit value R^2 reaches 0.604. In the cross-section data model, the results are considered to be

good. It shows that the variables are properly selected. From the calculated results, apart from that the values in the window phrase $[-5, 5]$ are negative, the relation between the shareholding of institutional investors and the shareholder wealth of overseas M&A enterprise is positive. Along with the extension of window phrase, this kind of positive influence is obvious, which further confirms the Assumption 1. In other words, in a certain period (generally a short period), the more the shares hold by the institutional investors is, the bigger the effect of shareholder wealth in the overseas M&A enterprise will be. On the contrary, the smaller the shareholding ratio of institutional investors is, the smaller the effect of shareholder wealth in the overseas M&A enterprise will be. Besides, an obvious negative correlation exists between the shareholder wealth of overseas M&A enterprise and the ROA value at the end of one year before the announcement day for overseas M&A. It shows that the higher the ROA value is one year before acquiring the overseas company, the smaller the short-term shareholder wealth of overseas M&A will be. On the contrary, the lower the ROA value is one year before acquiring the overseas company, the higher the short-term shareholder wealth of overseas M&A will be. From the results in Table 3, it can also be seen that the influence on the shareholder wealth of overseas M&A by the scale of company (LNA) is positive, while the relation between the debt ratio of tangible assets (TAL) and the shareholder wealth of overseas M&A is negative. It didn't get a consistent conclusion about the influence on the shareholder wealth of overseas M&A enterprise by the Tobin Q value.

	Model(1)	Model(2)	Model(3)	Model(4)	Model(5)	Model(6)
Variable	CAR[-1,1]	CAR[-5,5]	CAR[-10,10]	CAR[-20,-1]	CAR[2,20]	CAR[-20,20]
INS	0.000881 (0.62)	-0.00105 (-0.18)	0.0236** (1.98)	0.0187** (2.27)	0.0417** (2.16)	0.0664** (2.23)
INV	0.0758*** (20.54)					
ROA	-0.0670** (-2.06)	-2.516*** (-20.44)	-5.557*** (-22.93)	-3.523*** (-21.00)	-5.706*** (-19.47)	-8.702*** (-19.24)
TQ	-0.00644* (-1.93)	0.0500*** (2.93)				
LNA		0.0192* (1.73)	0.104*** (4.94)	0.0632*** (4.34)		
TAL			-1.481*** (-12.09)	-0.931*** (-10.97)	-1.368*** (-8.96)	-2.065*** (-8.77)
CONS	0.0149 (1.49)	-0.321 (-1.34)	-1.388*** (-3.20)	-0.847*** (-2.82)	0.723*** (5.29)	1.069*** (5.07)
N	541	541	541	541	541	541
R2	0.604	0.441	0.506	0.433	0.299	0.275
chi2	840.0	427.1	640.3	533.6	429.4	417.4

z statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 3 – Influence of Institutional Investors holding on Overseas M&A Shareholders

4.2 The Relation between the Fluctuations of Shares Hold by Institutional Investors and the Shareholder Wealth of Overseas M&A Enterprise

In order to further verify the influence on the shareholder wealth of overseas M&A enterprise by the fluctuations of shares hold by the institutional investors, in this article, it adopted multiple regression models to study the relation between the fluctuations of shares hold by the institutional investors and the shareholder wealth of overseas M&A enterprise. The calculated results are seen in Table 4. From the results, we can see that the relation between the fluctuations of shares hold by institutional investors and the shareholder wealth of overseas M&A enterprise is negative, and this kind of negative influence is obvious. In other words, in a certain period (generally a short period), the more the fluctuations of shares hold by the institutional investors are, the smaller the effect of shareholder wealth in the overseas M&A enterprise will be. On the contrary, the smaller the fluctuations of shares hold by the institutional investors are, the bigger the effect of shareholder wealth in the overseas M&A enterprise will be. This result confirms the conclusions of Fisher and Statman (2006). If the fluctuation of shareholding ratio is regarded as the emotional expression of the institutional investors, it shows that the emotion of Chinese institutional investors obviously influenced the shareholder wealth of overseas M&A enterprise, and this kind of influence is negative. At the same time, it indicates that a “risk compensation” effect exists in Chinese security market. However, in the process of doing study aiming at the heterogeneous institutional investors, it was not found that any influence on the shareholder wealth of overseas M&A enterprise by the pressure sensitive institutional investors and the pressure resistant institutional investors exists, namely, the “risk compensation effect” doesn’t exist.

Variable	Model(1) CAR[-1,1]	Model(2) CAR[-5,5]	Model(3) CAR[-10,10]	Model(4) CAR[-20,-1]	Model(5) CAR[2,20]	Model(6) CAR[-20,20]
CINS	-0.00463** (-1.98)	-0.0173** (-2.27)	-0.0525*** (-3.16)	-0.0251** (-2.15)	-0.0347** (-2.22)	-0.0555** (-2.31)
ROA	-0.517*** (-13.90)	-2.587*** (-19.34)	-5.608*** (-17.21)	-3.524*** (-19.24)	-5.681*** (-20.82)	-8.658*** (-20.59)
LNA	0.00691** (2.10)	0.0452*** (3.61)		0.0604*** (3.71)	0.107*** (4.20)	0.161*** (4.10)
TAL	-0.134*** (-6.96)	-0.693*** (-10.02)	-1.375*** (-8.24)	-0.950*** (-9.99)	-1.556*** (-11.02)	-2.350*** (-10.80)
TQ		0.00977 (0.49)	-0.0188 (-0.42)		0.0417 (1.02)	0.0590 (0.94)
CONS	-0.0784 (-1.17)	-0.630** (-2.37)	0.680*** (5.63)	-0.821** (-2.49)	-1.579*** (-2.91)	-2.386*** (-2.86)
N	541	541	541	541	541	541
R2	0.108	0.344	0.129	0.326	0.408	0.390
chi2	228.3	466.1	353.6	448.1	545.2	531.2

z statistics in parentheses, * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 4 – Influence of Changes of Institutional Investors holding on Overseas M&A Shareholders

5. Conclusion

In this article, it analyzed the effect of shareholder wealth in the Chinese M&A enterprise from the angle of institutional investors, and selected 541 overseas M&A events occurred in Shenzhen and Shanghai from 2006 to 2013 as the samples to conduct empirical study, and got following conclusions.

1. The influence on the shareholder wealth of overseas M&A enterprise by the shareholding ratio of the institutional investors is positive, and along with the extension of window phrase, this kind of influence is more obvious and tends to be accelerated. It shows that Chinese institutional investors are actively participating in the corporate governance and gradually playing a more and more important role, and this kind of influence is positive.
2. The relation between the fluctuation of shareholding ratio among Chinese institutional investors and the shareholder wealth of overseas M&A enterprise is negative. It indicates that a “risk compensation” effect exists in the Chinese stock market.
3. The heterogeneity of institutional investors has a certain influence on the shareholder wealth of overseas M&A enterprise, while the shareholding ratio of the pressure resistant institutional investors weakens the effect of shareholder wealth in the overseas M&A enterprise. However, the fluctuation of the shareholding ratio among the pressure sensitive institutional investors weakens the effect of shareholder wealth in the overseas M&A enterprise; the fluctuation of the shareholding ratio among the pressure resistant institutional investors strengthens the effect of shareholder wealth in the overseas M&A enterprise.

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Risk Analysis of Foundation Construction PPP Project based on Computer-aided Data Mining

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Abstract: With the development of computer information technology, large data mining has been widely used in economic statistics. In this paper, the authors make risk analysis of foundation construction PPP project based on computer-aided data mining. Public-private partnership (PPP) model as a new financing model is introduced into the infrastructure projects; it has changed the traditional mode which government has high financing pressure, and reduces the financing risk. Through empirical analysis, we find out the main risk factors of infrastructure financing, and evaluate the importance of various factors, and then make effective project risk assessment and analysis.

Keywords: Data mining, Foundation construction, Public-private partnership, Risk analysis

1. Introduction

Public Private Partnerships is a new public-private partnership mode, at present has been widely used in infrastructure projects, which overcomes the disadvantages of traditional financing mode of public funds shortage, long life cycle, low efficiency of management and the risk of defects such as, but also for the private sector to broaden the financing channels and get some profit (Azadi, 2014). In the mid-1980s, the project financing in our country has been widely used, mainly related to the highway, water plant, power plant, etc., in order to BOT mode is the most used method (Dirk, 2008; Hastak, 2009). As China is in a period of economic development, countries in order to stimulate domestic demand, to catch up with the developed countries the level of the city, we must accelerate the construction of infrastructure, but the state spending is limited after all, the main investment mainly includes following several aspects: government bonds, local government budget, policy loans and private investment and foreign investment. It is precisely because of the limited national spending, the private capital to enter the field of infrastructure has laid the foundation (Songer, 1997; Jiménez, 2015). PPP mode of continuous use and infrastructure in short supply, the introduction of PPP infrastructure projects to lay the foundation for this model, but also to achieve

a win-win situation between public and private parties (Martin, 2007). However, in the PPP mode of development is not mature Chinese, it is important to realize the risk management of the entire PPP infrastructure project objectives, both public and private is necessary to identify and evaluate the risks and objective of infrastructure PPP project to deal with. Therefore, in order to achieve the smooth development of the infrastructure PPP project, we must strengthen the risk management of infrastructure PPP project.

In infrastructure PPP project, the public and private sectors have their advantages and disadvantages in the joint venture, the public sector generally represents the state and local governments, and the private sector represents the private sector or private enterprises, some enterprises consortium (Terry, 2004). Public sector strategies have an impact on the project, but the lack of public sector funds, financial allocations cannot meet the demand for infrastructure investment, the management efficiency is low; the private sector of private capital, is also very rich management experience, but also has high creativity and strong initiative, but the private sector to bear the risk control ability limited (Zhang, 2014; Wang, 2015). PPP model was first used in the UK, at present; most of the developed countries in the world have applied the PPP model in the construction of infrastructure projects. In developed countries, the main application range covers a lot of public infrastructure, such as public transportation, water industry, electric power energy, defense, health, police, prisons and other large infrastructure etc. In China, private enterprises have also developed rapidly, and a large number of private capital idle, which provides an objective condition for the use of this model in the construction of infrastructure projects.

2. Data mining based on computer information technology

2.1. BIRCH algorithm

Birch algorithm is a very effective, traditional hierarchical clustering algorithm; the algorithm can be used to scan the scan efficiently and effectively to deal with outliers. Birch algorithm is based on the hierarchical clustering, which combines the hierarchical aggregation and iterative relocation method. Firstly, the algorithm is used to improve the results by the bottom-up algorithm. Is the use of hierarchical agglomerative bottom-up strategy, firstly each object as a cluster, and then combined to form larger clusters of these clusters, reduce the number of clusters until all objects are in one cluster, or a termination condition is satisfied.

Birch algorithm is mainly divided into the following two stages:

1. Scanning the database, the establishment of a dynamic tree stored in the memory of the CF tree. If the memory is not enough, then increase the threshold, in the original tree based on the structure of a smaller tree.
2. The leaf node further using a global clustering algorithm, to improve the quality of clustering. Because the CF tree's leaf node represents the clustering may not be the natural clustering result, the reason is that the threshold limits the size of the cluster, and the data input sequence also can affect the clustering result. Therefore, the leaf nodes need further use of a global clustering algorithm, to improve the quality of clustering.

$$CF = (n, LS, SS) \quad (1)$$

$$LS = \sum_{i=1}^n x_i \quad (2)$$

$$SS = \sum_{i=1}^n x_i^2 \quad (3)$$

The use of CF (cluster feature) can be derived from a part of Statistics: c

$$x_o = \frac{\sum_{i=1}^n x_i}{n} = \frac{LS}{n} \quad (4)$$

$$R = \sqrt{\frac{\sum_{i=1}^n (x_i - x_o)^2}{n}} = \sqrt{\frac{nSS - 2LS^2 + nLS}{n^2}} \quad (5)$$

$$d = \sqrt{\frac{\sum_{i=1}^n \sum_{j=1}^n (x_i - x_j)^2}{n(n-1)}} = \sqrt{\frac{2nSS - 2LS^2}{n(n-1)}} \quad (6)$$

The average distance of the objects in the cluster was measured by d.

$$d^* = \sqrt{\frac{SS_1}{N_1} + \frac{SS_2}{N_2} - \frac{2LS_1LS_2}{N_1N_2}} \quad (7)$$

2.2. Data mining technology

In recent years, data mining has attracted great attention of the information industry, the main reason is the existence of a large number of data, can be widely used, and the urgent need to convert these data into useful information and knowledge (Gonçalves et al, 2015). At the same time, under the network environment, in order to adapt to the growth of data quantity and cross regional business operations, enterprise data stored in the data warehouse or distributed data center, a large number of existing data

management software and business software does not support distributed network environment mining technology, which can deal with the need to build a distributed data storage perform data analysis tasks and distributed data mining pattern. Data mining generally refers to the process of searching for information hiding in the data from a large number of data.

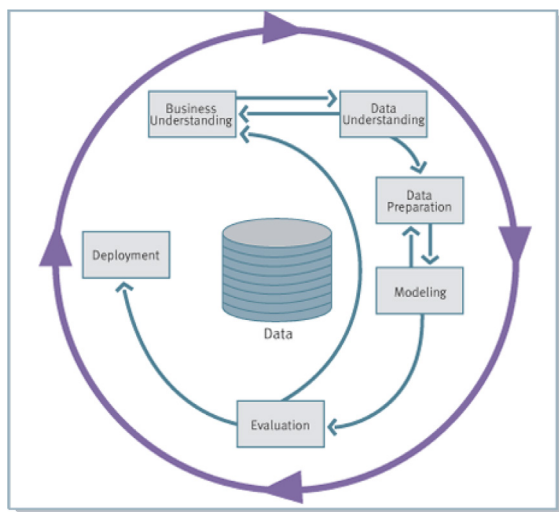


Figure 1 – Data mining

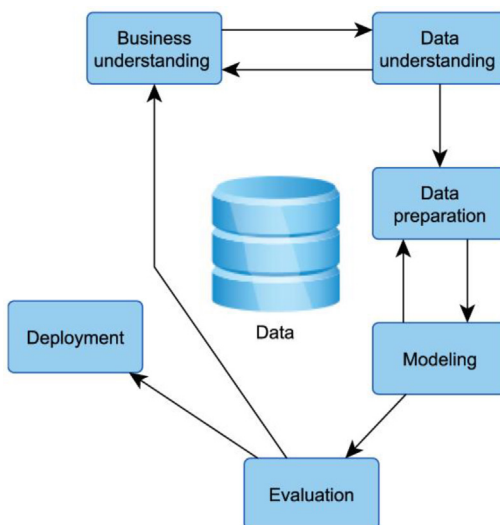


Figure 2 – Data mining model

Most of the existing data mining solutions to the system as the center, with special emphasis on Algorithms and systems engineering, not from the perspective of the user to explore the application of data mining technology, so that the system is difficult to operate and use. Some data mining tools for professional and technical personnel, do not know if the algorithm is difficult to obtain good model, it increases the enterprise vertical development of data mining technology cost platform, hindered the data mining enterprise application.

3. Risk identification of infrastructure PPP projects

The risk of any infrastructure PPP projects are related to the project itself and the various factors of uncertainty, the uncertainty mainly comes from the following three aspects: the influence factors and the external environment of the main project decision and project internal facilities. Among them, the main project external environment uncertainty refers to projects where the external environment (such as climate, geology, etc.) and macro environment (such as policy, economy and law); project decision-making uncertainty mainly refers to various decision-making activities in project main body in the process of the project, the decision is not uncertain cause results; internal facilities project uncertainty refers to the variation in the use of process equipment and all infrastructure projects involving; mutual influence of the three aspects of uncertainty, the risk of infrastructure PPP project.

Through the analysis of the common infrastructure PPP project risk factors, in order to analyze and evaluate further better ranking effect of each risk in infrastructure projects, the infrastructure PPP project risk is divided into the state, market and project 3 levels.

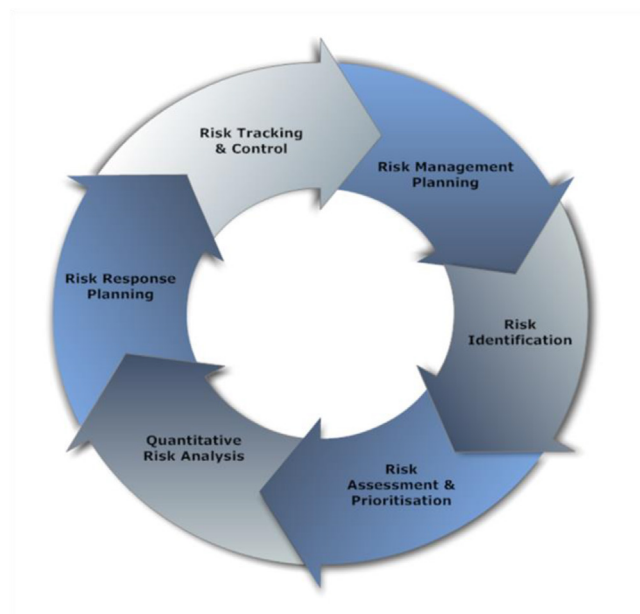


Figure 3 – risk analysis

Among them, for each level of the 12 major categories of the main risk factors may exist in the specific form of the breakdown of a variety of risk factors. The national level risk refers to the potential in the political, legal, social, and natural, such as political stability, legal regulation is not perfect, improve the ability to respond to natural factors and social event changes. The level of the market risk especially in a particular country, the risk of financial and economic environment, financing environment, infrastructure projects and the third party in the PPP market potential, including financial market changes brought about changes in the cost of financing, the market environment changes bring changes of operation risk, market competition demand caused by the change of the project risk and the third party the risk of changes in the market etc. The project level risk refers to the potential risks in the infrastructure PPP projects, such as construction risk, operational risk, design risk, cooperative relationship risk, etc.

	First order index	Second level index
Infrastructure PPP project risk	National level risk	Political risk
		Legal risk
		Natural risk
		social risk
	Market level risk	financial risk
		Financing risk
		market risk
		Third party risk
	Project level risk	Construction risk
		Operational risk
		Design risk
		Cooperation risk

Table 1 – Paired sample T test be

4. Evaluation of the risk importance of infrastructure PPP project

4.1. Level structure model construction

Analytic hierarchy process is a method of quantitative and qualitative analysis, qualitative analysis and quantitative analysis. AHP is a systematic evaluation object or problems, according to the general nature of the target object and the expected arrival, this problem is divided into different elements, and according to the correlation between the elements and the relationship between elements of different levels in synthesis, the problem of hierarchical structured, hierarchical structure formation, determined through 22 the relative importance of the 22 elements of each layer in comparison to that obtained with respect to the total importance of target layer sorting. First of all, to make clear the importance of the target layer of the PPP project risks study of the infrastructure project. As the criterion layer factors in the target layer, in the research of PPP project

risk management, the main criteria layer has the national level, the market level and the project level risk. Through the in-depth study of the risk analysis of PPP project, there are 12 main types of risk factors, which are the main criterion layer and the impact on the PPP project.

4.2. Judgment matrix

This paper adopts the expert questionnaire, this is network expert questionnaire, expert questionnaire 300 copies of the receipt, valid copies of 294 copies, due to different experts from different angles, different knowledge and experience, judgment matrix judgment on the same income criteria may be different, so according to the above definition important degree of risk, the weighted average of each expert to score, after all the calculated judgment matrix.

$$A - B_i = \begin{bmatrix} 1.4 & 0.48 & 0.35 \\ 2.8 & 1.2 & 0.6 \\ 4.3 & 2.6 & 1.5 \end{bmatrix}$$

The second level index judgment matrix is as follows:

$$B_1 - C_{1i} = \begin{bmatrix} 1.1 & 0.79 & 0.55 & 0.41 \\ 1.4 & 1.2 & 0.62 & 0.32 \\ 2.1 & 1.7 & 1.1 & 0.64 \\ 2.5 & 2.4 & 1.5 & 1.3 \end{bmatrix}$$

$$B_2 - C_{2i} = \begin{bmatrix} 1.0 & 0.84 & 0.42 & 0.63 \\ 1.6 & 1.5 & 0.56 & 0.78 \\ 2.4 & 2.0 & 1.2 & 0.91 \\ 3.1 & 2.6 & 1.9 & 1.0 \end{bmatrix}$$

$$B_3 - C_{3i} = \begin{bmatrix} 1.0 & 0.54 & 0.61 & 0.33 \\ 1.7 & 1.1 & 0.52 & 0.45 \\ 2.5 & 1.6 & 1.1 & 0.78 \\ 2.8 & 2.1 & 1.8 & 1.2 \end{bmatrix}$$

4.3. Consistency check

According to the basic calculation steps of single sort vector, the calculation procedure is as follows:

$$M_1 = \prod_{j=1}^3 B_{ij} = B_{11} \times B_{12} \times B_{13} = 0.0945$$

For vector normalization, that is:

$$W_i = \frac{m_i}{\sum_{i=1}^3 m_i}$$

We can get:

$$W_{A-B} = [0.1130 \quad 0.3254 \quad 0.5749]$$

The maximum eigenvalue of the matrix:

$$\lambda_{\max} = \sum_{i=1}^3 \frac{(AM)_i}{3W_i} = \frac{1}{3} \sum_{i=1}^3 \frac{\sum_{j=1}^3 B_{ij}w_j}{w_i} = 3.0124$$

Calculation consistency index CI:

$$CI = \frac{\lambda_{\max} - 3}{3 - 1} = 0.0062$$

The average random consistency index RI = 0.58, the consistency of the judgment matrix can be accepted by CR=0.0106<0.1. The comprehensive weight of each risk factor to the risk assessment of the infrastructure PPP project is calculated, and the weight set is established.

$$W = W_c \times W_{A-B} = (0.017 \quad 0.018 \quad 0.031 \quad 0.046 \quad 0.037 \quad 0.052 \dots \\ 0.075 \quad 0.081 \quad 0.064 \quad 0.083 \quad 0.127 \quad 0.245)$$

The weight vector of the target layer A from the criterion layer B can be learned in the order that the risk importance of the infrastructure PPP project is Project level risk<Market level risk<National level risk; The importance of the 12 major categories of risk factors can be sorted into: Cooperation risk < design risk < third party risk < operation risk < construction risk< market risk <social risk<financing risk< natural risk < financial risk< legal risk < political risk. Using the analytic hierarchy process to evaluate the importance of the risk factors of PPP project, with the infrastructure PPP project risk factors to build a hierarchical structure, the data collected by questionnaires, according to the judgment matrix and calculate weight vector and the characteristic matrix that the risk value of data, to evaluate the importance of risk factors, the weight vector of infrastructure PPP project risk factors, the judgment matrix of each level of risk. One sort and examine their consistency.

5. Conclusion

In the infrastructure urgently needs to develop today, PPP model as a new financing model is introduced into the financing of infrastructure projects. It has changed the traditional mode of government financing pressure, the risk of large, low management level of these limitations, the construction of infrastructure projects in the introduction of private capital to solve the financial problems on the outside, but also the private sector into the advanced technology and efficient management experience, improve the success of operation efficiency, realize the public “win-win”, also promote the development of infrastructure projects. Through reading and summarizing the domestic and foreign literature, from the current situation of China’s infrastructure, based on the theoretical study, the risk factors were analyzed and summarized the domestic and foreign infrastructure PPP projects have been identified and their characteristics, sources, imputation object; then based on the risk existing in the hierarchy, the establishment of risk index system of PPP infrastructure project, the risk evaluation and the important degree; risk sharing principle and risk allocation scheme under the specific project risk analysis subject should bear the corresponding measures on the risk.

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Innovation and Practice of Teaching Reform of College Mathematics Course under the Background of Information Technology

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Abstract: The integration of information technology and college mathematics curriculum is becoming a hot issue in information technology education. The application of modern information technology has led to the development of educational level, which has formed the core of the modern educational technology, such as multimedia, network and artificial intelligence. By using multimedia software in mathematics teaching, it could increase the intuitive, experimental, interesting, and reduce the difficulty of learning. The integration of information technology and mathematics curriculum can make full use of the advantages of modern information technology, and make computer technology as a teaching aid. Survey has proved that students are more likely to accept dynamic multimedia teaching, and multimedia teaching helps to improve mathematics teaching efficiency.

Keywords: Computer multimedia, Sequencer software, Interactive creation, Animation music

1. Introduction

With the rapid development of the modern era of information technology, multimedia and network technology as the core of information technology has changed the human learning and the survival and development of the environment, has become the creative tool of expanding human ability, the education is also had a tremendous impact (Chung, 2013; Aguilar, 2014). Information technology usually refers to access to information, processing information, the use of storage in information technology, the core includes sensor technology, communication technology, computer technology and microelectronics technology, the information technology mainly refers to the multimedia computer technology (Gopinathan, 2012). The integration of information technology and college mathematics has become a hot topic of current information technology education in our country and even the whole education in the process of information, provides richly endowed by nature (Gikas, 2013). The soil spreading development on the one hand, it is the university mathematics curriculum, on the other hand the University Mathematics Curriculum The value, goal, content and method of

teaching and learning has great influence, therefore become the concern of the majority of mathematics educators. Mark information society is a computer as the core of the information revolution; this revolution affects the social, economic, cultural and other aspects (Mahony, 2012; Kozhevnikov, 2014). The computer has a profound impact on mathematics, including the development of modern science and technology, including computer technology, will undoubtedly greatly affect the status quo of mathematics education. School mathematics teaching conditions will be further improved; mathematics education began to enter the era of information.

The integration of information technology and the university mathematics curriculum is not simply the superposition of information technology as a teaching method and traditional teaching method, but to the advanced education thought, under the guidance of the theory (Mora, 2014). Using the advantages of modern information technology, be used as auxiliary tools, emotion teaching tools, teaching environment incentive the creation of cognitive tools and independent learning, make all kinds of teaching resources, all teaching elements and teaching through the collation, combination, mutual integration, to achieve fundamental change in the way students learn, from the acceptance of learning into real self-exploration learning and meaningful passive, to better cultivate students' innovative consciousness and the spirit of innovation, innovation ability and the ability to solve practical problems. In order to achieve the integration of the real significance of the information technology and mathematics curriculum of the university, it is very necessary to discuss the way of integration and its theoretical basis, which is a problem to be solved urgently (Gonçalves et al., 2015).

2. Modern information technology

2.1. Multimedia technology

Modern information technology is used in education, which leads to the development of educational technology, and the modern educational technology, which is based on multimedia, network and artificial intelligence (Porter, 2014). The modern education technology compared with traditional educational technology, its role is more prominent, not only is to update the teaching methods and teaching means, more important is the full impact and challenge to traditional education theory and practice, will eventually lead to the education of integrity and fundamental change (Taras, 2013). In the aspect of education means and methods, modern educational technology is mainly based on information technology, the electronic technology, multimedia technology, computer network, application of remote communication and other advanced information technology in the process of education, optimizing the education information, selection, storage, transmission, transformation and distribution process, so as to improve the efficiency of education the teaching of information processing. The application of modern educational technology will lead to the information of education, so as to promote the modernization of education, so that modern educational technology plays an important role in the process of modern education reform, is an important part of the modernization of education.

The variety of teaching media is varied, each kind of media has its own advantages and disadvantages, a lack of media often can be made up by the advantages of other



Figure 1 – Multimedia teaching

media. Among them, the high precision, high speed and graphics function of the computer can provide a good condition for mathematics learning and teaching. In the university mathematics classroom teaching, CAI courseware can provide theorems and formulas, reasoning process, computational techniques and three-dimensional graphics and other material in mathematics, teachers use these materials, teaching according to the specialty and teaching organization design, computer processing of text, image, sound, animation and other information, the formation of multimedia teaching system sound, image, graph, text, fully demonstrate the process of mathematical thinking. For example, mathematics teaching software could improve the students' learning in mathematics, more intuitive, experiment and interest in mathematics teaching, reduce the difficulty of learning. At present, the Geometer's Sketchpad Assisted Mathematics Teachers' role has been recognized. In Learning Calculus, we can use the Geometer's Sketchpad dynamic demonstration. This dynamic demonstration can reveal the infinite thought more than the traditional teaching, and it is helpful for students to understand the essence of mathematics.

2.2. Digital teaching platform

At present, more commonly used PowerPoint, Flash, Authorware, EduOffice interactive digital teaching platform, such as Super Sketchpad multimedia presentation and editing software. In the university mathematics class, the proof process is made into PowerPoint, class, with the help of the screen detailed analysis of the theorem of proof ideas, the use of a variety of slides. Insert mode. , each explain one step reasoning, and then show one step process, take less time, so that students of the origin of the theorem does not feel too sudden or incredible, but also allows students to have the opportunity to think independently and to specify the way after class. For example, the differential mean value theorem and its proof can be revealed from the geometric relationship between

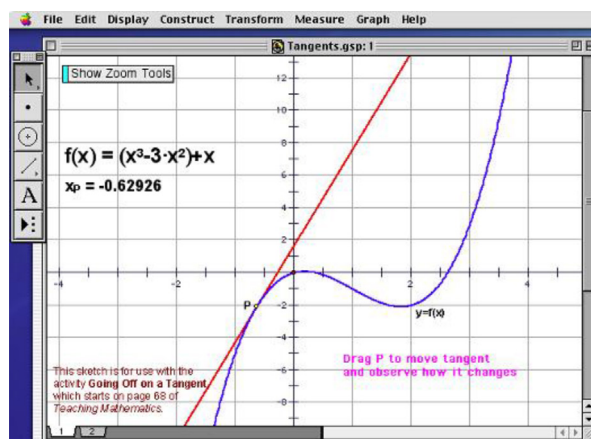


Figure 2 – Mathematics teaching software geometry sketchpad

the number of facts, theorem and proof of some PowerPoint, combined with the slides to explain, to enable students to produce the theorem has a clear understanding. Teachers can use the blackboard writing time saved, analysis of several methods of constructing auxiliary function using blackboard. Time consuming is not much; it helps to cultivate students' analytical thinking and logical reasoning ability. To prove integral nature of the students easy to accept, if the nature of the writing on the blackboard and then one by one, not only time-consuming, students also feel boring. If you take one or two of the nature of the explanation, and the rest stay for self-study, students of all the nature of the impression is not necessarily profound and comprehensive. In this case, teachers can be based on the geometric meaning of making some slides, according to the projection screen and explain; you can achieve good results, save time, and help students to cultivate the ability to generalize the overall.

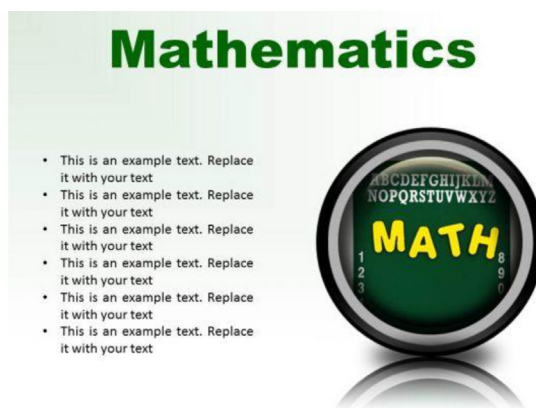


Figure 3 – Mathematics teaching PPT

Flash production of multimedia teaching courseware small size, can be downloaded while playing, and do not have to wait for a long time. FLASH can also generate animation; insert the sound in the courseware. ActionScribe interactive scripting language provides a custom function and powerful mathematic function of color, sound, XML object supports Flash, Flash in ActionScribe script, can produce high quality animation and strong interaction. It can be used in the teaching of statistics and probability theory of college mathematics courses, to increase the interest of learning, to cultivate students' sense of random and creative thinking. It sets the multimedia document editing and presentation in a body, operation methods and the use of MS interface and Office are basically the same, but also adds multimedia mixing (i.e. map, text, sound, animation, video, etc.), mathematical formula editing, graphics rendering and mathematics teaching function, especially for the majority of Teachers and students the development of the education sector special Office software. The teaching design of college mathematics curriculum content of each part, if according to their characteristics, the software with the use of making courseware suitable for students, not only will greatly increase the learning interest, but also to the excellent effect of There is nothing comparable to this to cultivate students' thinking ability.

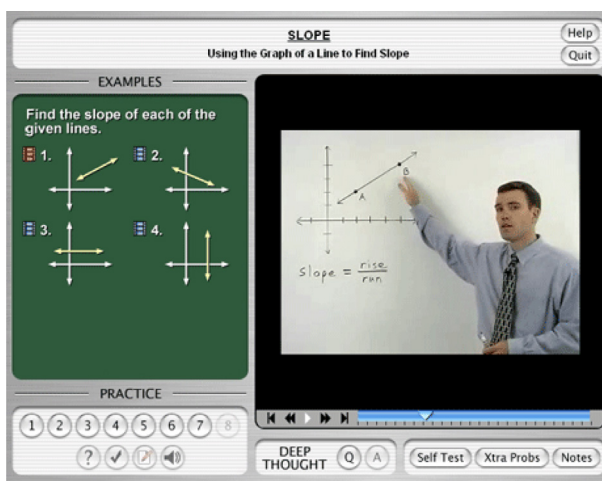


Figure 4 – Mathematics teaching platform

3. Integration of information technology and Mathematics Teaching

3.1. The necessity of modern educational technology

The integration of information technology and mathematics curriculum, is the use of modern information technology, as a teaching aid for teachers, students and cognitive tools emotional incentive tools, digital learning resources construction, students realize the reform way of learning, from passive learning into real self-exploration learning and meaningful learning. Especially the construction of the teaching mode of the integration of information technology and mathematics curriculum based on, in order to better cultivate students' innovation consciousness, innovation spirit, innovation

ability and the ability to solve practical problems. Using modern educational theory and modern information technology, the design, development, evaluation and management of educational resources and teaching activities are carried out in order to realize the optimization of teaching theory and practice.

Modern educational technology makes full use of the achievements of modern science and technology are numerous, for educational technology studies have provided new methods, new theories and new content, more educational technology laid the material premise and foundations. Educational technology is based on the theory of media theory and audio-visual education, the research and application of audio-visual media in education, promote the education technology, the means of progress and development. Educational technology is used to guide the theory, system theory and methods of all kinds of activities to optimize the learning process, the teaching design included in educational technology, is to optimize the teaching effect for the purpose of learning theory, teaching theory and communication theory as the theoretical basis.

Using advanced scientific and technological means and information processing technology, the learning resources and the learning process of scientific management and evaluation. With the development of science and technology, a large number of modern scientific and technological achievements have been applied to education, which not only enrich the learning resources, but also provide scientific and advanced technology and methods for the management of educational resources. With the computer as the control center of information processing technology, for the learning process and the evaluation and management of teaching process to bring great convenience, so that it is accurate and fast.

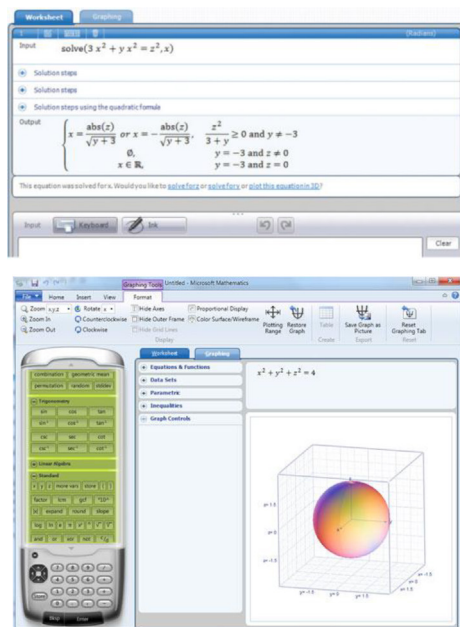


Figure 5 – Coordinate simulation mathematics

Modern education technology as a tool of mathematics teaching is to put modern educational technology into mathematics teaching, as the use of the blackboard, chalk, paper and pen as natural, smooth. The modern educational technology on the auxiliary mathematics teaching, it is important to note that the auxiliary mathematics teaching is to assist teachers to assist students. But teachers should according to the actual mathematics teaching content and students, the use of modern educational technology restructuring, knowledge of curriculum content creation, based on modern educational technology and friendly interaction will be integrated processing development for students learning resources, we should let the students take modern educational technology as the information needed to obtain mathematical knowledge, to explore and solve the problems of cognitive tools.

3.2.Characteristics of modern educational technology

The development of modern educational technology has created a wealth of mathematics teaching and learning resources, and these resources are organized in accordance with the characteristics of the structure of the hypertext structure in accordance with the characteristics of human association. Every student can obtain abundant learning resources from, can conveniently and quickly and effective learning, break through the cyber source books are the main source of knowledge, enrich the classroom teaching closed, isolated, greatly expanded the amount of knowledge teaching, so that students' learning is no longer confined to the textbooks of mathematics content. The integration of modern educational technology and mathematics teaching is not only a teacher demonstration and teaching knowledge to students, but also helps students to carry out knowledge reconstruction and creation. At the same time, modern educational technology has the following advantages in higher education:

- ***To provide an ideal teaching environment:*** Modern educational technology is a multimedia, network and intelligent organic combination of interactive, open dynamic teaching environment for college mathematics teaching. The teaching environment is not only confined to the school building, classroom, library, lab, playground and study area composed of family places of learning, and includes learning resources, teaching mode, teaching strategy, learning atmosphere, interpersonal relationship and other factors, and its teaching activities coexist; teaching situations and conditions are constantly changing the teaching environment is not static, but dynamic.
- ***Provide an ideal operating platform:*** Modern education technology set text, sound, graphics, images, animation and other forms of information expression in one, for the university mathematics teaching provides an ideal platform for the operation. L) expand the functions of modern educational technology, teaching content out of the textbooks and teaching book limitations, realize the diversification of teaching resources; 2) modern educational technology representation function, we can make some abstract process, the phenomenon of micro simulation process of dynamic analysis, for fixed moment the phenomenon, which makes the teaching content vivid; 3) virtual function of modern educational technology, makes the presentation of teaching content from the text graphic narrative mode,

- ***A new teaching relationship is constructed:*** Modern educational technology has brought about the teaching relations, the transformation of the relationship between teachers and students, the construction of a democratic, equal, new teaching relationship. The boundary of teaching and learning become blurred, the relationship between teachers and students become relatively, students fear degree of teachers is greatly reduced, the communication between teachers and students tend to be more equal and open, teachers become students to respect the elderly, partners in learning and discussing the opponent, best friends, teachers and students can obtain the psychological. To promote the Teaching benefits teachers as well as students.
- ***To better achieve the teaching of interaction and cooperation:*** The real teaching should be a process of education and learning, the main subject of interaction of teachers, students, teaching media, teaching environment of multiple teaching relationship, emphasizing multiple interactive teaching, modern educational technology emphasizes cooperation between teachers and students involved, provides a new possibility for multiple interaction and cooperation teaching. Each person is the recipient of the information, and the output of the information, the dual identity of the educators and the educated in the mutual inspiration, mutual complement, and mutual guidance of the cooperative relationship.

4. Innovation and practice of teaching reform of Mathematics Course

4.1. Dynamic class presentation

The classroom demonstration is the information technology used for the initial presentation of the mathematics teaching, is the lowest level of information technology and curriculum integration, is currently the most higher education are in the classroom demonstration level. Dynamic mainly refers to the teacher according to the teaching content, the computer assisted instruction software, multimedia database or simulation software and other information technology application in the classroom teaching, through the map, text, sound, image presentation, static to dynamic and easier, the abstract to the concrete, and then show the knowledge discovery process in the dynamic environment, the symbol thinking and psychological characteristics of college students, so as to mobilize the students' enthusiasm and initiative. This science, mathematics need to observe, also needs to carry out mathematical experiment. The experiment is an important means of the integration of information technology and the teaching of college mathematics curriculum. Mathematics experiment single refers to the situation of teachers problem, each student in a machine, computer to provide technical support to do the experiment, the whole experiment the students actively participate in discovering and solving problems, to obtain mathematical research and solve the problem in the process of experience, from the emotional experience, have a sense of achievement, improve mathematics, mathematics, consciousness and ability, and develop their innovative potential. The experiment process can be divided into five aspects: creating situations and activities with the experiment, discussion and exchange, induction and conjecture, verification and mathematics.

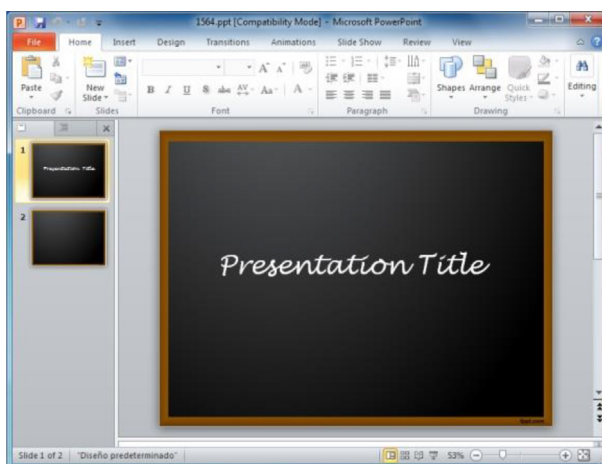


Figure 6 – Dynamic classroom presentation

4.2. To carry out mathematical experiment research

The traditional teaching methods to cultivate students' ability of observation and analysis, data processing and scientific computing capacity is obviously insufficient, the ability to carry out scientific research ability is more important to train high-quality personnel. The mathematics experiment mathematics teach the students to observe the phenomenon by experimental methods, explore the mathematical rules through mathematics experiment to enable students to master the advanced mathematical software, highly integrated, the general mathematical ability to enhance scientific computing ability. Although the mathematical experiment gives the mode of integration of information technology and mathematics curriculum, it does not mean that this course is the integration of the university mathematics curriculum. Mathematical experimental teaching materials have been published, there are still many aspects need to be further improved, such as it is not a systematic introduction of various fields of mathematics knowledge, but to play the advantages of the computer in various issues show beneficial aspects of mathematics and computer studies. Mathematical experiments should be positioned in the use of computer software for mathematical problems through observation, data processing and graphics analysis to understand the theory of Mathematics.

4.3. Integration of network curriculum resources

With the development of quality education and the promotion of information technology, the deep integration course of an open, resource centered network teaching emerged. Network teaching full interaction refers to the learners in the open environment of computer network, break the traditional education time and age limit, "whenever and wherever possible for full interactive" learning and teaching in the school without walls. In this process, between teachers and learners across space for real-time and non-real time interaction, learners need to choose according to the actual situation of

their contents, the main source of knowledge is limited by various breakthrough books, related resources to enrich the closed, isolated classroom teaching, expand the teaching knowledge, so that students not only learn the content of the textbooks, but can broaden their thinking, see hundreds of ideas; they can at any time A difficult problem in learning, and can get timely answer. The learner centered learning environment, give full play to the initiative, learning enthusiasm and creativity. The interactive network teaching is a new, interactive, open, lifelong learning system to learn and teach endowed with new connotation, but also brought profound changes to education, promote the education idea, education idea, teaching mode and teaching methods are constantly updated.

5. Conclusions

The integration of information technology and the university mathematics curriculum, not only in the field of educational technology are applicable to various disciplines, cannot stay on the phenomenon of some information technology to assist mathematics teaching, which must be specific to the content of university mathematics curriculum, combined with the college mathematics education teaching theory, and establish a theoretical system of integration for the implementation of mathematics curriculum with the University of information technology and mathematics curriculum of the university. All we must realize that the information technology plays in the university mathematics curriculum and its implementation, but also to see some negative effects, which cannot use information technology simply and completely, replace the traditional method. In the process of integration, only according to the special situation of teaching content and students, combined with the characteristics of the technology in-depth thinking in the teaching process, in order to better play the advantages and role of the integration of information technology and mathematics curriculum of the University.

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Analysis of the Service Mode of University Library Based on Cloud Computing Information Technology

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Abstract: As a new information technology, cloud computing provides an application service platform, which can integrate all the digital information resources of the library, and provide services for users. In this paper, the authors analyze the service mode of university library based on cloud computing information technology. In the context of the Internet environment, the library functions will gradually change to the management of knowledge, service and communication. Cloud computing services can improve the level of information resource management and service of digital library, and reduce the cost of management and services. Cloud service platform can realize the virtualization of distributed digital library services, at the same time to realize the sharing of information resources.

Keywords: Cloud computing, Information technology, University library, Service mode

1. Introduction

With the development of information technology, the library has undergone tremendous changes, realizing intensive literature information resources of the target is facing serious challenges (Agneta, 2014; Salvador & Rocha, 2014). The use of environmental information resources gradually transformed from physical space to virtual space, information resources are also gradually more and more from analog to digital state changes, in the digital library through the Internet era, the era of Web, grid era, the era of Web 2.0, it has begun to enter the era of cloud computing (Chang, 2014; Masitah, 2014). Cloud computing as a suitable library application framework, can be digital information resources scattered letter together, intensive implementation of digital library, build digital resources and provides a new solution to share (Francisco, 2015). We can predict that under the cloud computing environment influence, not only including computer, communication, Internet, information, the media content service will take place around Surface recombination, and the structure of the software industry will face a major adjustment. The library as an organization and knowledge transfer mechanism, the high degree of information service based on information technology, information technology development level determines the ability of library information service (Hu, 2015; Mario, 2015). Therefore, the library will inevitably affected by cloud computing, for a library, this is not a simple improvement of technology or equipment, but a fundamental change in the traditional library service system and operation mode.

Cloud computing refers to the resources and services available through the Internet and provide these services in the information platform of software and hardware infrastructure (Pereira, 2015). As a new mode of computer, provides an application service platform for cloud computing, digital information resources integration for all libraries, and provide services for users (Wendy, 2014). The unified platform the information integration of digital resources, decentralized reconfiguration, use, convenient use, low cost, can satisfy the user demand for digital library. When the cloud computing as an application mode of implementation platform, the desired information stored in the cloud service platform, users can use the Internet, convenient in no time and place restrictions on the circumstances, quick access to information or services in cloud service platform (Raju, 2014). When users submit requests for information, dynamic cloud services platform to dispatch and distribute the collected information resources, a data based on Cloud Computing Technology Information Center and large library alliance (Wang, 2010). Application of cloud computing in the field of library resource construction will change independent of the situation, to continue to scale, intensive, alliance. To build and expand the development space of Library cloud service platform of digital library, digital library can therefore improve the service functions; meet the needs of individual users, library service mode change.

2. Cloud computing model

2.1. Cloud service platform

Cloud computing to improve the user experience of digital library service, has the profound influence to achieve the goal of user centered service concept. The application of cloud computing technology, terminal equipment of users have very high demand, the user uses a simple operating system can obtain service information and service platform. Cloud computing is a technology with the application of the idea of combining, provides comprehensive guidance for the future development of library. The library is an information center data, the server can make full use of existing resources to carry out the no time limit of 24 hours of information service, using wireless Internet powerful maximize information resources of library open access. Each library has the characteristic collection resources will be placed in the cloud service platform of digital library unified, global library through digital library cloud service Platform integration and integration of information resources, to maximize the sharing of information resources to build the library, the cloud era.



Figure 1 – cloud computing

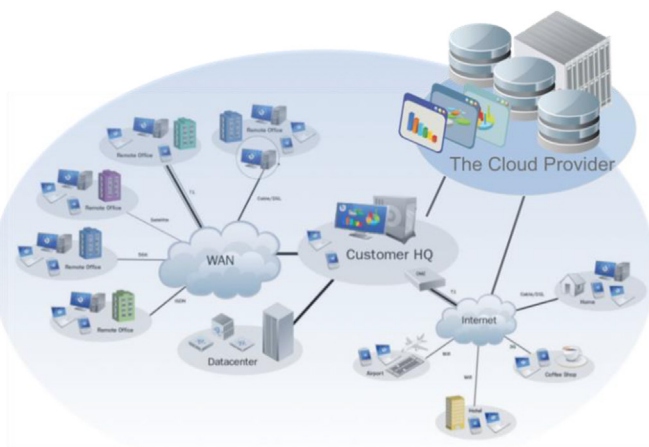


Figure 2 – Distributed network architecture

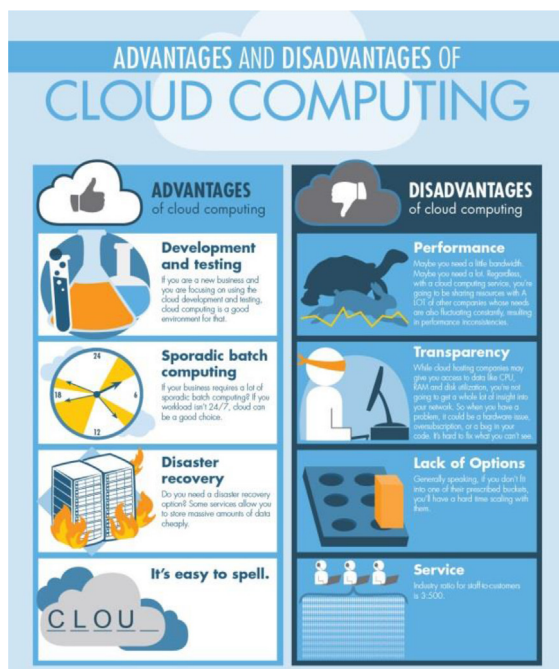


Figure 3 – Cloud computing model advantage

The current library information services rely heavily on information technology, information technology not only determines the ability of library information service, but also affected the organization structure and operation cost of the library. Therefore, when there is a field of information technology infrastructure stability, practicability and economy better, the platform or service mode, the library circles show great enthusiasm. The concept is the cloud library first discusses the calculation of characteristics. Cloud computing is the use of computer and Internet in the new way, it put all the computing and information resources are connected to the network, providing access to shared, whenever and wherever possible, the use and management of the relevant resource demand or function, can be deployed anywhere in the world within the scope of the server or data center. For a library, cloud computing is the largest value can make the map The library staff to focus on their own business, get rid of the shackles of information technology, make the best of the library, to reduce the difficulty and complexity of the application of information technology, thereby reducing management costs, reduce risk, and a wider range of cooperation, to provide better service. The dual impact of cloud computing on the library, points out that cloud computing brings the library advantages, the main performance is: reduce the operation cost, strong operation capability, the integration of information resources and the ubiquitous library. But at the same time, the initial realization of cloud computing brings threats and challenges to library career shows: cloud computing helps the search engine user behavior learned that may violate user privacy; providers will obtain more abundant information resources than library cloud computing, play an increasingly important role in the information service of the library, books Library's information services pose a threat.

2.2. Digital library

Digital library is a new concept after 1990s produced. With the rapid development of computer technology, especially the network technology, the comprehensive development of intelligent technology and data transmission technology, so that users of information resources collection, collation, retrieval, and other aspects of the use of library services have higher requirements. Therefore, with the with the user to improve the demand for resources has the service function more comprehensive digital library. Digital library is interdisciplinary, interdisciplinary research perspective and differences, researchers in different fields to define the concept of digital library have some characteristics and some limitations of this discipline.

The cloud computing technology in architecture model of Digital Library and digital library, traditional has many advantages. It can control, easy management, adaptive ability. The user enters cloud service platform through the Internet, the use of cloud services provided by the platform service any time any place, can realize the seamless access, but also other users and the platform to share the bandwidth and computing resources. Cloud services platform is dominated by the needs of the user, the dynamic deployment of virtualized hardware facilities, and provides storage space and computing capabilities.

- **Cloud computing software is a service:** Software as a service cloud service operator is provided to the user computing applications running on infrastructure in the cloud; the user can through the server interface in various client devices to access and download the browser software. Users do not need to manage or control the underlying cloud computing infrastructure, network,



Figure 4 – Digital library

servers, operating system, and storage space. Just need to manage the specific user specific application configuration settings.

- **Cloud computing platform that services:** Cloud computing platform as a service to users by using the supplier development language and tools, the application is deployed to establish cloud computing infrastructure. Users do not need to the underlying cloud infrastructure, network, servers, operating systems, storage space management, but also can control the deployment of applications, deployment, hosting the environment can be applied.
- **Cloud infrastructure is a service:** Cloud infrastructure as a service provided to the user is a rental data processing capability, storage space, network environment and the corresponding computing resources, the user can according to the deployment of services provided and use any software, including the operating system and applications. Users do not need to the underlying cloud infrastructure management, but can control the operating system. The application and storage facilities, the deployment of the application, can also choose a firewall, load balancer and other network components.

3. Library information resources integration

Cloud service platform of digital library can be defined as the construction of information resources on the Internet, virtualization, and provide services to users of the digital library. The library infrastructure or service platform of digital library cloud service platform can also be said that the cloud service platform of digital library construction is the use of cloud computing technology and the concept of digital library is a large computer the group, many of the digital library integrated into a unified platform, rapid access to resources according to user needs, and processed into need application, users can according to demand access to a computer and storage system. The cloud service platform of Digital Library in digital storage and network transmission of information resources as the basis, pay attention to resource sharing and user oriented personalized service, its ultimate goal is to establish a fully meet the needs of users of the library,

Realize the transformation of resources as the center to the user center, the real realization of digital library intensive, so that the literature information resources sharing.

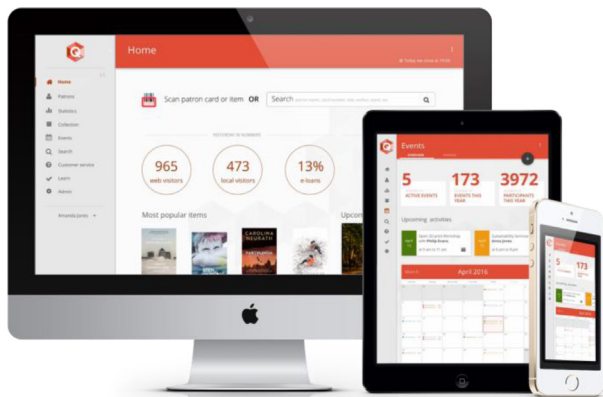


Figure 5 – Literature information resource

The specific meaning of cloud service platform of digital library can be understood from two aspects of the library and readers. For the library workers, the construction of digital library mainly includes two main hardware and software infrastructure and resources, such as integrated library management system, server, network storage and document database system, library construction and management only concern on the Internet can provide a variety of hardware and software infrastructure construction of library, software and hardware construction of Library Infrastructure rental price is reasonable, can ensure the smooth development of the business library. Therefore, the use of cloud computing technology to construct digital library is the digital library of cloud services platform. The user is concerned, the the basic purpose is to obtain the services provided by libraries, the satisfaction measure is service, the services they need The service is provided by who, access to resources through which way is don't care, and pay only for their own use. Therefore, for users, the cloud service platform of digital library is provided through the Internet and pay for services, these services from the form should be integrated, you can connect to the Internet access. Although the cloud service platform of digital library is virtualized, but is transparent to the readers, digital library cloud service platform feel with built in the Department, function and service of the digital library of the system provided is a kind of form, this is a more generalized digital library.

Compared with the traditional digital library, the characteristics of the digital library cloud service platform are mainly:

1. Digital library cloud service platform has become the main body of information resources and the object, the user oriented resources to enhance the ability to customize the library more personalized service capabilities
2. Cloud service platform of digital library resources with the dynamic integration of various resources, and is not a simple collection, on the contrary, the cloud

- service platform of digital library to integrate all kinds of resources using a variety of techniques, the heterogeneous resources to form an organic whole
3. Digital library cloud service platform to provide one-stop service, the user through a unified interface, so that a search operation can be seamlessly retrieved to a variety of information resources
 4. Digital library cloud service platform has the ability to solve problems, the digital library has gradually evolved into a high performance computing group
 5. Digital library cloud service platform can realize the optimization and integration of information resources, and constantly service innovation, and ultimately will realize the sharing of information resources.



Figure 6 – Library information management

The emergence of cloud computing technology can solve the existing problems in the digital library, the first cloud provides powerful data storage and Internet services through computing, cloud computing can solve the problem of heterogeneous digital library technology, reduce the storage space of the digital library cost, provide the user experience more perfect. Secondly, the cloud the calculation of distributed memory database and one-stop retrieval interface combined with the integration of digital resources, to achieve interoperability between different cloud and a full range of Internet services, to solve the problem of duplication of resources. At the same time, cloud computing can also provide more diversified, personalized information service of the library, so as to improve the digital library the information service ability. Therefore, the digital library has cloud service platform for the practical needs of cloud computing and digital library construction Necessary.

4. Digital library cloud service platform

4.1. Digital resource acquisition mechanism

Cloud service platform of digital library by the method to be retrieved for each node platform of information resources are collected, dispersed without centralized to each

node in the platform of information resources, cloud services platform provides a mechanism for acquisition of digital resources, the user sees only a unified cloud service platform cloud services platform search interface. The digital library dynamically the user submitted in the cloud service platform interface queries assigned to each node in the cloud platform, collecting and Dispatching Digital Resources cloud service platform of Digital Library of cloud node platform, based on user needs information resources of nodes in cloud platform of information resources integration, optimal selection, this integration. Acquisition method is a good solution to the repeated storage of information resources, information resources to bring the problem of storage space, users can also better Using the service provided by the digital library.

4.2. Organization and management mechanism of digital resources

The digital resource organization and management mechanism is the core mechanism of cloud service platform operation is a key part of the digital library, the digital library service platform. In the digital library cloud service platform for the deployment of the core application software such as database virtualization technology, virtualization technology will be a single resource (such as computer, disk, application components and information sources) according to the type of coordination use, together, running a model in other node server cloud services platform, or the deployment of a subordinate platform. The core system of heterogeneous data resource distribution node platform for cloud services platform on the centralized management and task scheduling. The node platform data resources to establish the form, so that we can ensure that the library cloud service platform in the digital resource sharing service platform cloud node On the basis of improving service platform efficiency and service level. The cloud service platform of Digital Library Based on node platform data resources for effective scheduling and management, to provide the original data, through the optimization and integration of data, and the processed data preservation, sharing, management, query, analysis of correlation, etc. a series of process, provide users with personalized services to meet user needs. On the one hand the management mechanism of digital resources organization through the automatic workload management work loads, the effective use of spare computing capacity; on the other hand can increase the computing capacity.

4.3. User service mechanism

The piece includes a soft and hard infrastructure and library to provide services necessary for the application of cloud services platform of digital library. The cloud platform uses virtualization technology to provide users with a unified operating system, a set of application software, and some other library applications and services. Users through the cloud service platform of digital library interface submission service request, cloud service platform for user requests to parse, and to normalize the user demand information released to the node node according to the service platform, service platform task scheduling digital library cloud service platform, searching the database and the user needs to match the data, cloud service platform of digital library will be back at the node in the platform data mining, classification, extraction of user demand information data, digital information resources and finally finishing well Complete release to the needs of users.

4.4. Interaction of operating mechanism

The mechanism of cloud service platform of digital library is the interaction and interrelation. Digital resources acquisition mechanism is the foundation, which is responsible for collecting the information required by users, the digital information resources on the database cluster search query to obtain matching information and user needs. The digital resource organization and management mechanism is the core of cloud service platform the mechanism of the digital library, will be collected by the mechanism of resource scheduling, allocation and management, and is responsible for the security of digital resources management, user management and other services. Users will get through the mechanisms responsible for the collection mechanism, organization and management mechanism by resource scheduling and management of information resources, unified by the WEB interface presented to the user, digital resources collection mechanism, management mechanism, service mechanism constitute the operating mechanism of cloud service platform of digital library. Together, work together, any change to a mechanism of the association reaction will lead to other mechanisms, coordination and cooperation and other mechanisms. Therefore the mechanism of interaction, in order to make the cloud service platform of digital library functions.

5. Conclusion

Cloud computing technology is a new way of thinking in the construction of modern digital library system. In the Internet environment and the knowledge background, the functions of the library will be retrieved from the information collection, the traditional change management to knowledge management, communication services, cloud service platform of digital library. There are many problems to solve the long-term management of the digital library information resources and in service from the infrastructure level, computing services can enhance the digital library information resource management and service level through the cloud, and reduce the management cost of the service, with the combination of cloud computing and digital library has become a field of research in the library just unfolding. The cloud service platform of Digital Library Based on cloud computing technology is dynamic, can the ability of management, and integration mechanism of adaptive system, enjoys a high degree of autonomy, can realize the service of Digital Library Distributed virtualization can achieve a greater degree of resource sharing and collaboration.

Cloud service platform of digital library management, which has dynamic, ability and integrated mechanism of adaptive system, enjoys a high degree of autonomy, virtualization can realize distributed digital library services, to achieve intensive information resources to a greater extent, the greater the degree of realization of information resources sharing, will to enter the cloud era application of Digital Library in our country. It will cloud service platform of Digital Library in the future to achieve the perfect convenience of both complexity and use application of the combination. To realize user access using the simple operation of the most complex demand information, this information can be customized, unstructured, and the user can to deliver results in the shortest possible time to give users the most convenient access to the terminal equipment.

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An Analysis of Risk in the West Texas Intermediate Market Based on Extreme Value Method

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Abstract: This paper uses the generalized Pareto distribution to model the extreme losses exceedances that peak the given threshold, estimates the value at risk with the extreme value based peak over threshold model, in the case of an investor has long positions in the West Texas Intermediate market both during market crashes (2008.1-2014.4) and before crisis (1999.1-2007.12). At the same time it forecasts the value at risk by the traditional method of variance-covariance based on the assumption of normal distribution. With comparing two kinds of the value at risk by different methods, it suggests that the peek over threshold approach is more effective than the traditional approach for calculating the value at risk under the normality assumption in both before crisis period and during crisis period.

Keywords: Value at risk, extreme value theory, generalized Pareto distribution, peek over threshold

1. Introduction

Recently, people are paying more and more attention to the risk management of the financial market, especially after the financial crisis of Asia in 1997-1998, and the global economic crisis since 2008. How to measure and manage the market risk is becoming more and more important. Value at Risk has been generally used as the standard measure by financial analysts to quantify the market risk of a portfolio. During financial crisis such as the Asian crisis of 1997-1998, financial institutions incurred extreme losses that could not be estimated correctly with the parametric methods of value at risk, which are based on the normality assumption of asset returns. Therefore, some reassessments are required for the traditional and widely used parametric measures of market risk, such as the variance-covariance approaches.

Alexander (2001) suggested that traders could perform a fast calculation to find the impact of a proposed trade on their value at risk limit by using the variance-covariance method. But the method based on variance-covariance has two serious disadvantages. Firstly it can accommodate only portfolios that are assumed to be linear with respect to risk factors. Secondly, it is successful only when the portfolio of profit and losses has a

normal distribution. Géhin (2006) gave that returns in financial markets are not always normally distributed. So the normality assumption is improper.

As noted by Bensalah (2000), investors and risk managers have become more concerned with events occur under extreme market conditions. The extreme value theory would be useful for us to search for a supplemental risk measure that is able to describe the behaviour of losses during market crashes, because it provides a more appropriate distribution which fits extreme events. More in detail, considering extreme movements, Koedijk et al. (1990), Wagner and Marsh (2005) and Iglesias (2012) showed the advantages of modelling fat-tailed distributions for modeling exchange rate changes. Kabundi and Muteba (2011) compared two kinds of the value at risk based on the different scenarios and suggested that the peak over threshold method is more effective in higher quantiles. Allen et al. (2013) discussed tail specific distribution based extreme value theory, calculated the value at risk in different models including the peak over threshold model etc, and demonstrated that the extreme value theory can be successfully applied to financial market return series for predicting static the value at risk and the expected shortfall. Karmakar (2013) concluded that it is useful to estimate tail-related risk measures based on extreme value theory in Indian stock market. This paper uses the generalized Pareto distribution to model the extreme losses exceedances that peak the given threshold and gains the value at risk with the peak over threshold approach in the case that an investor who has long positions in the West Texas Intermediate market both during market crashes (2008.1-2013.12) and before crashes (1999.1-2014.4). In addition it forecasts the value at risk by the traditional method of variance-covariance.

The paper is organized as follows. In Section 2, the models we consider are shortly discussed. The empirical procedure and results about the West Texas Intermediate daily returns with the extreme theory based the peak over threshold model are presented in Section 3. Additionally, the conclusion is drew in Section 4.

2. The models

In this Section, we introduce some conclusions which derive from the extreme value theory and underlie our model. There are two mainly ways estimating the value at risk of a portfolio with the extreme value theory: the first approach is using the block maxima model, and the second approach is using the peak over threshold model based on threshold exceedances. The block maxima model is a traditional method for dealing with the largest observations collected from large samples of identically distributed observations. But the peak over threshold model is more modern and powerful method for all large observations which exceed some high level than the block maxima method based on the extreme value theory, and it is usually considered to be the most useful for practical applications due to their more efficient use of the (often limited) data on extreme outcomes.

In practice, the block maxima method has a major defect that it is very wasteful of data. Therefore, it has been largely superseded in practice by the methods based on threshold exceedances, which we use all data that are extreme in the sense that they exceed a particular designated high level. Now we focus on the specific details of the peak over

threshold way and some properties of the models. The main distributional model for exceedances over thresholds is the generalized Pareto distribution whose definition is:

$$G_{\xi,\beta}(x) = \begin{cases} 1 - (1 + \xi x / \beta)^{-1/\xi}, & \xi \neq 0 \\ 1 - \exp(-x/\beta), & \xi = 0, \end{cases} \quad (1)$$

where $\beta > 0$, and $x \geq 0$ when $\xi \geq 0$ and $0 \leq x \leq -\beta/\xi$ when $\xi < 0$. The parameters ξ and β are referred to, respectively, as the shape and scale parameters. The generalized Pareto distribution in the extreme value theory has played an important role in modeling the excess distribution over a high threshold. This concept is defined along with the mean excess function, which will also play an important role in the theory in returns. The following is the definition of excess distribution over threshold u and mean excess function. Let X be random variable with distribution function F , the excess distribution over the threshold u has distribution function

$$F_u(x) = P(X - u \leq x | X > u) = \frac{F(x+u) - F(u)}{1 - F(u)} \quad (2)$$

For $0 \leq x < x_F - u$, where $x_F \leq \infty$ is the right endpoint of F . The mean excess function of a random variable X with finite mean is defined by

$$e(u) = E(X - u | X > u) \quad (3)$$

The excess distribution function F_u describes the distribution of the excess loss over the threshold u , given that u is exceeded. In survival analysis the excess distribution function is more commonly known as the residual life distribution function—it expresses the probability that, say, an electrical component which has functioned for u units of time fails in the time period $(u, u+x]$. The mean excess function is known as the mean residual life function and gives the expected residual lifetime for components with different ages.

In fact, the generalized Pareto distribution is a natural limiting excess distribution for many underlying loss distributions. Then distributions for which the excess distribution converges to the generalized Pareto distribution when the threshold is given are equivalent to those distributions for which normalized maxima converge to a generalized extreme value distribution. Therefore, the shape parameter of the limiting generalized Pareto distribution for the excesses is as same as the shape parameter of the limiting generalized extreme value distribution for the maxima. We assume a loss distribution F whose normalized maxima can converge to a generalized extreme value distribution, hence for some suitably chosen high threshold u , we can model F_u by a generalized Pareto distribution, which is formalized with the following assumption.

Assumption 1. Let F be a loss distribution with right endpoint x_F and assume that $F_u(x) = G_{\xi,\beta}(x)$, $0 \leq x < x_F - u$, $\xi \in \mathbb{R}$ and $\beta > 0$ for some high threshold u .

This is clearly ideal for the reason that in practice the excess distribution is generally not exactly generalized Pareto distribution, yet we use the above Assumption 1 to make a number of calculations in the following details.

Now the method of peek over threshold is introduced. Given loss data $X_1, \dots, X_n$ from F , let N_u be the number of the data exceeding our threshold u , and relabel these data $\tilde{X}_1, \dots, \tilde{X}_{N_u}$ for convenience. For each of these exceedances we calculate the amount $Y_j = \tilde{X}_j - u$ of the excess losses. We wish to estimate the parameters of a generalized Pareto distribution model by fitting this distribution to the N_u excess losses. There are various ways for fitting the generalized Pareto distribution including probability-weighted moments and maximum likelihood which is commonly used and easy to implement if the excess data can be assumed to be realizations of independent random variables, since the joint density will then be a product of marginal generalized Pareto distribution densities.

This paper uses the method of maximum likelihood to estimate the parameters. Denote the density of the generalized Pareto distribution by $g_{\xi, \beta}$, then the log-likelihood is easily calculated to be:

$$\begin{aligned} \ln L(\xi, \beta; Y_1, \dots, Y_{N_u}) &= \sum_{j=1}^{N_u} \ln g_{\xi, \beta}(Y_j) \\ &= -N_u \ln \beta - \left(1 + \frac{1}{\xi}\right) \sum_{j=1}^{N_u} \ln \left(1 + \xi \frac{Y_j}{\beta}\right) \end{aligned} \quad (4)$$

which must be maximized with respect to the parameter constraints that $\beta > 0$ and $1 + \xi Y_j / \beta > 0$ for all j . Solving the maximization problem yields a generalized Pareto distribution model $G_{\hat{\xi}, \hat{\beta}}$ for the excess distribution F_u .

In the following we describe how the generalized Pareto distribution model for the excess losses is used to estimate the tail of the underlying loss distribution F , which is associated with risk measures. For the necessary theoretical calculations we make Assumption 1 again.

Under Assumption 1, we can obtain, for $x \geq u$,

$$\begin{aligned} \bar{F}(x) &= P(X > x) \\ &= P(X > u)P(X > x | X > u) \\ &= \bar{F}(u)P(X - u > x - u | X > u) \\ &= \bar{F}(u)\bar{F}_u(x - u) \end{aligned}$$

$$= \bar{F}(u)(1 + \xi \frac{x-u}{\beta})^{-\frac{1}{\xi}}, \quad (5)$$

Which provides a formula for calculating tail probabilities if $F(u)$ is given. This formula (5) may be inverted to obtain a high quantile of the underlying distribution, which is interpreted as value at risk. For $\alpha \geq F(u)$, we yields

$$VaR_\alpha = q_\alpha(F) = u + \frac{\beta}{\xi} \left(\left(\frac{1-\alpha}{\bar{F}(u)} \right)^{-\xi} - 1 \right) \quad (6)$$

In practice, we first fit a generalized Pareto distribution to excess losses over a threshold u . We estimate these quantities by replacing ξ and β in formulas (4)–(6) by their estimations. Finally in order to estimate the value at risk, an estimate of $\bar{F}(u)$ is required. Here we take the simple empirical estimator N_u/n . So we can gain an estimation of the value at risk in the following:

$$VaR_\alpha = u + \frac{\hat{\beta}}{\hat{\xi}} \left(\left(\frac{n(1-\alpha)}{N_u} \right)^{-\hat{\xi}} - 1 \right) \quad (7)$$

We compare the estimation of the value at risk by peek over threshold method with that by traditional variance-covariance method. Following Duffie and Pan (1997) and Alexander and Leigh (1997), the variance-covariance based value at risk at time interval t is computed as:

$$VaR_\alpha = Z_\alpha \sigma_p \sqrt{\Delta t} \quad (8)$$

where Z_α, σ_p and Δt are the standardized normal variable, the portfolio volatility and the time horizon, respectively. We use this formula to generate that estimations of the value at risk based on the variance-covariance method and compare them with the estimation based on the peak over threshold method. Finally, we also demonstrate the efficiency of these two approaches by back testing.

3. Data and empirical results

This paper aims at generating different scenarios of the value at risk estimation during financial crashes. For this purpose we collect daily closing prices of the West Texas Intermediate from 1 January 1999 to 14 April 2014. In order to find the difference of market risk between the two periods before and during the crisis, the sample period is divided into two parts: the pre-crisis period (from 1 January 1999 to 31 December 2007) and the crisis period (from 2 January 2008 to 14 April 2014).

3.1. Description of data

The basic statistics are given in Table 1 and the time series plot of daily negative log-returns of the West Texas Intermediate from the indices during 1999.1–2007.12 and 2008.1–2014.4 in Figure 1.

	Before crisis	During crisis
mean	-0.03986795	-0.001188147
standard	1.042079	1.087631
skew	0.5385107	-0.1151543
kurt	3.73172	5.907043
max	7.422868169	5.570574
JB statistic	1419.88	2313.78

Table 1 – Summary statistics

The kurtosis in Table 1 is greater than three for return series both before crisis and during crisis which suggests that the distributions of return in the West Texas Intermediate market are fat tailed. The value of Jarque-Bera statistic for the series indicates that the returns do not follow a normal distribution.

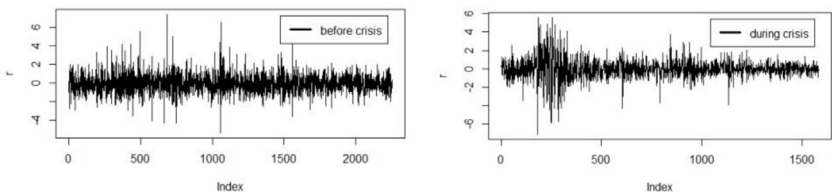


Figure 1 – Daily log-return

Figure 1 shows that the time series plots of daily returns of the indices during 1999.1–2007.12 and 2008.1–2014.4. The extreme behaviour of the return series during the sample data period is showed by the above graphs.

3.2. Value at risk-the peak over threshold approach and the variance-covariance approach

We use the maximum likelihood method to obtain point estimations of the shape parameter ξ and scale parameter β in equation (1). In addition, we consider only the right tail of the generalized extreme value, which represents losses for an investor with long positions in the abovementioned the West Texas Intermediate market. At first, we compute the distribution of maximal losses for the above investors in the above. This distribution is obtained as follows. Denote p_t the closing price at time t in the West Texas Intermediate market. Following Payaslıoğlu (2009), we construct the return as $r_t = 100 \cdot \log\left(\frac{p_t}{p_{t-1}}\right)$, where $t=1,2,\dots,T$. Because we study on the loss function in this paper, we let $X_t = -r_t$ be the negative return sequence, in other word $X_t = -r_t$, and our discussion and estimation are both based on the sequence (X_t) .

We apply first our negative returns to estimate the parameters in equation (1), and use $N_u = 0.1T$ following Payaslioglu (2009) and forecast the value at risk based on the formula (7). The results are given in Table 2.

	Before crisis	During crisis
ξ	0.1883935 (0.07412521)	0.09592439 (0.1033087)
β	0.5699422 (0.05636310)	0.80526363 (0.1048012)
u	1.185787	1.100841

Table 2 – Estimation of parameters of GPD

	VaR(POT)	VaR(V–C)
$\alpha = 0.99$	2.828808	2.388176
$\alpha = 0.975$	2.088671	2.002607
$\alpha = 0.95$	1.607795	1.679562

Table 3 – Value at risk estimates before crisis

	VaR(POT)	VaR(V–C)
$\alpha = 0.99$	3.175747	2.532992
$\alpha = 0.975$	2.294801	2.130568
$\alpha = 0.95$	1.677982	1.793403

Table 4 – Value at risk estimates during crisis

The estimation of the generalized Pareto distribution's parameters signal higher fat-tailedness in the distribution of the West Texas Intermediate in the crisis in comparison to that in the non-crisis period. Furthermore, the generalized Pareto distribution estimators for the volatility are higher than that before the financial crisis, which suggests higher volatility during the crisis characterized by higher negative returns. These results highlight the importance of the extreme value theory in managing market risk during crisis.

We now estimate the value at risk using equation (7) which based on the peak over threshold method. Table 3,4 represents 99%, 95% and 90% estimates of both the value at risk by equation (7) and the value at risk that based on the variance-covariance method. The results suggest that the value at risk is higher during crisis than that before crisis with $\alpha = 0.99, 0.975, 0.95$. In the meantime, we can find that the estimations of the value at risk based on the peak over threshold method is higher than that based on

the variance-covariance method when with $\alpha = 0.99$ and $\alpha = 0.975$. The possible reason is that the variance-covariance method does not relate to the fat-tailedness behavior of returns during market crises. But if $\alpha = 0.95$, the conclusion is opposite that the value at risk based on the variance-covariance method is higher than that obtained by the peak over threshold method. These results are consistent with Gençay and Selçuk (2004), who argued that the value at risk estimates based on EVT are reliable and more accurate at higher quantiles.

3.3. Backtesting

One approach used to evaluate the performance of the value at risk techniques is the two sided binomial test. The theory we used to proceed our back testing is that the expected number of breaches m which the actual loss exceeds the forecasted the value at risk is $n(1 - \alpha)$ if the value at risk model is actual. In other word, if the model is effective, the number of exceedances (which is denoted by m) follows a binomial distribution whose expectation is $n(1 - \alpha)$ and variance is $na(1 - \alpha)$. We use the test statistic

$$z = \frac{m - n(1 - \alpha)}{\sqrt{na(1 - \alpha)}} \quad (9)$$

Whose approximation distribution is normal distribution, On the one hand, if the number of exceedances is much larger than $n(1 - \alpha)$, the model is considered to underestimate risk. On the other hand, if the number of breaches is too smaller than expected violations, the model is viewed to overestimate the risk. The values of the test statistic z and the numbers of breaches for the two sided binomial test are given in Table 5 and Table 6.

	$\alpha=0.99$	$\alpha=0.975$	$\alpha=0.95$
Expected violations	23	56	113
Violations in TOP model	22	48	110
Violations in the V-C model	33	56	99
Value of Z in the POT model	-0.1058932	-1.120267	-0.2513867
Value of Z in the V-C model	2.223758	-0.040404915	-1.314946

Table 5 – Results-backtesting (before crisis)

From Table 5 and Table 6, we can find that the method based on the peak over threshold model is accepted both before crisis and during crisis at every confidence level ($\alpha = 0.99, 0.975, 0.95$). From another point of view, the method based on traditional variance-covariance with the assumption of normal distribution is rejected in two cases at confidence level $\alpha = 0.99$. When $\alpha = 0.975$, the results based on the extreme theory

	$\alpha=0.99$	$\alpha=0.975$	$\alpha=0.95$
Expected violations	16	40	79
Violations in TOP model	18	43	80
Violations in the V-C model	34	46	63
Value of Z in the POT model	0.555731	0.482957	0.09802383
Value of Z in the V-C model	4.54689	0.965914	0.965914

Table 6 – Results-backtesting (during crisis)

are superior to the results based on traditional variance-covariance approach in any case. In addition, the traditional approach based breaches is closer to expected violations in the non-crisis period only when $\alpha = 0.95$. The above mentioned conclusion is consistent with the result proposed by Kabundi and Muteba(2011) that the peak over threshold method is more effective in higher quantiles.

3.4. Discussion of results

By the empirical results of 3.1, 3.2 and 3.3, we can conclude that the daily log-returns distribution of the West Texas Intermediate market is characterized by heavy tails presented by excess kurtosis and is not captured by the normal distribution, but it can be derived from extreme movements. The peak over threshold estimators and variance-covariance estimators are signal higher fat-tailness in the distribution of the daily log-returns in West Texas Intermediate market during the crisis in comparison to the non-crisis period at confidence level 0.99, 0.975 and 0.99. The above mentioned results mean that volatility during the crisis period is higher than before crisis and it suggests that people need pay more attention to risk management during crisis. Furthermore, by comparing the efficiency of the peak over threshold approach with that of variance-covariance approach, the importance of using extreme value theory in modelling extreme market returns especially during crisis is showed. From another aspect, a closer look at Table 5 and Table 6 reveals that the peak over threshold model based estimator of the value at risk is more acceptable not only in the crisis period but also in the non-crisis period at higher confidence level such as 0.99.

4. Conclusion

A sound framework for modeling extremely events is provided by the extreme value theory, which can be used to quantify extreme risk situations. In this study, we focus on the extremes of market risk in oil market and use extreme value theory to model such extreme events. The data set we used is daily log-return in West Texas Intermediate

market observed from 1 January 1999 to 16 April 2014. We divided this sample period into two parts: the non-crisis (1999.1-2007.12) and the crisis period (2008.1-2014.4).

The value at risk based on the peak over threshold model is a good alternative risk measure, especially in recession, mainly because it slacks the strong assumption of normally distributed returns and hence exploits the features of fat-tailedness and asymmetry observed from daily log-returns in West Texas Intermediate market. We compare the estimates of value at risk by the peak over threshold model with that by the traditional variance-covariance method. During downturns, the peak over threshold model based value at risk estimates is higher relative to that by the traditional variance-covariance approach. In addition, the method based on the peak over threshold model is accepted both before crisis and during crisis at every level ($\alpha = 0.99, 0.975, 0.95$). But the method based on the traditional variance-covariance with the assumption of normal distribution is rejected in two cases at $\alpha = 0.99$.

Through our empirical study, the advantages of the peak over threshold model are verified again in estimating and managing market risk, especially in the crisis period. The conclusion of the study can give some suggestions to financial institutions and managers. From the above discussion, we can say that the peak over threshold method in estimating the value at risk of daily log-returns serious in the West Texas Intermediate market is effective both during crisis and before crisis at higher quintiles, because the tail of loss distribution is taken more attention when we use this method.

Acknowledgments

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Research on the Relationship between Strategic HRM and Employee Knowledge Sharing from the Perspective of Social Network

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Abstract: Employee knowledge sharing behavior is the focus of the organization to obtain the competitive advantage. The impact of strategic human resource management in promoting knowledge sharing is one of the important issues in current theoretical cycle. Based on the survey of 586 employees in Suzhou logistics enterprises, the paper discusses the relationship between SHRM and knowledge sharing based on social network. The research shows that strategic human resource management has a positive effect on knowledge sharing; the influence of instrumental network on knowledge sharing is more significant than the affective network; Instrumental network and affective network play a partial intermediary role in between SHRM and knowledge sharing. The practical implication of the results is to guide enterprises in HRM practice, such as prudent recruitment, extensive training, employment guarantee, compensation management, employee involvement.

Keywords: Strategic HRM, Knowledge sharing, Instrumental network, Affective network

1. Introduction

With the acceleration of globalization, the internal and external environment is changing fast. Knowledge has become the most important strategic resource to gain competitive advantage in the process of sustainable development (Grant, 1996). Dynamic innovation and knowledge development can be injected for the organization (Waston, 2006; Kimble et al., 2016). At the same time, the present stage is often used as a direct carrier of team knowledge management team, in the process of operation, through the promotion of knowledge for effective transmission and sharing within the team, and on the basis of optimization and innovation, so as to maximize the organization's competitive ability (Li, 2015). It can be seen that effective knowledge sharing between employees and teams is the focus of the organization to gain competitive advantage (Tsai, 2002).

Although more and more knowledge sharing for concern of many enterprises, but due to the characteristics of knowledge is highly personalized, contextual, employees tend to knowledge as their own unique resources and advantages (Jones, 1998). so how to

motivate knowledge sharing among employees has become the focus of theoretical circles through effective measures. At present studies have shown that the plan model of strategic human resource management as the allocation of human resources and activities to promote the organization to achieve its goals of (Wright, 1992), the organization can especially significantly affect knowledge sharing within the team (Hislop, 2003; Minbaeva, 2008; Gu, 2009), but the current research on between strategic human resource management and knowledge sharing theory mainly has the following three aspects: (1) first, the relationship between strategic human resource management and knowledge sharing are mainly focused on the research from the macro level, while the research on the individual micro level is relatively small (Purcel, 2007). (2) the second, the internal mechanism between the two is not completely clear, still cannot be accurately revealed the internal mechanism of the black box that is sharing the strategic human resource management and knowledge (Paauwe, 2009). (3) finally, in theory from the perspective of strategic human resource management and knowledge sharing between employees is relatively single, mainly focuses on the study on the relationship between content and trust from the perspective of (Bowen, 2004). Therefore, in the future, we need to use the corresponding theory to discover the relationship between SHRM and knowledge sharing (Evans, 2005).

At the same time, the theory on knowledge sharing influence gradually from the perspective of social network is studied (Collins, 2006), the organization through the construction of good structure, perfect social network will contribute to knowledge sharing among employees, but it has also been supported by scholars in empirical studies (Lam, 2010; Shuier, 2014). At the same time, strategic human resource management has a crucial impact on the formation of employees' social networks (Subramaniam, 2005; Kang, 2007). Therefore, based on this, the main purpose of the following two aspects: (1) from the social network perspective as the breakthrough point, to explore the intrinsic relationship between strategic human resource management and knowledge sharing, and before the study from the perspective of resources, such as trust, we can try from the new perspective of knowledge of SHRM the intrinsic mechanism of sharing between the "black box" breakthrough. (2) This study in this article is different from the previous research on strategic human resource management and knowledge sharing from the macro level (Shipton, 2003), this paper will integrate the macro and micro level theory, deepen the understanding of the influence of strategic human resource management on employee knowledge sharing.

2. Literature review and hypothesis

2.1. Strategic human resource management and social network

Strategic human resource management is the mode of human resource activities (Wright, 1992) which is implemented in order to achieve the goal. About the practice of strategic human resource management covers the theory, research object and research from different angles based on the definition, Paauwe (2009) SHRM and Zhu Fei based on the foreign research (2013) based on the research of domestic SHRM, found that strategic human resource management practice research stage basically covers prudent

recruitment, extensive training, internal promotion, high level of compensation, employee participation in five strategic human resource management practices. Therefore, this paper will divide SHRM into five major strategic human resource management practices.

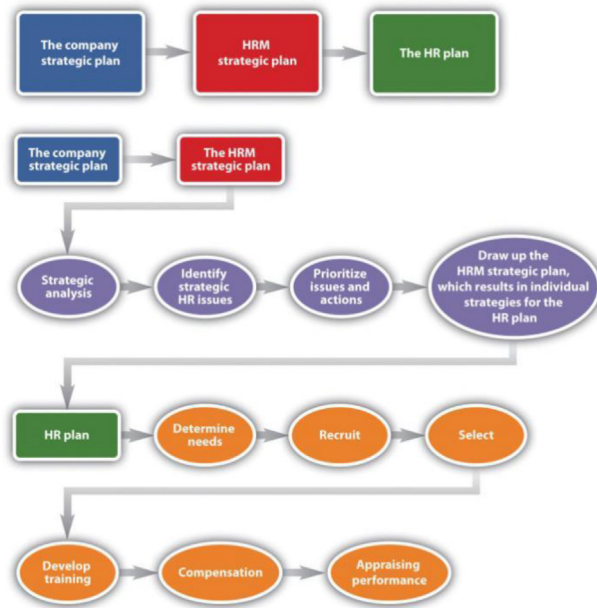


Figure 1 – Strategic human resource management

Social network is a dynamic system which is built up for the purpose of achieving a specific purpose. In this system, we can communicate and interact with each other (Zhang, 2002). Individuals in the organization can acquire various unique resources and capabilities by embedding the social network relations, thus continuously improve their performance level (Peng, 2011). The nature of the relationship between the social network division, Krackhardt (1992) research within the organization of social network content, he will organize social network into the emotional network, consulting network and information network. Follow up, and some scholars according to the reasons of the formation of social network relations, the individual in the organization of the network relationship are divided into the tool type and the privacy of the points (Podolny, 1997). On the basis of these studies, this paper divides the content of social network into the relationship of the instrumental network and the relationship of the emotional network (. Tool network relation is closely related to the work role, it is the network structure formed by the exchange of information and knowledge sharing. The emotional network relationship is mainly the emotional communication between employees in the organization, which is constructed on the basis of friendship, love and frequent interaction between employees. It can be seen that the strategic human resource management has close relationship with the social network.



Figure 2 – Social network

On the one hand, SHRM model emphasizes the extensive training and information sharing practices, can promote the mutual understanding between employees and enhance their communication willingness and opportunity, which is helpful to create informal networks (Chang, 2014). On the other hand, the participation of the main management mode in team work and staff, often organized a transfer to the members of trust and rely on that which is helpful to promote the construction of good emotion between the members of network to solve the main problems existing in the organization, to promote the sustainable development of the organization (Chowdhury, 2005). Therefore, based on the above analysis, this paper puts forward the hypothesis 1:

H1: strategic human resources management and social network relations are significantly positive related

H1a: Strategic Human Resource Management and instrumental network relationship is significantly positive related

H1b: strategic human resource management has a significant positive correlation with affective network

2.2. Social network relationship and knowledge sharing

Knowledge sharing is the process of individual knowledge exchange and jointly create new knowledge (Wang, 2010). The main focus of employee knowledge sharing is that employees can exchange and absorb the explicit knowledge and tacit knowledge, and create new knowledge. Therefore, this paper draws on Hooff according to the division standard of knowledge sharing process, the knowledge sharing is divided into knowledge contribution and knowledge collection. Knowledge contribution is mainly refers to the employees through long-term information, knowledge exchange, will have their own personal intelligence costs to other members of the organization. The knowledge collection mainly refers to the individual initiative to consult and accept knowledge, the purpose of which is to share the intellectual capital through this channel.

The tools of network, is often based on work and completing the tasks, and encoding of the information and knowledge of the relationship network will exchange content for

the general business related work (Wong, 2008). As a result, the network of knowledge sharing by means of a networks which have different information resources in the organization is connected with the individual. Once employees are able to obtain the convenience of work from this interconnected network resource, it tends to strengthen the knowledge contribution or collection behavior (Jian, 2010). At the same time, Liu (2013) through empirical studies have also proved that, based on the discussion of work problems and the establishment of the tool type network connection, the knowledge sharing between employees, the higher the frequency of interaction.

From the emotional network, is often formed by both similar background, personality characteristics and mutual recognition based on the network, this relationship can often promote members within the organization formed a strong relationship between the two sides connected under the strong atmosphere of trust tend to share information and resources are unique, so as to enhance the exchange of knowledge intensive (Li so, 2011). At the same time, the formation of mutual trust and similarity based on emotion based on the network, can provide the staff information exchange platform, the two sides to promote the information interaction of a more in-depth understanding, is helpful to exchange knowledge and information deeply, which promote the knowledge sharing behavior (Willem, 2006). Wang (2012) the results of the empirical study, also show that the emotional network relationship has a significant positive impact on employees' explicit knowledge sharing and tacit knowledge sharing. Therefore, based on the above analysis, this paper puts forward the hypothesis 2:

H2: social network relationship and knowledge sharing are significantly positive related

H2a: a significant positive correlation between instrumental network and knowledge sharing

H2b: the relationship between affective networks and knowledge sharing is significantly positive.

2.3.Strategic human resource management and knowledge sharing

The relationship between strategic human resource management and employee knowledge sharing can be explained by AMO theory. According to the AMO theory of knowledge sharing behavior is a function of ability, motivation and opportunity of the three variables, and strategic human resource management for knowledge sharing behavior, motivation and ability to provide opportunities and other necessary conditions (Minbaeva, 2012).

Competence mainly refers to the individual characteristics of the employees who are the main body of knowledge sharing. The knowledge sharing ability of employees must take the knowledge and ability of individuals in the organization as the important condition, and improve the ability of individuals to carry on the fragmentation. Knowledge integration and sharing (Lu et al., 2006).The SHRM practices such as prudent recruitment, extensive training, and employment assurance, which are covered by strategic human resource management, can adequately manage employees' knowledge-sharing capacity acquisition, capacity utilization, capacity retention, and capacity elimination (Wright et al., 1998) Thereby enhancing the ability of employees to share knowledge. Strategic human resource management support for knowledge sharing among employees has been supported by empirical evidence (Searbroug, 2003).

Motivation mainly refers to the individual will of the staff as the main body of knowledge sharing. Studies have shown that knowledge, as a closely related resource, such as employee status and career development prospects, tends to maintain the motivation to privatize knowledge, so knowledge sharing does not occur automatically within the organization. (Yang, 2007) There are two main mechanisms for the impact of strategic human resource management on knowledge sharing motivation: First, the management practice covered by the strategic human resource management emphasizes a kind of authorization and trust management mode, which can bring employees to Security and belonging (Jones, 1998). In return, when employees perceive goodwill from the organization, integrity, tend to give employees the inherent initiative to share with other members of the organization to share knowledge. Second, the Minbaeva (2013) study shows that when a strong SHRM atmosphere is formed within the organization, it will help employees understand the organizational vision, goals, and values in a consistent manner, thereby contributing to employee motivation for knowledge autonomy, Knowledge sharing.

Opportunity Mainly the knowledge sharing subject have knowledge sharing opportunities. Nonaka et al (1995) point out that there is a need for a shared space between employees to transfer knowledge, which can facilitate the communication and exchange of information between the owner and the recipient. Therefore, for the organization managers to build a good group knowledge sharing space, and establish a good group learning atmosphere to shorten the distance of knowledge sharing. On the one hand, emphasize empowerment, self-management mode give employees independent decision-making power by SHRM, which often require extensive and close communication and contact between employees, channel more links between staff, knowledge integration of space and scope will be more extensive, and promote knowledge sharing (Chiu, 2006); the other on the one hand, strategic human resource management in the extensive training and information sharing covering practice helps in the formation of informal contacts between employees in contact, and the informal contact further to strengthen the will and communication machine, which contributes to the knowledge sharing is the sharing of tacit knowledge of the behavior of long (Bock, 2000). Therefore, based on the above analysis, this paper puts forward the hypothesis 3:

H3: Strategic Human Resource Management and knowledge sharing significantly positive correlated

2.4. The mediating effect of social network

Through the above analysis, the value of knowledge resources, private individuals, often are not willing to communicate and transfer of knowledge with other members in the organization, so it is difficult to think of the smooth realization of knowledge sharing. According to the perspective of social exchange theory, knowledge sharing is a kind of information exchange behavior, with mutually beneficial ingredients, in fact are the owners of knowledge to share their knowledge with others, will have individual knowledge from the transition process to have groups (Zhu Yanhan, 2013). Therefore, only by constructing the social network relationship in the organization can help to achieve the will of knowledge sharing. A SHRM practice hand by forming tool network in working, work, business between strengthening the knowledge contributors and recipient information communication, so as to promote knowledge sharing especially

explicit knowledge transfer and exchange; on the other hand, training employees belonging mutual commitment and awareness within the organization through a series of list of strategic human resource management practices, build good relationship of trust between employees, so as to form a strong willingness to share the emotional network, promote the knowledge especially tacit knowledge exchange. Based on the above analysis, this paper puts forward the hypothesis 4:

H4: social network relationship is the mediator between strategic human resource management and knowledge sharing.

H4a: the tool network relationship is an intermediate variable between strategic human resource management and knowledge sharing.

H4b: the relationship between affective networks is the mediator variable between strategic human resource management and knowledge sharing.

3. Research design

3.1. Research sample

In this paper, the data collected by the questionnaire, the survey object for the logistics enterprise employees in Suzhou City, a total of 678 questionnaires, 586 valid questionnaires, the effective rate of 86.4%. Respondents were selected from the SHRM, social network and knowledge sharing variables. The questionnaire survey was from February 2015 to October 2014. Male employees are 255 people, accounting for 43.5%, and female employees as 331 people, accounting for 56.5%. In the working age, the length of service 5 years following the 243 people, accounting for 41.5%, 6-10 188 people, accounting for 32.1%, 11-20 105 people, accounting for 17.9%, 21 years and more than 50 people, accounting for 8.5%. In the degree of education, college education personnel 45 people, accounting for 7.7%, college education staff of 7.7% people, accounting for 38.7%, undergraduate education personnel 289 people, accounting for 49.3%, master's degree or above personnel 25 people, accounting for 4.3%. At the level of work, senior management 18 people, accounting for 3.1%, middle managers 85 people, accounting for 14.5%, 483 ordinary employees, accounting for 82.4%.

3.2. Research variables and measurement

In order to guarantee the research has high reliability and validity, the questionnaire item design will be mainly used in the domestic and foreign more mature scale. Specifically, in the strategic human resources management variables were measured using Delmotte (2012) questionnaire, the questionnaire a total of 16 questions, a total of 13 empirical analysis of the problem. Social network variables are mainly used Wang Zhining and other (2012) design of the questionnaire, the questionnaire is a total of 7 items, the experience of the analysis of a total of 6 questions. Knowledge sharing questionnaire mainly used Hooff (2004) of the research paper questionnaire, the questionnaire a total of 10 items, the experience of the analysis of the 7 questions. All of the above questionnaire variables were likert5, 1 were totally disagree, 2 were not satisfied, 3 were general, 4 were satisfied and 5 were very satisfied.

3.3. Questionnaire reliability and validity analysis

The reliability of measurement, this paper adopts Cronbach's a coefficient to test variables, through analysis, strategic human resource management variable alpha value is 0.867, the relationship between the social network value is 0.854, the knowledge sharing of alpha value was 0.786, 0.7 higher than the standard, it can be seen that the questionnaire has high reliability. The validity of measurement, this paper uses confirmatory factor analysis to test the validity of the variable, after analysis, the questionnaire of strategic human resource management to verify the validity of the indexes of GFI, CFI, RMR, RMSEA, X2/df values were 0.998, 0.958, 0.038, 0.066 and 330.72/93; the social network questionnaire confirmatory indexes of GFI, CFI, RMR, RMSEA and X2/df were 0.992, 0.976, 0.034, 0.081 and 218.98/30; knowledge sharing questionnaire confirmatory indexes of GFI, CFI, RMR, RMSEA, X2/df values were 0.996, 0.983, 0.099, 0.031 and 336.39/50. Therefore, through the above data analysis, we can see that the validity of the questionnaire has basically reached the standard of judgment. Finally, because the questionnaire items by the staff to fill in the questionnaire, fill in the process there may be homologous data error, this paper using the method of single factor Harman test data of the questionnaire were tested by the analysis of homologous deviation, exploratory factor, all the characteristics of the extracted value greater than 1 factors are no more than 20%, can be a preliminary the questionnaire identified homologous bias is not a serious problem.

4. Hypothesis test and analysis

4.1. Descriptive statistics and correlation analysis

Through the analysis of the data, this paper shows that the reliability and validity of the different variables of this paper can reach the acceptable standard. The mean,

variable	mean	std	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Gender (1)	1.60	.535	1	-.017	.116*	.075	.086*	-.107**	-.090*	-.039
Length of service (2)	1.83	.856		1	.061	.085*	-.137**	-.105*	-.030	-.024
Education (3)	2.78	.688			1	.026	-.076	-.093*	-.077	-.051
Work level (4)	3.67	.754				1	-.084*	-.126**	-.045	-.063
SHRM (5)	3.61	.757					1	.765***	.606***	.594***
Instrumental network (6)	3.82	.873						1	.663***	.653***
Affective networks (7)	3.86	.757							1	.701***
Knowledge sharing (8)	3.78	.762								1

Table 1 – Mean, standard deviation and each variable correlation

standard deviation and correlation analysis between different variables are shown in table 1.

From the table 1, the data shows a significantly positive correlation between the strategic human resource management and the tools of network, affective network, knowledge sharing, and between instrumental network, emotional network and knowledge sharing has a significant positive correlation, the 1 assumption, assumption 2 and hypothesis 3 has been proved.

4.2. Hypothesis test

Analysis methods to verify the hypothesis by regression equation, 1 data is in the control of gender, education and other demographic variables, to study the effects of SHRM on instrumental network, analysis showed that the regression coefficient analysis showed that the SHRM of instrumental network was 0.649 ($P < 0.001$), R^2 0.587, $F=138.78$, to verify the hypothesis 1a. Equation 2 data is to verify the effect of SHRM affective network, analysis showed that the regression coefficient SHRM of affective network was 0.560 ($P < 0.001$), $DR^2=0.371$, $F=57.808$ to verify the hypothesis 1b. Equation 3 is a verification tool of network data on employee knowledge sharing, network analysis tools on the regression coefficients of knowledge sharing is 0.565 ($P < 0.001$), $DR^2=0.430$, $F=73.738$ to verify the hypothesis 2a. Equation 4 is to verify the emotional network data on employee knowledge sharing, affective network analysis showed that the regression coefficient of knowledge sharing is 0.714 ($P < 0.001$), $DR^2=0.639$, $F=174.428$, to verify the hypothesis 2b. Finally, equation 5 is to verify the SHRM data on employee knowledge sharing effect analysis showed that the SHRM regression coefficients of the knowledge sharing is 0.511 ($P < 0.001$), $DR^2= 0.359$, $F=54.624$, verify the hypothesis 3.

In order to verify the mediating effect between SHRM and employee knowledge sharing, this paper applies the Bootstrapping method to test the mediating effect. Existing theoretical studies show that the Bootstrapping method has a high statistical significance, and does not have to carry out the distribution hypothesis. In this paper, the application of F. Hayes Andrew (2013) developed the Spss program, the application of Bootstrap (1000) method to verify the mediating effect. The results show: (1) instrumental network between SHRM and employee knowledge sharing the mediating effect of 0.1849, Sobel test Normal theory-based value and is based on ($Z=7.8955$, $P < 0.001$), while the 95% reliability, effect value range is [0.1045, 0.2687], mediating effect for the entire effect ratio is 36.27%, which indicates that the tool is the network variables play the part of the intermediary role and knowledge sharing SHRM, to verify the hypothesis of 4a. (2) the emotional network between SHRM and employee knowledge sharing the mediating effect of 0.2178, Sobel test Normal theory-based value ($Z=8.6776$, $P < 0.001$) based on the reliability, at the same time in 95%, the effect of interval value is [0.1415, 0.2857], mediating effect of total effect ratio is 40.56%, which indicates that the affective network is variable part of the intermediary role and knowledge sharing SHRM, to verify the hypothesis of 4b.

	Datum model	Equation 1(hyp.1a)	Equation2 (hyp. 1b)	Equation 3(hyp. 2a)	Equation 3(hyp. 2b)	Equation 5(hyp. 3)
variable		Instrumental network	Affective network	Knowledge sharing	Knowledge sharing	Knowledge sharing
intercept	4.967**	2.578**	2.375**	2.389**	2.698**	2.058**
Sex (1)	-.089*	.072	.028	.059	-.019	.057
Length of service (2)	-.007	-.089**	-.067**	-.065*	-.110*	-.039
Education (3)	-.092**	.035	.018	.026	-.030	.045
Level (4)	-.038	-.029	-.032	-.018	.013	.034
SHRM		.649***	.560***			
Instrumental network				.565***		.511***
Affective network					.714***	
F value	6.259**	138.780***	57.808***	73.738***	174.428***	54.624***
R2	0.04	.591	.375	.434	.643	.363
ΔR^2	0.035**	.587	.371	.430	.639	.359

Table 2 – SHRM, social network relationship and knowledge sharing relationship model

5. Conclusion and discussion

5.1. Main conclusions

Study on the difference between the SHRM from the previous literature mainly from the macro level to explore the relationship between HR practice team organizational performance, try from the micro level, to explore the effect of SHRM on the content of employee knowledge sharing behavior, and from the social network perspective to explore SHRM and organizational performance between the “black box” mechanism. Mainly come to the following four aspects of the research conclusions:

1. through the practice of human resource management strategy, through the construction of a learning team, strengthen communication and other means, the organization formed the perfect tools of network, on the other hand, a variety of strategic human resource management practices through the promotion of mutual understanding between employees, enhance their willingness and opportunity to effectively construct, which contributes to the emotion network. In this paper, the results of the study to a certain extent verified the conclusions of Kang et al. (2007).
2. the conclusion of this paper reveals that building a perfect network relationship within the organization will help to promote the formation of effective

knowledge sharing behavior among employees. From the tools of network, the formal business to carry out the work based on effective communication and help to strengthen the staff knowledge contribution or collect behavior; trust and strong emotional atmosphere through network construction, will help individual employees share the information and resources are unique. At the same time, the study also found that the effect of affective network compared instrumental network on employee knowledge sharing is more significant, which may be related to the formation of Chinese traditional society's "human" relationship, Huang (1988) on the basis of social exchange theory, think through the formation of a stable relationship between "emotion" and will contribute more effectively formed on both sides of the exchange of resources. But for the organization members, the important part of the exchange of resources lies in the sharing of information, knowledge and other resources.

3. the results of this study reveal that strategic human resource management is positively related to knowledge sharing among employees, which is consistent with the conclusions of Minbaeva (2008) and Gu (2009) study. The organization through the implementation of effective strategic human resource management practice, subject ability, continuously improve the knowledge sharing behavior of the main motivation and broaden the knowledge sharing subject opportunity etc. the optimization of effective knowledge sharing, to strengthen the knowledge sharing among employees.
4. The study is different from the existing research literature which is failed to explore the relationship between the overall behavior of the three variables SHRM, social network and knowledge sharing, the conclusions of this study research shows that social network relationship is the behavior between SHRM and knowledge sharing between variables, and the SHRM is through the formation of the sensibility and tool to improve the two the different nature of the network relationship within the organization, so as to effectively promote the employees' knowledge sharing behavior, this is the optimization of the integration and innovation of the previous study, will be better able to make the theory to better grasp the inherent relationship between these three variables.

5.2. Research limitations and future perspectives

In this study, there are the following problems: (1) the scale even more authoritative, but the data obtained are mainly subjective data subjects, objective data obtained by slightly less than, the future still need to use more objective data to probe into related problems. (2) due to time and cost, the survey mainly concentrated in Jiangsu Province, the research object of the area is limited, so this paper through the research conclusions are applicable to other areas remains to be further empirical test. In the future, will be the further research in the following two aspects: (1) strategic human resource management and knowledge sharing of the "black box" mechanism has not yet clear, the future can also from the psychological empowerment and employee trust perspective to further study. (2) the current research on strategic human resource management mainly focus on the content of the SHRM paradigm in the future can be integrated content type SHRM and type SHRM process to further investigate the relationship between the paradigm and knowledge sharing, social network.

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Neural Network Data Mining Application in Risk Factors Analysis and Countermeasures of Sports Injury Accidents in Colleges

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Abstract: With the rapid development of information technology and the wide application of database management system, data mining technology has become more and more popular. In this paper, the authors research on the neural network data mining application in risk factors analysis of sports injury accidents. Through the empirical analysis, we find out the risk types of sports injury accidents in ordinary colleges and universities. $KMO=0.879$, Bartlett test $X^2=187.117$, $P=0.000<0.01$, The contribution rate of the 9 main factors were 25.441%, 19.669%, 11.820%, 10.744%, 6.867%, 5.872%, 4.464%, 4.267%, 3.293%, and the cumulative contribution rate was 92.436%. The main types of risk are teacher ability risk, teacher work style risk, student knowledge risk, student behavior risk, student ability risk, student psychological risk, school sports facility risk, school management risk and school medical supervision risk.

Keywords: Neural network, Data mining, Physical activity, Injury accident, Risk type

1. Introduction

With the rapid development of information technology and the wide application of database management system, more and more data have been accumulated (Vachon, 2006; Gonçalves et al, 2015). There is a lot of important information hiding behind the surge of data, people want to be able to carry out a higher level of analysis, in order to better use of these data (Michelsen, 2006; Asudi, 2015). So we can use the database management system to store data, machine learning and statistical methods to analyze data, mining the knowledge behind a large number of data, and their combination has contributed to the production of data mining (Jabbour, 2014). Data mining is the highly automated analysis of raw data, make the inductive reasoning, dig out the rules and knowledge from the potential, to help decision-makers to make correct decision; with the development of data mining technology, it has good accuracy, time complexity and space complexity of data mining algorithm is proposed, which the data mining technology in many fields can be widely used, data mining technology has increasingly become the focus of research and application of society (Yazdanpanah, 2015).

With the continuous development of China's social and economic development, sports and human life are inseparable (Pereira, 2015). In recent years, college students in sports activities in sudden death, violence, injury, disability and injury accidents is rising, bring them misfortune and disaster, and family, but also to the administrative departments of education, universities and teachers and sports management personnel brings new problems at the same time, there are different arguments on the law (Singh, 2013). Injury accidents in sports activities with sports activities and sports activities, and is directly related to the body with diversity, sudden, complexity, cause serious consequences, processing difficulty, to the society, family and University bring different injury. The risk of sports activities in Colleges and universities is varied; Mowbray (1969) according to the nature of the risk of the risk is divided into pure and speculative risk. There are only two types of risk, that is, there is no loss or loss of. There are three kinds of risks in the result of speculation, that is, there is no loss, loss or profit. The loss caused by the risk of pure fragmentation is "absolute" and, in the same basic condition, can be repeated in general. Specific risk arises from a particular person, the loss is only related to individuals, and the basic risk associated with the group, which is caused by the nature of the group, the loss only affects the entire body, and a particular individual (Sok, 2015). Specific risk is more pure broken risk; the basic risk includes the pure and speculative risk. According to the risk of the potential loss of form to the risk is divided into property risk, risk physical, liability risk. According to the causes of risk loss is divided into natural risk, social risk economic risk, political risk, technology risk and some other risk classification (Yi, 2014). Because of the scope of this study is university students' sports activity as a loss of pure risk, to the factors that affect the risk of college sports activities occur, to provide a method for the control of the sports risk. Therefore, this study from the factors that lead to the risk of sports activities, sports activities are classified into three aspects: responsibility risk, personal risk and property risk. Visible, risk type factors of injury accidents in sports activities must be clear, control and response, it has very important reference value and significance of the research on forming a set of feasible value types of risk management mode.

2. Neural network data mining

Knowledge discovery in database KDD is a high level process to extract a credible, novel, effective and understandable model from a large number of data. General KDD in the knowledge learning stage called data mining. Data mining is a very important processing step in KDD. Multi stage processing model of knowledge discovery in databases as is a multi-stage process, in the overall knowledge discovery process including many stages of processing. However, the application of data mining technology in the field of sports rarely at home and abroad in the initial stage, for example in the NBA team using IBM to develop data mining application software Advanced Scout system to find out the player's strong and weak points, optimizing the team's tactical combination, to help the coach to formulate the corresponding training plan and arrangement. With the development of China's sports information technology, in the national physical health, competitive sports, sports industry and sports education and other square area tired a lot of data. How to make full use of these data, and dig out useful and important information is often ignored by people, has become an important task for the sports scientific research personnel.

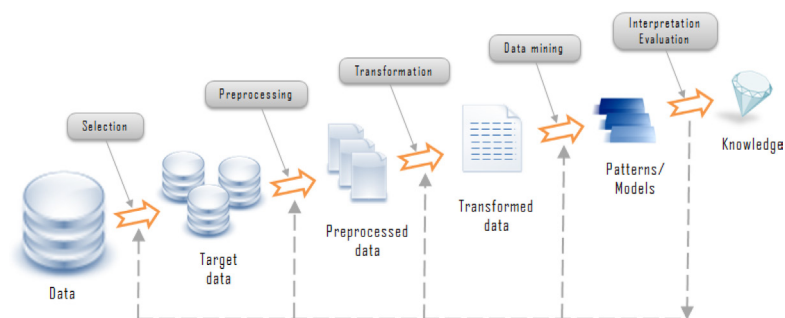


Figure 1 – Data mining process

The basic theory of data mining includes the concept, classification, method and process of data mining. Data mining has been widely used at home and abroad, the present definition of our experts generally agree that data mining is from the large, random, fuzzy, fragment data, the process of extraction of implicit, unknown and potentially useful information or knowledge, data mining and data analysis, usually data fusion, decision knowledge and with the application of knowledge discovery technology. Data mining technology can be divided into text database, relational database, object-oriented database, spatial database, multimedia database and global network. According to the different methods of data mining, it can be classified as machine learning, statistics, database and neural network. Commonly used data mining methods at home and abroad are genetic algorithm, decision tree, clustering analysis, association rule, rough set, fuzzy set, grey system and influencing factors analysis. Commonly used data processes include the following seven steps.

1. Clean up data: data that is clearly irrelevant to the topic of the cleanup.
2. The integration of data: the combination of multiple data, the formation of data warehouse.
3. Select the data: from the data warehouse to extract and select the data associated with the task.
4. The conversion data: the data is converted to data mining for easy data format.
5. Mining data: the law or knowledge of data mining methods.
6. The evaluation model: according to a certain evaluation criteria from the mining results in the selection of meaningful patterns of knowledge.
7. Knowledge: using visualization and knowledge representation techniques to show the relevant knowledge to the user.

In recent years, with the gradual improvement of our national life material and cultural level, the social public to personal physique monitoring and testing data, all kinds of social sports game data gradually increased, the annual accumulation of public health data and social data is more and more competitive sports events, how to play the role in the field of mass sports data, in order to improve the national physical fitness and sports training efficiency in our country, analyze the data and find the relationship between mass sports and its influencing factors among various factors become the important subject of sports teachers and researchers. PE data analysis refers to the use

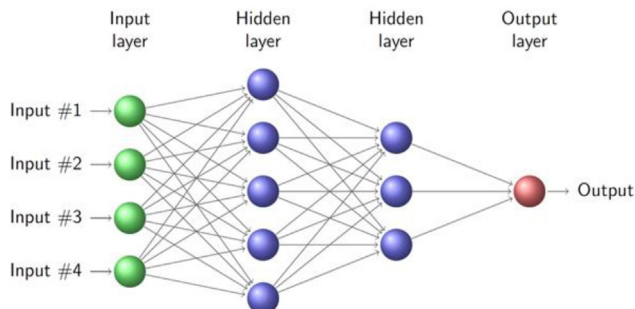


Figure 2 – neural network

of information technology to find relationship between the various factors from massive data accumulation, found the changes between them, then the data in-depth analysis led to lower health status may be the cause of disease, which can provide powerful guidance for all aspects of people's self-health and fitness the technology. Data mining technology is widely used in the field of sports teaching, such as teaching management, teaching evaluation, curriculum, teaching methods, teaching material selection and other aspects can be widely used, such as the use of management rules in data mining according to different students' gender, age, body function test data to establish the performance prediction model find potential knowledge, to improve teaching methods, improve the effect of physical education teaching and training.

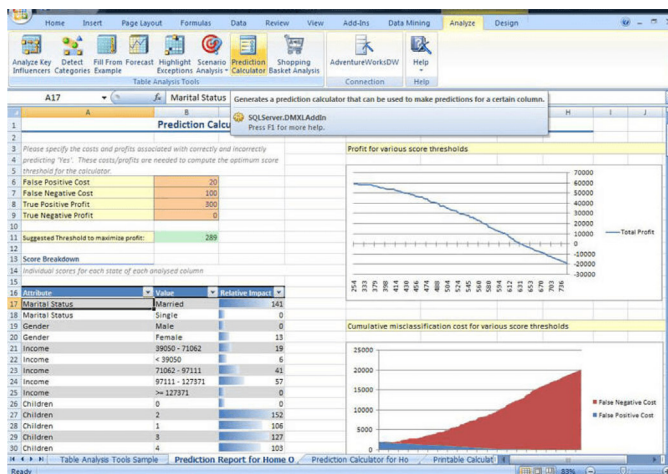


Figure 3 – Statistical analysis of data mining

3. Research objects and methods

3.1. Object of study

The object of the study is the 10 universities (Beijing Sport University, Tongji University, Renmin University, Guangzhou Sports University, Jiangxi Normal University, Jinggangshan University, Ganzhou Normal University, Hainan University, Xiamen University, Guangxi University of TCM) college students, physical education teachers and high school sports management personnel 223 people.

3.2. Research method

- **Historical research method:** historical data and literature data are the important basis for the identification and Countermeasures of the risk management of injury accidents in college students' Sports activities. In the past, different forms of data were collected, and their research and statistical analysis were carried out to provide basis for the research.
- **Comparative study:** a comparative study of the thinking process and method of determining the similarities and differences between things. Through the comparison, the similarities and differences, to find the law, to solve the difficulties, to improve the sports activities of college students to provide reference for risk identification.
- **theoretical analysis:** theoretical analysis is the key step in the process of investigation and research from perceptual knowledge to rational knowledge. Can be used for qualitative analysis of College Students' sports risk, seek the logic relation between students' physical activity and risk, in order to find out the general characteristics and basic principles of college sports activities accident risk.
- **Questionnaire:** (1) questionnaire: according to the basic requirements of questionnaire design, the harm of college students in sport activity (SCD) type of accident cases and related data were studied and analyzed based on the planning and design questionnaire. (2) the questionnaire survey: it is mainly to carry on the questionnaire survey to the physical education teachers, the sports service management personnel and the university student in the ordinary university sports activities.
- **Expert interview:** Research on the government or the general university officials, experts and teachers in the management of sports accidents in some sports colleges and universities.
- **Mathematical statistics:** the use of SPSS16.0 for data processing and analysis, the main analysis methods include exploratory factor analysis (EFA) and factor analysis.
- **Logical reasoning:** through the experimental data and the corresponding results of the use of comparison, deduction, induction, analysis, reasoning and other methods to deal with, draw the conclusion.
- **Observation:** on College Students' annual student basketball volleyball football, athletics, swimming, tug of war, traditional sports and other sports

competitions, “national student’s health standard” test track, the extracurricular sports activity of observation and attention. Including the mentality and behavior of university teachers and students’ sports activities in the project, climatic and environmental conditions of facilities, detailed record of the relevant situation, the appropriate use of photography, camera and other auxiliary tools, fully understand the types of risk sports activities in advance to avoid sports injuries.

- **Case study:** on the basis of dialectical materialism on the unity of opposites of individuality and commonness, the combination of individual and general principles. Taking the risk types of injury accidents in college students’ sports activities as an individual case study.

4. Results and analysis

The liability risk in Colleges and universities from the perspective of law, the liability risk of university sports activities mainly refers to the student accident in school physical education, extracurricular sports activities, sports training, sports competition, as a serious injury, disability, death and other major incidents of school should be liable. Due to the dynamic change of individual and the surrounding environment, the university sports activities there are many risks, sports venues, facilities and equipment accidents, school management is not strict, the system measures are not perfect, teachers and students do not mistake fault, according to the movement requirements of practice, have implied a huge liability risk. Mainly includes the risk of school responsibility (the main responsibility of the university sports activities, sports venues and facilities of public liability risk), personal responsibility, the responsibility of the school sports community risk.

Physical activity in college physical education is the risk of injury caused by physical activity in the physical activity of the physical disability or death. Students in sports activities, if you do not pay attention to exercise before, after the safety protection measures in the process of activity and relaxation exercises, not only can cause muscle or ligament injury, fracture or physical damage, but also not conducive to the movement of the body after recovery, some hidden risks hidden in the body. Many uncertain or non-measurable factors in sports activities, especially in the project of physical collision, and constantly challenge the limits of physical ability, skills, and other factors, there are different levels of personal risk.

The risk of the loss of physical property mainly includes the risk of sports facilities, the property of the facilities, the sports goods, the belongings of the sports players. In addition to the stadium in addition to the risk of public responsibility, but also because of its high value, the area is very large, difficult management, so the risk of damage to the venues and facilities, devaluation of the risk is not. Sports intangible assets in Colleges and universities refer to the fame or popularity of college leaders, teachers and students. Any accident caused by sports activities, whether teachers or students to assume responsibility for the accident of sports injury, its negative effects than positive effects, will make its reputation or popularity decline, namely intangible property losses.

The research uses the sports factor analysis method to carry on the analysis and research to the sports injury accident risk type factor in the ordinary colleges and universities. The expert evaluation of ordinary higher school sports injury accident in 29 types of risk

factors (1 - teaching equipment does not meet the requirements of the state; 2-school safety education is not in place; 3-school teacher training is not enough; 4- master the knowledge of sports is not good; 5 -students' safety protection measures are not good; 6-school health care system sound; 7- class preparation is not good; 8- school risk management plan is not perfect; 9- students ideological paralysis is not good; 10- students' physical condition is not good; 11 students of technical action is not good; 12 - step teaching organization is not good; 13- students nervous and negative mood; 14- the students' self-regulation is not good; 15- student violence is not good; 16- preparation activities is not good; 17- no regular inspection equipment; 18-protection responsibility is not good; 19- students wrong and dangerous action is not good; 20- students to protect themselves is not good; 21-Not good for the students, the classroom discipline supervision; 22- is not good; 23-professional sports injury treatment personnel is not enough; 24-students have not told physiological defects is not good; 25 - the risk factors predicted is not good; 26-management personnel quality is not high; 27- students patience is not good; 28- student movement the clothing is not good; 29-individual difference is not good) by factor analysis. By the KMO value and Bach Wright test: KMO = 0.879, Bach Wright test $X^2=187.117$, $P=0.000<0.01$, there are significant differences, indicating that the data is very suitable for factor analysis.

4.1. Determination and nomenclature of the number of public factors

According to the questionnaire survey results of the risk factors of sports injury accidents in ordinary colleges and universities, the factors of the 29 variables were analyzed. According to the "9 main factors of Keyser" eigenvalue greater than 1, the first common factor contribution rate was 25.441%, the second factor contribution rate was 19.669%, the three factor contribution rate was 11.820%, the fourth factor contribution rate is 10.744% and the five factor contribution rate was 6.867%, sixth male factor contribution rate was 5.872% and the seventh factor contribution rate was 4.464%, the eight factor contribution rate was 4.267%, the ninth factor contribution rate was 3.293%, the

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.378	25.441	25.441	5.353	18.457	18.457
2	5.704	19.669	45.111	4.162	14.353	32.810
3	3.428	11.820	56.930	3.267	11.265	44.075
4	3.116	10.744	67.674	2.772	9.560	53.634
5	1.991	6.867	74.541	2.728	9.408	63.042
6	1.703	5.872	80.413	2.492	8.592	71.634
7	1.294	4.464	84.877	2.108	7.270	78.905
8	1.237	4.267	89.143	2.053	7.078	85.983
9	1.003	3.293	92.436	1.865	6.453	92.436

Table 1 – Total Variance Explained(n=223)

cumulative contribution rate was 92.436%, the amount of information can reflect the overall perfect.

Grouping and classifying the original variables according to the steps. First is the determination of the main factor, the actual meaning of the non rotation of the common factor is not good explanation. Therefore, the variance of the common factor is maximized by orthogonal rotation. 29 primitive variables are grouped into 9 main factors (Table 1, 2 and figure 1). F1 named the risk factor of teacher's ability; F2 factor teacher style risk factors; F3 factor risk factors for students' knowledge; F4 factor student behavior risk factors; F5 factor students ability of students; F6 psychological factors; F7 factor the school sports facilities risk factors; F8 factor school management risk factors; F9 factor school medical supervision risk factors.

index	Component								
	1	2	3	4	5	6	7	8	9
7 preparation is not good	0.762								
12 organization of teaching steps	0.673								
16 preparation activities	0.825								
25 to predict the risk factors	0.957								
29 individual differences	0.637								
18 protect the responsibility		0.892							
21 is not good for students		0.614							
22 classroom discipline		0.736							
27 patience is not good		0.775							
4 master the knowledge of sports			0.837						
20 students self protection			0.846						
28 students sports clothing			0.506						
5 student security measures				0.872					
11 students technical action				0.505					
15 violent behavior of students				0.725					

index	Component								
	1	2	3	4	5	6	7	8	9
10 the student body condition					0.604				
14 students self regulation					0.746				
19 student error and dangerous action					0.792				
9 students thought is not good						0.811			
13 student tension and negative						0.730			
24 have a physical defect						0.683			
1 teaching equipment							0.671		
17 equipment is not checked							0.575		
26 personnel quality is not high							0.946		
2 school safety education								0.600	
3 school teacher training								0.904	
8 school risk management plan								0.585	
6 school health care system									0.899
23 professional treatment									0.663

Table 2 – Risk type factor analysis of sports injury accident

4.2. The theory and method of the risk types of sports injury accidents

Research data show that, in understanding the risk, risk identification and risk assessment, based on the theory and practice of risk management can be prevented and effective control. Risk response is the completion of risk identification and risk assessment, to find and determine a number of possible and possible ways to select the best risk management methods and in practice, to achieve a certain effect. Generally speaking, before the accident to reduce the incidence of accidents, reduce the loss rate, so as to achieve the desired results. Obviously, the risk of college sports is to reduce the risk of injury accidents caused by the probability and degree of students. Coping strategies mainly include risk avoidance, risk transfer and risk control, and there are different ways to deal with different types of risk.

Through the division of the university sports injury accident risk type and the specific practice, mainly from the teachers, students and school 3 aspects to study sports activities in typical types of risks and the corresponding coping strategies and coping methods is relatively common. See as Table 3.

Serial	type	strategies	Coping method
1	Teachers ability risk	Risk Management Risk avoidance	Engineering physics law, people's behavior law and procedural law Give up the implementation of some sports activities and change the nature of a sports activity
2	Teacher style risk	Risk Management Risk avoidance	Same to 1
3	Students knowledge risk	Risk Management	Engineering physics law, people's behavior law and procedural law
4	Student behavior risk	Risk Management Risk avoidance	Same to 1
5	Students ability risk	Risk Management Risk avoidance	Engineering physics law, people's behavior law and procedural law Transfer of insurance companies and judicial bodies
6	Psychological risk of students	Risk Management	Same to 2
7	Risk of school sports facilities	Risk Management Risk avoidance	Same to 5
8	Risk of school management	Risk Management Risk avoidance	Same to 5
9	Risk of medical supervision	Risk Management	Same to 2

Table 3 – Coping strategies and methods of the risk types of injury accidents in sports activities

5. Conclusion

The risk factors of physical injury in colleges and universities can be summed up as follows: “teacher’s ability risk factor”; “teacher’s work risk factor”; “student knowledge risk factor”; “student behavior risk factor”; “student ability risk factor “,” student’s psychological risk factor “,” school sports facilities risk factor “,” school management factor “,” school medical supervision risk factor “. There are three types of injury risk in

university: teacher ability risk, teacher work style risk, student knowledge risk, student behavior risk, student ability risk, student psychological risk, school sports facility risk, school management risk and school medical supervision risk. The risk coping strategies of sports injury accidents in colleges and universities mainly include risk avoidance, risk transfer and risk control. The risk coping methods of sports injuries in colleges and universities are mainly: abandoning the implementation of certain sports activities and changing the nature of certain sports activities in risk avoidance; transferring the insurance companies and judiciaries in risk transfer; engineering physical laws in risk control; Behavior law and procedural law.

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Study on the Information Resources Sharing Mode of Library based on Network Technology

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Abstract: The 21st century is the information age, computer network provides a new way for library information service. The construction of information resources is the foundation of library network construction and the realization of resource sharing. In this paper, the authors study on the information resources sharing mode of library based on network technology. Based on the network environment of computer and modern communication technology, information resources sharing mode has change the traditional way of information providing and obtaining, and the sharing of information resources also has become the developing direction for libraries. So that, library should improve the database construction of literature information resources, make full use of advanced technology to achieve the sharing of book and information.

Keywords: Information technology, Resources sharing, Digital library, Literature resources

1. Introduction

The twenty-first Century is the era of information technology, information resources as a strategic resource, plays an increasingly important role in the national economic and social development. The social progress and economic development, need this information to actuate, information resources has become the basic elements of productivity progress (Alice, 2013; Francisco, 2015). In recent years, rapid development information technology, information industry is just unfolding, doubled the amount of information, the information network all over the world, the development and utilization of information resources has entered a new era (Irene, 2013; Gaby, 2014). The computer and modern communication technology combined with each other to construct a network environment based on the traditional information and the way to get completely changed, people can use the network office terminal release or access concerned about the information, the information network to form a virtual user centered system of information, as long as the user will own computer (Salvador & Rocha, 2014; Mario, 2015). And the network connection, cannot be restricted by time, is not affected by the location information, easy to search, select online, get the information they need. The sharing of information resources and sharing are closely related (Barbuti,

2014). The sharing of resources must be based on resources to build the library, only to actively participate in the formation of literature resources. Information security system is perfect, in order to effectively share resources (Chang, 2014; Masitah, 2014). With the popularization and development of information technology and the Internet electronic publications, network information and other digital information collection and the higher the proportion of using library resources and information resources sharing, the content will be more abundant, the range will be more extensive, means more advanced (Tramullas, 2013; Raju, 2014). The library only followed the footsteps of the times, and makes full use of the advanced technology resources, realize the sharing of resources to achieve better, to provide users with information the functions of resource services.

Computer cyber source environment provides a new way for library information service, the transmission distance information and exchange can be realized, so that some isolated, scattered through the collection of electronic communication network, composed of transnational cross regional, not limited to the region and environment of virtual library, users can in every corner of the world, the use of computer each terminal, not affected by time, space constraints, to the library in the network whenever and wherever possible to retrieve literature information. The library's behavior will also change greatly, the service content form and content, the information resources organization, great changes in information management mode and user behavior (Wendy, 2014). The focus will shift to the development and utilization of information resources, the traditional closed service mode will change to open the network electronic information service, outstanding performance in information Access to resources can be shared and remote through remote calls, breaking through the space and time constraints, for the sharing of resources and information services in the field of information research has brought far-reaching impact.

2. Information service and resource sharing

2.1. Development of network information

The biggest characteristic of the development of information and utility is the sharing of information resources. The development of information technology for cross regional, cross-border exchange of information, communication, storage, use provides by far the most convenient way of processing and provides the possibility for the effective implementation of information resources sharing of information resources. Sharing is the main direction of development of information technology, we have to constantly increase the information resources in various fields, shared in different regions, and we will achieve the information development goals. The information age is the era, all kinds of intelligence tools of information technology have emerged and rapid development based on. With the continuous progress of information technology, information resources sharing will be on a larger scale, in the field of implementation, the speed of information sharing will gradually accelerate, information resources, information products will be unprecedentedly rich together, and in the whole The dominant position of social resources. Therefore, a fundamental shift in the economic form of the whole society would: for thousands of years to the traditional material production, circulation, consumption as the basic characteristics of material economy, will gradually to modern

information production, exchange, use and consumption for the transformation of basic information the characteristics of the economy, make full use of information, information sharing will be the basic goal of the development of information technology.

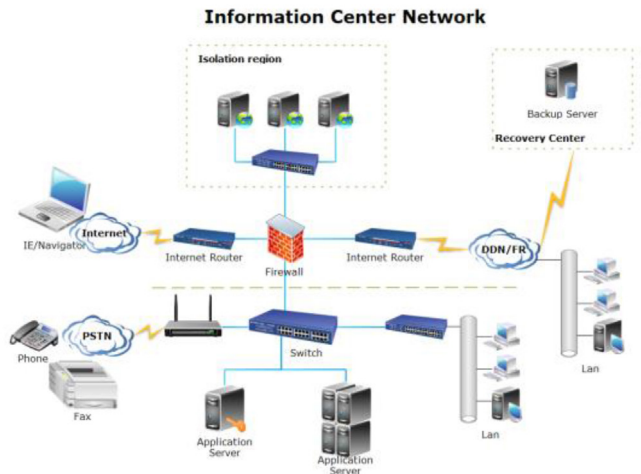


Figure 1 – network information

The era of big data, enhance the user information demand information consciousness, but selective impaired users in rich data resources, it is difficult to find the required information, so the library needs to provide users with strong pertinence and high accuracy of the information, which prompted the personalized information service. In the information age, the library network service from the traditional closed to open, the core of the service core, the change of the network information service has also promoted the development of personalized information service. Changes in the information environment, the user needs, awareness, service management mechanism and so on. In the era of big data, the university library has a large number of digital

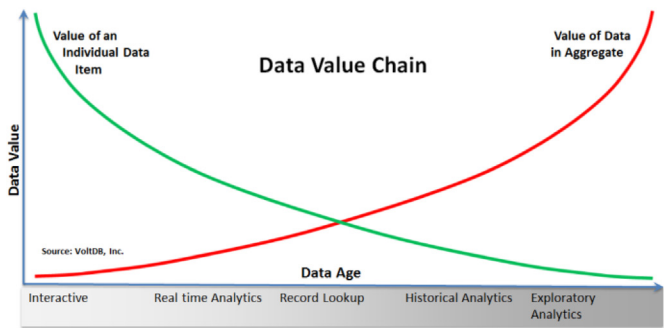


Figure 2 – Big data value

resources in addition to the traditional paper documents. All along, the library has attached great importance to the literature collection, collation and utilization, ignoring the data collation and mining. Currently has the digital resources, in addition to a variety of electronic resources, literature database, etc., its automated system also track record a large number of users of basic information, information behavior and service information and other data. At the same time, the development of social networks, such as WeChat, micro-blog and so on, resulting in a large number of exchange of information, the information is not only included structured data, semi-structured and unstructured data are increasing, the depth data mining can be direct or potential value of information.

2.2. Resource sharing

For a long time, the rapid increase in human beings' information resources, publications and journals and books are increasing, prices are rising, which makes any one of the library due to funding, space, manpower constraints to achieve a complete collection of all documents to meet all the needs of readers has been impossible. Especially in the rapid development of information technology and with the popularity of the network environment, great changes faced by the library information environment, the information needs of readers also have great changes. In the spatial extent from the demand point of view, the information needs of readers are not only depend on a library, further beyond the country, regional restrictions to the worldwide information demand. Therefore, any one of the library is able to use their own collection fully meet the needs of the readers, the contradiction between the unlimited expansion of the readers the information demand and the limited library information resources are becoming increasingly acute. In the library funds are limited, how to make the input and output library for better performance, give play to the greatest benefit of library resources, any libraries are hoping to achieve the goal. In this demand driven, resource sharing and meet the needs of readers how to use the library to maximize the network platform becomes more and more important.



Figure 3 – The book Resource sharing

Our library has entered a new historical stage. The concept of sharing information resources gradually accepted the attention of the government funds is greatly increased, or called the network library alliance gradually built and put into use a variety of library information resources sharing. Organized by the Ministry of education, launched in 1998 China CALIS project, is the most marked project sharing resources and influence, is one of the two public service system in the overall planning of the higher education of our country 211 project. Its purpose is to be the modern library concept, advanced technology, rich in literature and human resources integration, and the construction of digital library to China higher education as the core of education security system combined with literature.

3. The construction of library information resources under the network environment

3.1. Library Information Resource Database

The rapid development of modern science and technology, recorded this knowledge, technical literatures, collection scope of library is increasing, the content is constantly updated, the collection of carrier, library, profound changes of collection quality. The electronic information resources and digital information resources spread, contributed to the digital library collections produced the collection of information resources, the library of the printed digital conversion, the purchase of electronic publications and databases, etc., has become a way to increase their own library collections. The construction of the main index of construction information resource library digital database, it plays an important role in the construction of information resources, the construction of information resource is an important level sign to measure the construction level of modern library. The library as the traditional information circulation and transit agencies has been the social information network an important node in network. With the rapid expansion of the remote computer, through the development of a communication technology and the Internet, the user needs the use of multimedia information through the network is more and more high, the amount of information it provides is growing at an alarming rate, the digital information resource is the foundation of information resources sharing under the network environment of the library. The staff will be on the network information resources scientific organization, and will provide valuable information to the reader, thus forming a new resource library. Therefore, specific to the library, it is composed of two parts: the collection is a real collection; the other part is the virtual library reality. Collection usually refers to all the collections of the service for readers of the library can be used, including traditional literature resources, bibliographic information database (reader database, library circulation information etc.) And electronic publications (such as the purchase of library digital information resources and databases) library and the museum he developed or co construction and so on. The ownership of real collection each hall, free access to information resources is the most direct and the most frequent security resources, current and future for a long period of time, it is still part of the leading role of the library resources construction. The contents of the database library real collection include the following four aspects:

- 1. Bibliographic database:** The bibliographic database is the base of the development of information resources, and it is the basis of the comprehensive

realization of the network automation. Its function is to reveal the collection, which is convenient for users to retrieve and use the information resources of the library.

2. **Combined bibliographic database:** The combined bibliographic database is usually an area or a country such as the library information organization based on bibliographic database, and through the establishment of online cataloguing resources reflects the literature. The combined bibliographic database of bibliographic database is conducive to the establishment of regional cooperation and procurement document resource guarantee system, is to achieve interlibrary loan and the precondition of sharing resources.
3. **Characteristic document database:** Characteristic literature database is the library information organization according to the literature resources and the information needs of users, select the specialized database to establish a distinctive collection of literature resources. The characteristic literature database can be divided into the characteristics of bibliographic database and characteristic literature database of two types. The characteristic literature database to reveal and use the literature information resources is an important way to library information organization information resources to improve the service level and the development of information resources sharing.
4. **Database products:** The database products of a variety of types, such as disc database, stand-alone version of the database, on-line database, bibliographic database, database, database and so on. They, as electronic books, journals full text database the D-papers database, conference papers database, newspaper database and so on, greatly enriched the digital information resources in China.

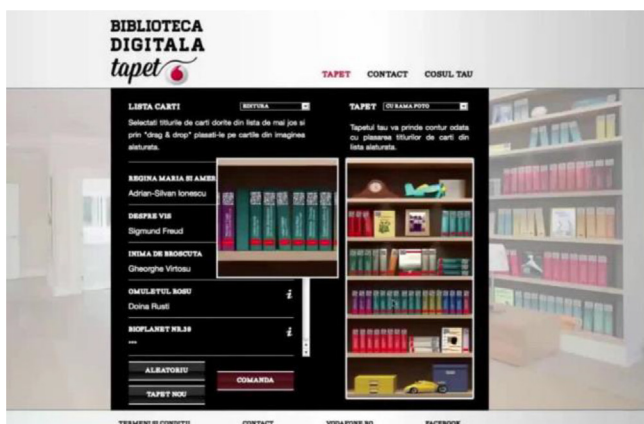


Figure 4 – Virtual library

3.2. Digital Library

The virtual storage of Digital Library in detail is a collection of resources and environment, in this virtual environment in the library collection, the user can through the library computer system and communication equipment sharing outside the library

information resources on the Internet, this does not belong to the library of their own information resources through the network. The library can be connected through the network search to other libraries and library resources available to the user, in this part of intangible resources also became a part of the library collection. This part of the virtual library resource called the library. At the same time, the library's collection can also through the network for other library users search using a virtual collection of other. The Library under the network environment, the types of users will be more and more. They may seek scientific knowledge, improve their own knowledge The structure, improve the cultural literacy and the quality of life and quality, may also be entertainment type, or other purposes of users, so resource sharing content may involve politics, economy, education, health care, financial investment, commodity marketing, culture and sports, leisure and entertainment, tourism and many other aspects of information, these contents also, it has become a part of the virtual storage of digital library. The main contents of the virtual storage of digital library include some network information:

1. The network version of the electronic literature information resources, mainly refers to the protection of certain intellectual property rights, the quality of the official network of reliable publications, including electronic books, electronic journals, electronic newspapers and so on.
2. The network information resources database. Mainly refers to be the protection of intellectual property rights, and from the library or database to maintain and update the network database, including online databases, OPAC (OPAC), network navigation database, the network version of full text database.
3. other Internet information resources, mainly refers to the two categories of network information resources, other than the Internet information resources, according to the network protocol to divide, including e-mail, FTP documents, the World Wide Web information, etc.



Figure 5 – Digital library

4. Library information resource sharing model

4.1. Interlibrary loan service

The earliest form of library resource sharing is the sharing of literature entity, entity at first appears in literature sharing of interlibrary loan service means, interlibrary loan service in ancient times has emerged, the traditional interlibrary loan is to meet the needs of readers in the library, access between the library catalogue, according to the two sides in advance agreed, by mail, courier, fax or other transport document delivery means to carry out in the library literature between the mutual use of business in the information network environment, the information needs of users, information consciousness and information ability have great change, interlibrary loan is changing. First, change that other library bibliographic information means, either by way of on-line batch retrieval network members of bibliographic information, can also search through the Internet library specific retrieval method OPAC A library bibliographic information. Secondly, changes of document delivery means can be lent Museum digitization and the network digital the rapid transmission of information to the user or to borrow this museum, known as the transfer of electronic literature interlibrary loan means more convenience and convenience.



Figure 6 – Library resources

Document delivery service is the extension and expansion of traditional interlibrary loan service in the network environment. The traditional interlibrary loan service refers to a collection of information to the library to provide another library using activities. Document delivery service is defined by the information providers to store information of the entity is transferred to the user activity. Document delivery is the user needs literature from the literature have passed directly to a service user, which originated in the interlibrary loan, but interlibrary loan refers to direct foreign books, periodicals and literature carrier by way of document delivery service is not original, only a copy of the document lending the service, which is a kind of non-return type of interlibrary loan, with the return type of interlibrary loan There is nothing comparable to this advantages. Modern information technology transfer services in the application in the literature,

makes some people focus from technology perspective. All kinds of document delivery information services through the Internet and other channels to provide delivery service to the various original documents Global users. Service is the user through Internet will transfer their request to the service, and by these institutions by email, fax, mail, online download the original The beginning of the document is passed to the user.

4.2. Book resource sharing

The development and popularization of Internet, the library can conveniently use the Web service to the readers in the library on the home page, in addition to a variety of library information presentation, there are a large number of outsourcing electronic literature resources, built a variety of characteristic database, subject navigation systems, providing storage services to a large number of literature when readers. All kinds of resources in the search or reader retrieval, find problems, we need librarians timely help in the network environment, the expert directly facing readers, timely answers readers' questions. The individualized information service of the library is based on library user specific information behavior, habits and preferences, to provide users to meet their individual needs the information content and information service activities. The library personalized information service has a long history, with the resources and environment, information environment, technology environment as well as the change of living environment, the personalized information service has become the core work and the future development trend that the library needs to strengthen.

Under the network environment, terminal readers can sit in the library or home, through a can according to user needs and integrated service interface customized access all the information he needed, and other background work, selection and organization

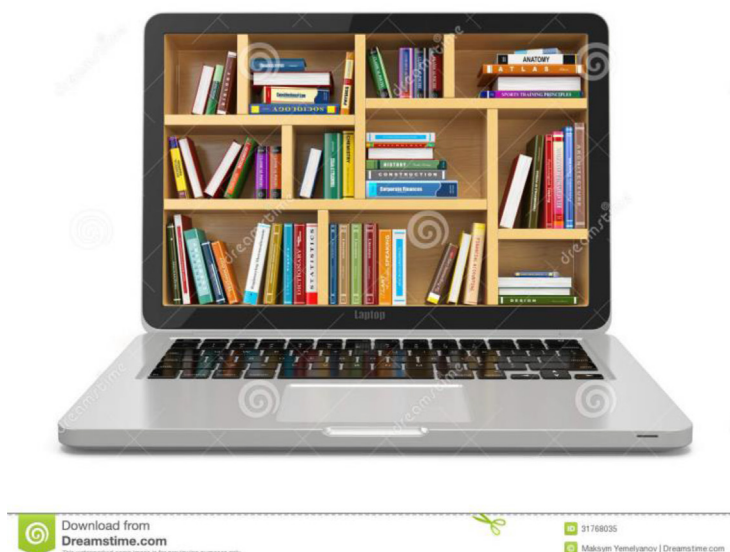


Figure 7 – Network Library

of information such as the interface, and so on are accomplished by this way has the following library. The following characteristics: first, it is a set of advisory functions, service functions to provide modern information and document retrieval function. Users can stay at home, just knock on the keyboard, you can communicate with the librarians, remote download files directly or through online ordering, get their needed information. Secondly, this is an information resource integration service mode. Under the network environment, library resources includes printed documents, including virtual collection, integration of library through standardization, a variety of information resources The source into the one, show to the user is the seamless collection resources unified transparent, users do not feel the existence of heterogeneous and distributed resources. Again, this is to provide a multi-level information service mode. Users can retrieve relevant information, and then got the full text on the basis of literature or data. The library can also, deep processing and comprehensive identification of information content, and information recognition, image synthesis, video decoding, conditional library can also analyze system platform launched with intelligence on the user's information needs, and timely initiative to recommend to the readers of the relevant resource information has strong personalized features.

5. Conclusion

The construction of information resources is the basis for the construction of library network and realizes the sharing of resources, is the premise to carry out the work. The database construction of literature information resources is an important basic work of library automatic system, a large number of Literature Library to readers use must establish a standard bibliographic database. Only by establishing the corresponding database the library can realize the automation of the work, to help communication network and database resources by using computer to realize resource sharing. Resource sharing is always the pursuit of the development goal. The development of network technology provides great development platform for the sharing of resources in our country. The library should make full use of advanced technology, promote the construction of resources sharing, and provide more services for users to improve their information literacy and culture play a role.

Involves the sharing of resources construction in many aspects, first of all from the resources construction, scene out of the software technology, digital storage technology, network technology makes the information resources of the library collection is more convenient and easy to manage, but the amount of information is becoming more and more complicated but also a test of the library management system and operation mechanism. How to make use of cooperation and sharing and get the more information with fewer funds, the establishment of basic complete database, as far as possible to meet the needs of users, need library regulations in management mechanism, construction technology, investment and other aspects to increase efforts to better cooperation between Libraries should implement joint procurement, joint catalogue of resources can be better sharing. In addition, the network user's information needs is complex and changeable, the library should be from the user perspective, in order to meet the demands of the principle, to interlibrary By means of the transfer of resources and the sharing of resources, it should be more tailored to some personalized service content, to meet the various requirements of users, as far as possible the user satisfaction.

Acknowledgments

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Research on Employment Guidance of College Students based on Employment Network Information Service Platform under the Era of Big Data

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Abstract: The university employment information network platform is facing challenges in the era of big data, how to effectively in the employment of college graduates information of complex data “purification” amount, provide accurate guidance for graduates, improve the efficiency of employment guidance work, is a topic worthy of study. This paper briefly introduces the information network of large data, the effective employment and significance of the application background, the current situation of development and the current employment information network, and discusses the effective countermeasures of the employment information network platform in the new era.

Keywords: College graduates, Era of big data, Network platform, Employment guidance

1. Introduction

With the development of the Internet, information technology has been widely used in life, work, study, service, transportation, production and other fields, to change the world, to bring a lot of convenience to mankind (Deffuant, 2000; Ferreira et al., 2015). The construction of employment information is of great strategic significance to China's economic and social stability. Help in a variety of information platform, students can more easily find the number of college enrollment in the Chinese graduates increased year by year to make work more convenient, greatly easing the pressure of employment, to provide personnel for our country's economic construction (Katarzyna, 2000; Hegeselmann, 2005). Therefore, the state attaches great importance to the construction of employment information, since the twenty-first century, the CPC Central Committee, the State Council, the Ministry of Education promulgated a number of instructions, and requires great efforts to carry out the construction of information.

Big data (data big) mainly refers to the massive data generated by the era of information explosion, as well as the development and innovation of related technologies. The first proposed big data era is the world's leading consulting firm mckinsey (Liu, 2013; Pereira,

2015). Data, has penetrated into today's every industry and business functions, has become an important factor in production. People for massive data mining and use, indicates a new wave of productivity growth and consumer surplus, the era of big data is an important feature of the era of massive data (Zhou, 2012).

Large data types, including video and audio information, image information, location information, network log information, the processing ability of complex data put forward higher requirements. With the increasingly serious employment situation, the establishment of employment guidance service in Colleges and universities (Zhang,2014), some colleges and universities also set up employment guidance service center plays an important role in promoting the employment of university students, and college employment guidance service of information technology and network technology plays an important role (Tian, 2012; Yang, 2014). At present, most colleges and universities in China have established the information network platform, the use of advanced information technology, faster and better to promote the development of employment. With the popularization of the information network technology, most of the functions of the employment guidance service need to be completed through the network technology and information platform. In the face of great challenges and opportunities in the employment information network platform in the era of big data, how to effective employment information from complex data, improve the purification efficiency, is the school employment guidance work, is a topic worthy of study.

Big data type	Proportion
video	10.23%
Audio information	11.56%
image information	19.76%
position information	35.56%
Web log information	22.89%

Table 1 – Data Types

2. Employment Network Information Service Platform

2.1. Employment guidance in the form of a single, not fully play the role of the network

At present, the general use of employment guidance in Colleges and universities in China is the classroom teaching system, expert lectures, the employment sector advisory system or network consulting system, and so on. These forms of guidance are the main body of the professional staff of the employment guidance, the network as an auxiliary tool exists. As the product of the development of the era of big data, the network should play a greater role in the guidance of College Students' employment. Taking a university in Jiangxi as an example, the graduates of the network conducted a survey on the employment intentions of the network, but also uploaded a resume, but did not appear on the website of the survey. Student network problems in the change of employment

agreement or loss report card is a very common problem, put forward in response to students' answers, the network is too simple, it can be seen that the school did not make full use of the network to solve practical difficulties and problems of students' employment. For the search of the university website can also be seen, only the school level of the employment sector, the school's two schools did not set the corresponding employment plate. With the development of the network age, contemporary college students should be more convenient in the form of network employment guidance. With the development of the era of big data, the network not only occupies an important position in the life of students, in the employment guidance also began to occupy the main position of graduates. Especially in the case of the mobile phone network, the main position of the traditional college employment is threatened and challenged.

2.2. Network information confusion, lack of depth analysis

Information network construction related departments of employment and entrepreneurship information is divided into several major modules, such as policies and regulations, recruitment information, employment guidance, classification, information release confusion, access to information has brought great inconvenience. However, visitors can only click on each of the information in the ocean as a needle, and then choose the useful information, the efficiency will be greatly reduced. Second, colleges and universities are often just a simple recruitment notice, copy, paste, publish to the network, no longer on the company's situation, work function, wages, etc. Travel spend more time looking for employers and recruitment information to make a better job to judge. Once the graduates find employment information to find in the ocean to lose patience, employment information processing need to lose interest, the employment information network will be greatly reduced.

2.3. Guidance time arrangement is not reasonable

Our university's employment guidance is the focus of this year's graduates, generally in the beginning of employment guidance education, far less than the requirements of the entire employment guidance. According to a survey done by Yao Yuqun of the Renmin University of China, the 52.9% university employment is fourth years, only 17.6% of the college students' employment guidance, students from a large, but only 58.8% of the college employment agencies believe that employment guidance should be from the beginning, there is the concept of more than 40% colleges and universities do not agree with the employment guidance.

Grade	Proportion
Freshman	17.6%
Sophomore	40.0%
Junior	58.8%
Senior	52.9%

Table 2 – proportion of school graduation

2.4. Lack of targeted employment guidance

The employment information network platform of domestic colleges and universities generally has no specific and personalized guidance. The university employment information network platform, the basic characteristics of the project of employment guidance, such as resume and interview, but these are from other sites, no personality, no purpose, no more function, help the University graduates. In the pursuit of personalized today, the network employment guidance should guide students according to the actual situation, according to the wishes of the individual and the characteristics of students, combined with personal occupation interest in work, reasonable planning, in order to meet the needs of the students. For example, a construction professional student wants to work in the field of human resources, the students how to find their own suitable work? This needs to be based on the student's personal practice. This time can be recommended to the construction company's human resources department to try, and it is recommended that students take an examination of a human resources certificate, to facilitate the employment of students. Not all the students have to learn what professional, you have to engage in what professional work, this is a one-sided view. Personalized counseling schools also need to invest a certain amount of human resource, employment department is limited, it is difficult to ensure the overall across the one-on-one personalized guidance, so that through the network channels, can let more students get personalized service.

3. Big data analysis

College	Jiangsu Province	Outside
College of Mechanical Engineering	242	160
Agricultural equipment Engineering Institute	31	0
School of automobile and traffic engineering	318	125
School of automobile and traffic engineering	198	126
School of materials science and Engineering	115	247
School of electrical and Information Engineering	200	170
School of food and biological engineering	99	83
School of environmental and safety engineering	44	88
School of computer science and Communication Engineering	12	186
College of Science	148	35
School of civil engineering and mechanics	122	29
School of chemistry and chemical engineering	65	65
School of management	203	150
Finance and Economics College	492	75
Marx School of	27	0
Grammar School	161	83
Foreign Language Institute	139	48
college of art	142	124

Table 3 – the statistics on the number of Colleges

For a long time, the employment of college students, student employment, regional employment, the ideal business statistics and other information to do a full accumulation, here, the employment structure of the Jiangsu University in 2015 cases were analyzed.

3.1. Regional flow

As can be seen from Figure 1, in recent years, the employment of college graduates in the employment of concentrated in the Pearl River Delta, Bohai, the Yangtze River Delta region, the Yangtze River Delta region. These areas accounted for 78.19% of the total employment of students, and the structure of the students, the level of regional economic development is closely related.

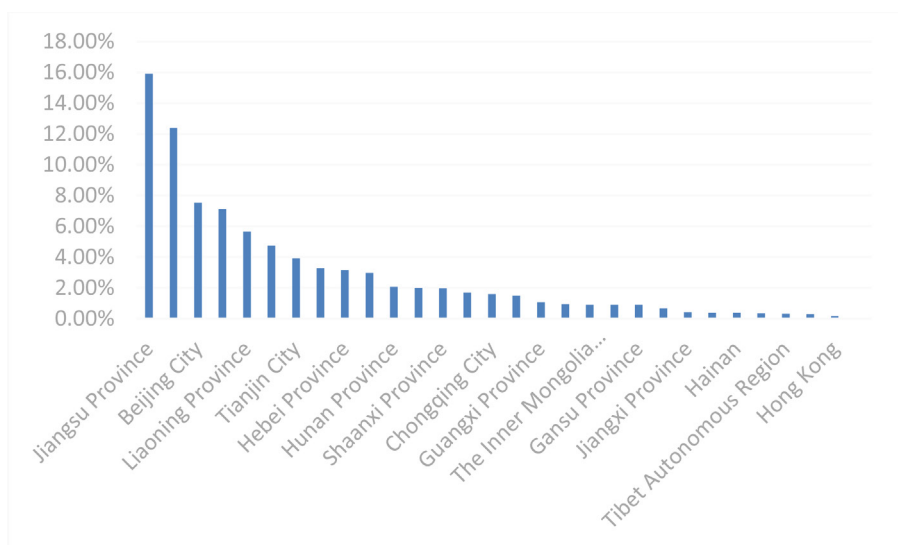


Figure 1 – 2015 session of the college graduates employment area flow

3.2. Unit flow

From figure 2-2, graduates employment unit flow: PubMed (35.85%), (20.56%) the state-owned enterprises, foreign-funded enterprises (12.89%), business (11.56%), (10.78%), overseas institutions (3.26%), (2.32%), the army grass-roots civil servants (2.21%), health (0.52%), other (0.05%).

3.3. Industry distribution

Figure 3 can be seen: the employment of college graduates is mainly concentrated in the manufacturing industry (38.19%), information transmission, software and information technology services (13.22%), scientific research and technical services (8.11%), the proportion of the three industry employment is close to 60%.

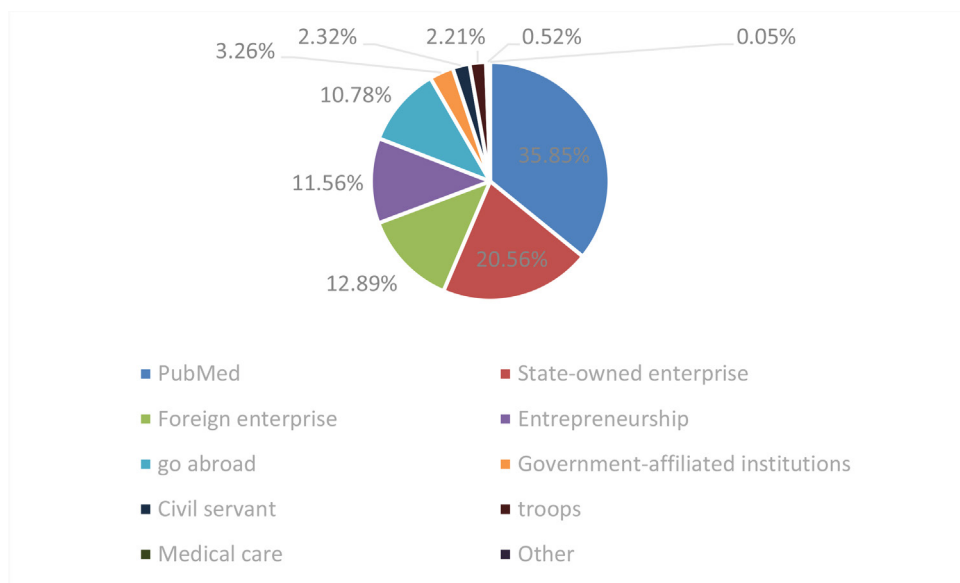


Figure 2 – 2015 graduates employment unit flow

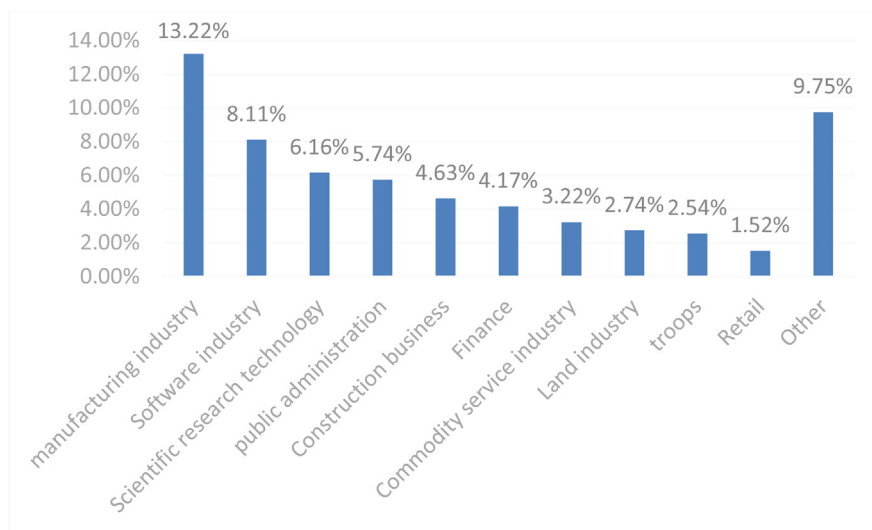


Figure 3 – 2015 session of the college graduates employment industry flows

4. College Students' employment guidance mode in big data Era

4.1. The combination of the employment network information service platform and the college students employment guidance mode

Using mobile wireless applications, relying on mobile networks and mobile phones and other mobile terminals, the establishment of information dissemination and interactive platform, the platform is composed of public websites, mobile websites and SMS information release platform. The platform for the timely release of relevant national policies, employment guidance, employment network employing units and related agencies through the audit of the school's employment sector through, you can publish recruitment information, etc.

One is to collect student information. Collect data in a big school for students. First of all, students will be included in the system of personal information, including personal interests and hobbies, etc. Universities, students and employment and other departments to share basic information data, in the course of a day of maintenance, you can make the students to add or modify the relevant data through the network platform. The administrator can put two of the administrative power of universities reintroduction, reduce the manpower cost, and improve the accuracy of student information sources. Before the operation of the platform, first, the number of valid phone can be added to the system. The school employment office will collect all the student's employment phone numbers, use the system to enter the user library, these students will be the number of mobile phone users as the landing site and the user's identity. All kinds of platform information can be released to all the graduates through SMS platform, so that students can get timely information and feedback, students can obtain employment information, adjust their employment.

Two is to collect all kinds of employment information and related websites. Recruitment units can be registered on the platform, according to the information uploaded by the audit qualification enterprise employment department, after the audit, the unit can be uploaded through the platform of recruitment information and the application of campus recruitment. Enterprises have a unique platform account, you can update the recruitment information, and through the platform release. After the administrator of the online audit, through the information of the audit will be sent to the form of text messages directly to the phone's graduates, graduates can also obtain relevant information through the school website or mobile phone.

School employment department can also collect a variety of regular web site recruitment information, after a direct transmission to the students to call. At present, there are a lot of professional employment website and media, such as E, recovery joeb, schools can explore the reasonable way of cooperation, broaden access to employment information channels, to achieve win three of enterprises, universities and graduates, shared data. The accurate data of 2 school employment office staff of relevant departments of personnel, college students employment, mainly responsible for the maintenance and management platform, including website background, audit user registration of enterprises, is the most important problem of college students employment guidance. College students can get information at any time to send to the platform, if there is any doubt can be online video consulting or through the QQ and other forms of doubt, the situation is complex, you can make an appointment through the platform. This form of teaching, need more human resources, if the school does

not meet this demand, can guide the personnel authorized by the second grade student counselor work, as long as the employment expenditure of funds, to avoid the waste of manpower. In the era of big data, people's contact information and the use of information, due to the different needs of users, resulting in a combination of new data, the geometric growth of these massive data, the formation of large data. At present, the intelligent analysis of large data has been applied to various fields, colleges and universities can make full use of these analytical data, to provide accurate basis for the development of College employment.

4.2.Recovery analysis intelligent classification guidance system

Resume management system to facilitate to resume data and safety control of graduates, centralized management of user information network service, users can also make the students realize efficient recovery system construction, modify and delete and search etc. "The resume <http://cv.qiaobutang.com/>" Joe cloth as an example, the site is the classification of function analysis of a professional resume of the website, students can easily create personalized appropriate resume template on the website of the resume. Through the operation of large data analysis, the website platform can meet the job seekers to different positions of different positions for customization, easy to adjust the format requirements of the resume, greatly improve the efficiency of the work. However, it is difficult to achieve the function of the University's own employment website. This feature is mainly determined by the storage capacity of the school's back-end server, in particular, the latter part of the need to invest more funds. However, "Joe cloth resume" in order to solve this problem, the University set up a special edition, in the major colleges and universities employment online links, in order to promote the university employment management department and the two grade teacher management student, synchronous login system, so you can log in once, optimize resources. Students according to the system automatic generation of personal resume, for different positions to provide different resumes, so as to meet the needs of College students.

4.3.Bit information precision matching guidance system

In China's existing recruitment site through the analysis of the key words to achieve with the user's search location, to match the location of similar to the user to push. Although this method is not accurate enough, but it is convenient for job seekers from a large number of data information in the choice of suitable for their own job information. University employment department should take the employment demand as the basis, take the employment demand as the standard, analyzes the University Graduate Employment data. Data collected included: contact tracking data, employment information, such as browsing the content on the page, click on the time of employment; employment information, search words such as regular post demand information data show that the search behavior of conversion, what type of information demand; employment information preference data. Employment information and the way to express love, hate employment information and presentation. Universities must carry out real-time tracking of these data, analysis of various data association, to infer the student's professional preferences, recommend appropriate location for the students.

Based on this situation, we need a precise location information tracking and matching system, through the analysis of the students in the university four years of relevant data, the investigation, construction pattern of demand for graduates full employment of

graduates, the graduates employment behavior tracking, improve the accuracy of search results to send push.

4.4.Occupational assessment and occupational skill assessment guidance system

Professional skills and professional standards in accordance with the relevant provisions of the state, through the government authorized inspection and appraisal institutions, professional knowledge and skills of workers to conduct an objective and impartial, scientific and standardized evaluation and certification activities. An authoritative evaluation of their professional interests, professional skills, can guide students to better planning career. In the employment information platform, the evaluation of professional skills is essential. This can help the graduates to more accurately grasp the professional development trend, accurate positioning. In particular, vocational education teachers college graduates, such as: students can go to the school to test the qualification certificate, you can also go to the accounting certificate. At this time the professional testing and intelligent data analysis is particularly important.

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Thermal Structure Coupling Finite Element Analysis and Strength Evaluation Method for Multi Support Autoclave

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Abstract: In this paper, the authors analyze thermal structure coupling finite element analysis and strength evaluation method for multi support autoclave. With the analysis design method, ANSYS was used to perform finite element analysis of thermal-structure coupling for the Multi-saddle Supports autoclave by the JB4732-1995 Steel Pressure Vessels-Design by Analysis (confirmed in 2005). According to the stress nephogram of stress field, the maximum stress of autoclave's vessel body, enclosing cover and support were analyzed and calculated, and the corresponding improvement measures were put forward after finding out the weak points in strength of autoclave.

Keywords: Autoclave, Thermal-structure coupling, Finite element, Strength evaluation, Analysis design method

1. Introduction

Autoclave is a kind of pressure vessel, which uses 1.4MPa, 190°C of steam to steam pressure maintenance of building materials; the application scope is very wide (Lu, 2009; Huang, 2013). At present, for this kind of pressure vessel design enterprises mostly use the traditional design method of design, the design is based on elastic design criterion allows only elastic deformation, in order to ensure that the container is safe and reliable, with high safety factor in the design of the general safety factor $n=5$ or $n=4$. This safety margin is too large, the strength assessment is too conservative; in addition, the effect of thermal stress on the container is not considered in the design, design lead to inaccurate results (Qian, 1989; Lu, 2005). This paper adopts analysis design method, considering the effects of heat stress on the basis of finite element analysis, the autoclave thermal structure coupling finite element analysis, put forward 4 kinds of strength evaluation criteria, and the strength of the weak point of the corresponding improvement measures were put forward in the structure (Wang, 2010).

1.1. Heat transfer mode

Autoclave working hand due to the temperature gradient inside the object, the energy through heat conduction from the high temperature area is transferred to the low

temperature region (Zhuo, 2008), on the other hand between the object surface and the motion of the fluid heat convection heat transfer will occur, so the autoclave at work when passing in the heat conduction and heat two kinds of heat convection.

1.2. Thermal structure coupling method

Autoclave working temperature reaches 190 degrees Celsius, the stress analysis, in addition to considering the load stress also need to consider the structure thermal stress caused by high temperature, the need for thermal structural coupling analysis (Zhou,2010). Indirect coupling method is used to calculate the temperature field distribution of the structure as the next step, which is the thermal analysis of the node temperature as the structural stress analysis of the body load. The coupled analysis process is shown in figure 1.

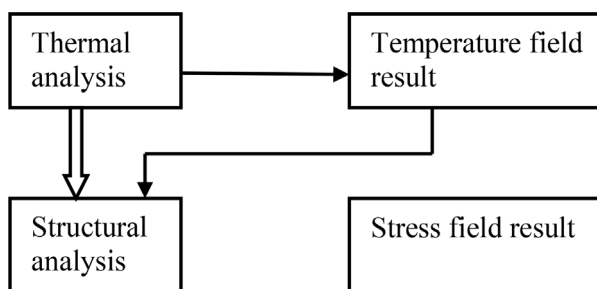


Figure 1 – Indirect coupling process

2. Establish the finite element model of autoclave

2.1. Thermal structure coupling method

The model with $\Phi 2m \times 31m \times 16mm$ autoclave model, model comprises a kettle body, bearing, seal and track the four part, the kettle body modeling on the trolley track, in

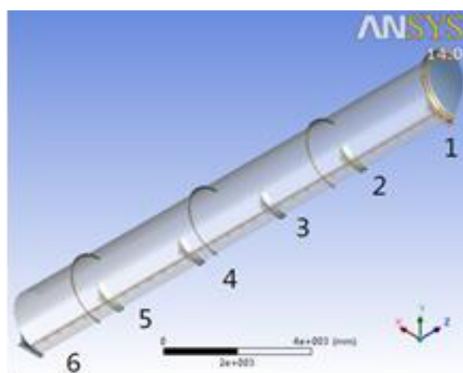


Figure 2 – Autoclave 1/4 model

order to more accurately analyze the influence of steam curing material and the trolley weight of steam autoclave. The container is supported by 11 saddle supports, sixth of which are a fixed support, and the rest is a movable bearing, which is used to reduce the effect of the axial stress. Reinforcing ring is arranged on the outer wall of the container, which is used for improving the strength and rigidity of the container. In the autoclave hole flange and the kettle body are connected through the device, because the hole opening rate is very small, so the modeling is not steam pipe hole. Without considering the influence of weld strength, the model to support, kettle body, cover and guide by Boolean operations are combined into a whole. Taking into account the characteristics of the basic structure of the vapor pressure of the symmetric structure, according to the overall structure of the 1/4 modeling and analysis, model diagram as shown in figure 2.

2.2. Grid division

Using ANSYS Workbench in the grid division, set the maximum grid size of 30mm, the grid cell type by the Workbench automatic selection. The kettle body, rail support plate, sealing, sealing flange, kettle body flange and the support of the SOLID87 unit, a reinforcing ring and track with the SOLID90 unit, after the division of the grid is shown in figure 3. Most of the grid quality is above 0.65, which can meet the analysis requirement.

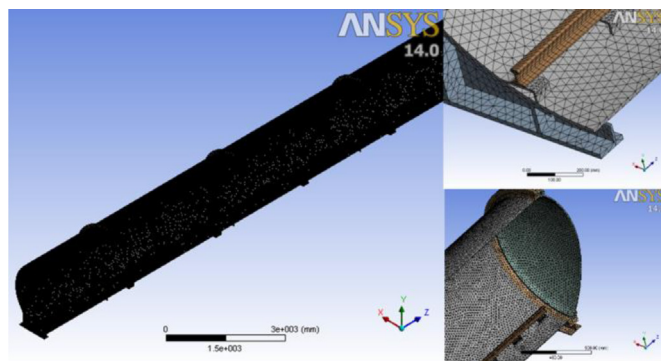


Figure 3 – Grid graph

3. Setting material properties and boundary conditions

3.1. Material properties

The autoclaved kettle body and sealing material for Q345R bearing material is Q235A, the attribute values are selected according to the manual.

3.2. Load boundary conditions

The external load includes the gravity of autoclave, 1.4MPa of steam pressure and the gravity of steam raising material and 2.2e+005N.

3.3. Setting of displacement boundary conditions

The bottom plate of the fixed support is in the middle of the bottom plate, and the rest bearing is limited to two displacement constraints in addition to the axial displacement.

3.4. Load boundary conditions

The heat transfer process of autoclave is a complicated process of heat conduction and convection, so it is difficult to solve the problem. Therefore, under normal operating conditions, the temperature boundary conditions are as follows: as a set of steel with good thermal conductivity, the convective heat transfer inside the kettle body and ignore the 190 degrees of water vapor, the same temperature and steam temperature, the highest temperature in the kettle is only considering the design temperature of 190 DEG C; the kettle body and the external cover are due the insulation layer, without considering the kettle body, cover and outside air heat conduction, convection and support only consider the outside air heat exchanger, air in the vertical face of preset hysteresis flow heat transfer coefficient is $3.784\text{e-}006\text{w/mm}^2\text{°C}$; the environment temperature is 22 °C.

4. Thermal structural coupling stress

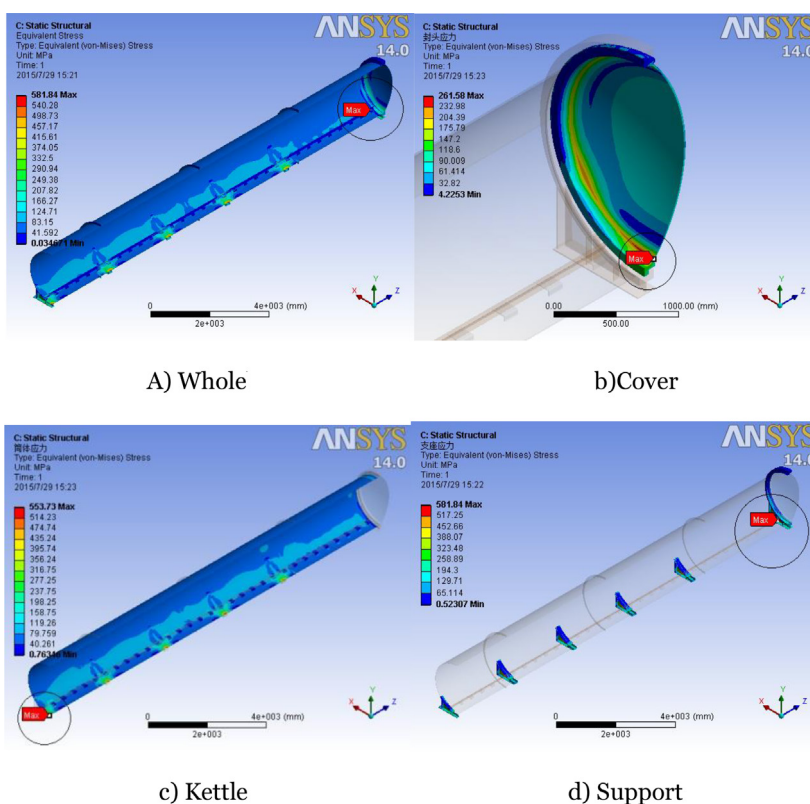


Figure 4 – Thermal structure coupled stress field distribution

4.1. Thermal structure coupled stress field distribution

Figure 4 a), b), c), d) respectively, the thermal structure coupling and sealing, and the whole kettle support four parts of the stress field distribution, capping the maximum stress appears in the ellipsoidal head and cover flange connected with the lower part of the kettle body, in the middle of the bearing is below the maximum stress, maximum support stress risers in curved end bearing on the circled parts for the maximum stress. Cover the kettle body and the support, the maximum stress node number, node coordinates and stress values in table 1.

Position	node	X (mm)	Y (mm)	Z (mm)	(von-Mises) stress (MPa)
Cover	9027	0	-938.52	15850	261.58
kettle	5230	0	-1000	0	553.73
Support	88799	574.25	-1199.4	15765	581.84

Table 1 – Maximum stress node number, node coordinate and stress value

As can be seen from table 1, the maximum stress level of the vessel and the bearing is higher. Because of the stress with ANSYS finite element calculation results is a comprehensive and integrated elastic stress, elastic stress distribution of the location, status, the causes have different allowable stress of autoclave in different parts, and because there is no beyond the yield limit of the elastic stress, so in accordance with the JB4732 is required to evaluate the strength of autoclave based on stress classification on linearization.

4.2. Stress linearization classification and linear path selection

The total amount of stress is separated into three parts: the average part of the path along the path, the part of the linear variation along the path, and the part of the. These 3 parts are thin film stress, bending stress and peak stress. Stress linearization path is selected in the maximum stress position along the wall thickness direction, figure 5 a), b), c), respectively, is figure 4 b), c),d) in the circle part of the image of the map, the direction of the direction of the linear path.

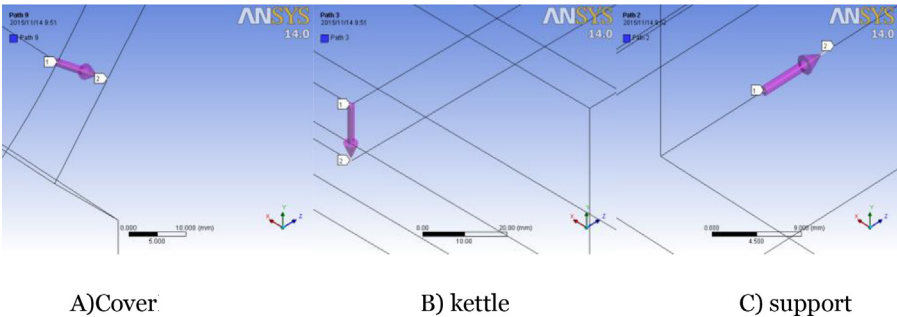


Figure 5 – Linearization path

4.3. Stress linearization treatment

In order to reflect more clearly the thermal stress influence on the structure, in the linear path according to the analysis of normal structure analysis and thermal structure coupling of two kinds of stress linearization, Figure 6 a), b),c) were sealed, the kettle body and the base three of maximum stress of linear classification after the stress curve.

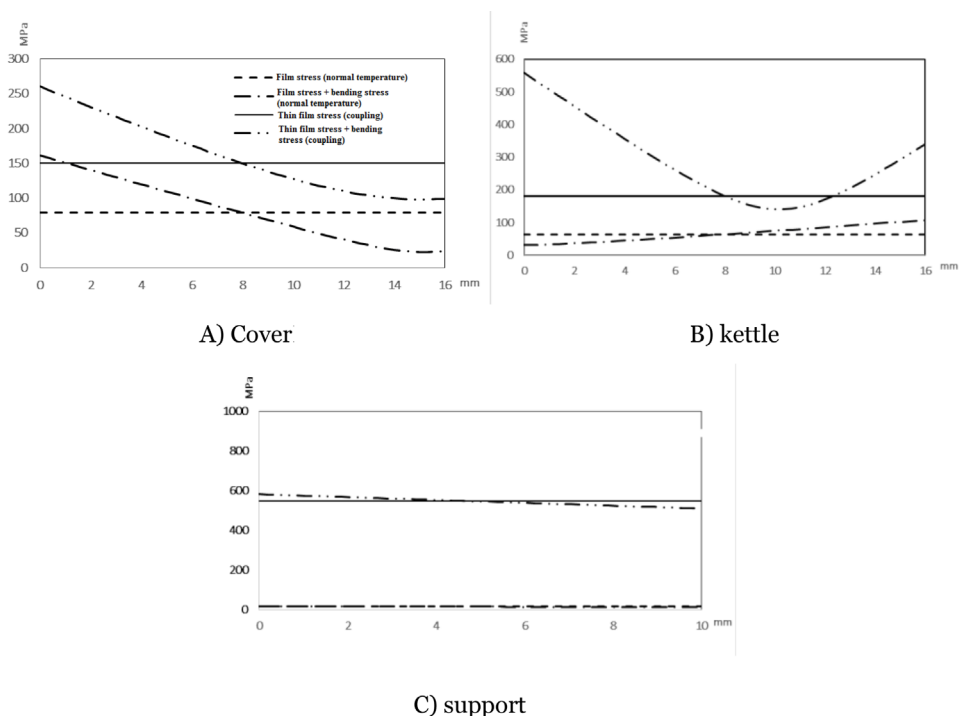


Figure 6 – Stress curve after linearization

Comparison of normal structure analysis and thermal structure coupling analysis of two kinds of situations, from figure 6(a) showed that the lidding film under normal temperature stress is 78.975 MPa, when the coupling is 149.97 MPa, increased 1.899 times compared to normal temperature; room temperature film stress and maximum bending stress value is 161.14 MPa, when the coupling is 260.23 MPa, compared with normal temperature increase 1.61 times. From Figure 6(b) shows that the kettle body film under normal temperature stress is 64.271 MPa, coupled to 181.42 MPa, compared with normal temperature increased 2.82 times; room temperature film stress and bending stress maximum value is 107.85 MPa, when the coupling is 557.93 MPa, compared with the normal temperature increased 5.18 times. From Figure 6(c) shows: film bearing under normal temperature stress is 14.989 MPa, when the coupling is 545.3 MPa, increased 36.38 times compared to normal temperature; room temperature film stress and bending stress maximum value is 15.781 MPa, when the coupling is 581.46 MPa, compared with the normal temperature increased 36.87 times. The effects of heat stress,

the stress of each component are increased to different extent, some have been more than the yield limit, designed by conventional design method cannot, so for evaluating the strength of autoclave required further analysis using the method of JB4732 design evaluation.

5. Strength evaluation

5.1. Strength criterion

The analysis in the design of strength failure criterion, strength evaluation to design stress intensity based on different stress according to different size and area of the kettle body deformation effect and influence, has different criteria. According to the design standard JB4732, select the Q345R at 190°C under the design stress intensity S_m for the 192.6MPa; Q235A in the design stress intensity of S_m at 100°C for 157MPa.

In this paper, autoclave in stress analysis without considering the fatigue damage, ignoring the influence of stress peak strength, put forward the following four criteria: (1) $P_m \leq KS_m$ (2) $P_l \leq 1.5KS_m$; (3) $P_l + P_b \leq 1.5KS_m$ (4); $P_l + P_b + Q \leq 3KS_m$; the S_m design stress intensity, P_m - a total film stress, P_l - a local film stress, P_b a bending stress, Q - secondary stress, K - force combination coefficient of load, $K=1$.

5.2. Stress analysis

1. A total film stress P_m : P_m is caused by mechanical loading (not including thermal load). In Figure 4 a) we can see that the vast majority of the whole stress is in the 0.034671~124.71MPa region, so take the P_m as its average value 62.37MPa.
2. A local thin film stress P_l :

P_l effect on the local area, including the overall structure of the film caused by the discontinuous stress, Workbench stress linearization results did not distinguish between primary stress and secondary stress of two, with the following treatments: 1, due to thermal stress is two times of stress, not including the film stress at room temperature should be regarded as a film stress of two thermal stress, a thin film this treatment of stress will include two stress components, but considering the convenience and safety of the components in the two angle still stress a range of stress. The 2 part, because the maximum stresses in local area, thus further to 1, to obtain the stress as a treatment for a local film. Through the above two steps namely workbench films at room temperature under the decomposition of stress as a local P_l film, the corresponding figure 6 a) and b), c) in the dotted curve, its value is 78.975MPa, 64.271 MPa and 14.989 MPa respectively.

3. a local thin film stress P_l + primary bending stress P_b : the bending stress at room temperature affected by the non-thermal stress is regarded as a bending stress P_b . This may include two stress components, but from the convenience and safety point of view is still in a stress range, Figure 6 a), b), c) the midpoint line shown in curve is $P_l + P_b$, the maximum value is 161.14 MPa, 107.85 MPa and 15.781 MPa respectively.

4. primary stress and secondary stress of two P_1+P_b+Q and two times: considering the influence of thermal stress, the workbench thin film thermal coupling stress and bending stress as a stress and stress of two and P_1+P_b+Q , in Figure 6a), b), c) in two points crossed the curve shown, its maximum value is 260.23 MPa, 557.93 MPa and 581.46 MPa respectively.

5.3.Strength evaluation

The criterion (1), $P_m=62.37\text{MPa}$ $\text{EKSm}=192.6\text{MPa}$, through evaluation.

For the criteria (2), (3), (4), the different design stress of the material is different,the evaluation results are shown in Table 2 and table 3.

		primary local membrane stress P_1 (MPa)	primary local membrane stress Plus a bending stress P_1+P_b (MPa)	secondary stress P_1+P_b+Q (MPa)
Evaluation condition		$P_1 \leq 1.5\text{KSm}=289$	$P_1+P_b \leq 1.5\text{KSm}=289$	$P_1+P_b+Q \leq 3\text{KSm}=578$
Position	cover	78.975	181.42	260.23
	kettle	64.271	107.85	557.93
result		passed	passed	passed

Table 2 – The kettle body, cover (Q345R) stress rating scale

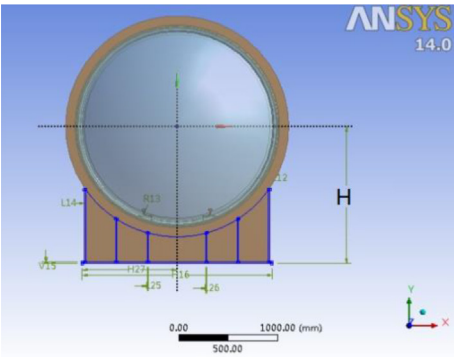
		primary local membrane stress P_1 (MPa)	primary local membrane stress Plus a bending stress P_1+P_b (MPa)	secondary stress P_1+P_b+Q (MPa)
Evaluation condition		$P_1 \leq 1.5\text{KSm}=235$	$P_1+P_b \leq 1.5\text{KSm}=235$	$P_1+P_b+Q \leq 3\text{KSm}=471$
Position	Support	14.989	15.781	581.46
result		passed	passed	failed

Table 3 – Support (Q235A) stress assessment form

The evaluation results show that the strength of the support is weak, and the structure of the support and the stress of the bearing are further analyzed.

The upper and lower bearing kettle is connected to ground contact, because the bearing has no insulation layer, to support the existence of large temperature, thermal expansion blocked very large thermal stress due to thermal stress is two times of stress, it is self-balance within the structure, unbalance and external mechanical load. When the stress exceeds the yield point, the yield deformation can help the material to overcome the temperature difference. In addition, the maximum stress at the arc on the vertical plate stress contains one or two stress, connected with the side plate, bearing bottom most regions are in the elastic state of stress is low, the overall bearing deformation is small, it should be high arc vertical board to support and protect the good effect on the whole, the support is safe.

The evaluation of the support is not in the standard (4) indicates that there is a possibility of partial cracking of the curved riser plate at the end of the vessel. For the sake of safety, the end of the kettle body can be improved on the structure. Figure 7 for the kettle body end bearing structure, H is the kettle body center to the bottom plate distance. Figure 8 H from the original 1220mm every 75mm to 1520mm, after ANSYS Workbench parametric modeling to calculate the corresponding maximum stress value curves from the curve can be seen, the bigger the H value corresponding to the stress value is small, this is because the web area increase value increased H to improve coordination free stretching deformation heat, reduce the deformation caused by thermal stress. Therefore, in the design of the structure, select the appropriate H value to control the maximum stress of the support, in order to meet the strength requirements.



coupling analysis of stress field distribution, and the autoclave, autoclave body, sealing and bearing the four part of the strength verification and evaluation.

1. nephogram of stress thermal structure coupling, because under the influence of temperature stress, steam autoclave at room temperature is more obvious than in the structural analysis of large, therefore in the autoclave stress-strain analysis, the temperature should not be neglected. The results show that the maximum stress of 261.58 MPa capping occurred in the flange in the connecting surface, the kettle body maximum stress occurs in the middle of 553.73MPa at the bottom of the kettle body, bearing the maximum stress of 581.84 MPa in support of arc vertical plate.
2. On the basis of stress linearization classification processing, autoclave sealing and kettle body meet all the criteria for the evaluation of the support requirements, not through the criterion evaluation, thus bearing strength of weak points due to possibility of tension crack.
3. The analysis of the position, stress and strain of the weak points of the support, increasing the web height of the support can effectively reduce the value of the maximum stress, in order to ensure that the stress of the bearing is limited to the evaluation index.
4. This paper presents a reliable and accurate analysis and design method, which has a certain commonality, and provides a theoretical guide for engineering design.

Acknowledgments

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Study on Knee Joint Injury in College Football Training based on Artificial Neural Network

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Abstract: Artificial neural network is an information processing system; researchers could build complex mathematical models by using computer technology to simulate the mechanism of human neural system to accept external stimuli. In this paper, the author study on knee joint injury in college football training based on artificial neural network. Based on the empirical analysis, we find out the main factors of the knee joint sports injuries in football training. KMO value=0.868, Bach Wright test =186.128, $P=0.00<0.01$ so that statistical significance. Nine main factors, the contribution rate is 20.773%, 19.735%, 10.576%, 8.569%, 7.612%, 6.426%, 4.464%, 4.101%, 3.024%, the cumulative contribution rate of 85.279%. Includes coaching factors, technical factors of athletes, load factor of athletes, factors of safety knowledge of athletes, factors of athlete preparation, factors of unfair behavior of athletes, psychological factors of athletes, factors of athletes training site and unexpected factors.

Keywords: Artificial neural network, Information processing, Knee joint injury, Football training

1. Introduction

The contemporary competitive sports to the high and difficult precision instrument, the development trend of the sports training into a multidisciplinary collaborative combat era, urgent need with the help of modern science and technology, to study the laws of sports, maximize human potential, enhance the ability of people. However, the factors that affect the technical level of athletes are very many, and the results show that the performance is nonlinear (Dai, 2012; Huang, 2014). Neural network as an important subject of modern nonlinear science, has developed rapidly in recent years, is widely used in pattern recognition, automatic control and the social economic field, in the field of sports and use, and is very successful (Hu, 2012; Jiménez, 2015). But only for the prediction of sports performance and the football team's clustering, but the number is very small. In fact, the application of neural network in the field of sports is a great potential. Artificial neural network is a simulation of the human brain, along with the development of neural network research, understanding of the part

function of the human brain has been greatly improved, such as the study of visual processing network, the storage and memory problems research have achieved some success (Jian, 2015). When the development of neural network theory has already objective requirements related to mathematics should be developed, and bold expected a mathematical method to express nonlinear system more concise, more perfect and more effective and analysis is a major goal of the development of mathematics in this field (Kim, 2014; Lino et al., 2016).

Football is the world's largest sports, sports is the world's most influential individual sports, is an antagonism strong movement project, football can promote to athletes thinking, physical and psychological, learning and life improvement. Long engaged in football training of college students (Sigala, 2012), not only can effectively develop knowledge of football and football skills, football tactics, physical quality, psychological quality, but also can improve the radian of the cardiovascular system and respiratory system organs, very love by college students (Krstev, 2014). But the characteristics of football players is particularly touching each other violently, relative movement speed, attack and defense conversion is fast, a fierce, it is very easy to cause the students sports injuries, damage easily occurred in the process of movement, football player injured throughout the body, is part of the knee, foot, leg, the wrist, head, shoulder and waist (Zhang, 2012). The football training of sports injury in training effect is very large, the causes and the complex, generally can be divided into internal and external factors, according to the characteristics of football training, knee sports injury causes of 35 factors in the study of football training to experts, coaches and athletes in the questionnaire survey, factor analysis and summary, find 9 genetic factors for coaches and athletes in training, reduce knee injuries in football training, and promote the healthy development of College football.

2. Artificial neural network

Artificial neural network is an information processing system, it is the use of computer technology in different degree and level of simulation of the human nervous system stimulation (input) transmission of nerve impulses, information processing, and feedback control mechanism, the unknown coefficients for polygenous complex mathematical model. This information processing system has the characteristics of self-organization, self-learning and self-adaptation, and has good fault tolerance, so it has a wide range of applications and great potential for development. In the military field of production and scientific research of pattern recognition, image understanding, intelligent control, optimization, decision making, prediction, diagnosis, communication, artificial neural network has been widely used at home and abroad, and achieved satisfactory results. Neural network model is the description and Simulation of different levels of the brain from different angles. According to the network structure can be divided into feed forward and feedback type, according to the learning method can be divided into a tutor and no tutor learning. There are dozens of neural network model, some representative models are mainly the following: BP neural network, radial basis function (RBF) network, Hopfield neural network, adaptive resonance theory ART model, self-organizing feature mapping model, Self-organizing Artificial Neural Network etc.

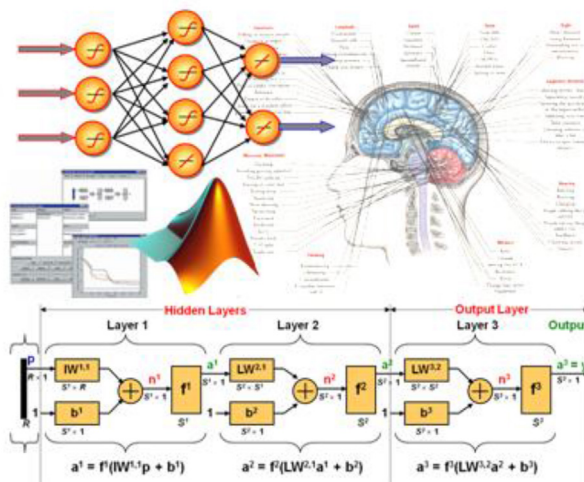


Figure 1 – Artificial neural network

Artificial neural network (ANN) is a network consisting of some basic functional components (i.e. artificial neurons), which are used to simulate the biological neuron. Especially in the past ten years, with the study of artificial neural network deeply, has made great progress in Electronic Science, computer science, automatic control, mathematics, physics and biology fields such as the widely used frontier crossing since 90, artificial neural network has been solved, especially is this Hopfield neural network model to study the convergence and stability of the network with a clear criterion, its application has been expanding, the neural network theory is becoming more and more outgoing, focus on interaction between itself and science and technology. The artificial neural network is composed of a neural model, which is composed of a number of neurons with

NEURONS AND NEUROGLIAL CELLS

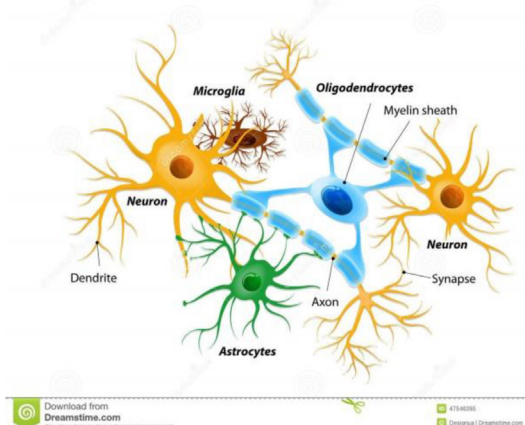


Figure 2 – Neurons

parallel distribution and structure. Each neuron (Figure 2) has a single output, and can be connected to other neurons; there are many (multiple) output connection methods, each of which corresponds to a weighted coefficient.

The artificial neural network method with its unique structure and information processing, automatic control, image processing, pattern recognition, signal processing, robot control, signal processing, welding, geography, data mining, power system, military, transportation, mining, agriculture and meteorology etc. many practical applications show the excellent performance. Application of several common neural networks:

- **BP neural network:**BP network applications generally have classification, function approximation, optimization prediction and so on. For example, ECG classification and the classification of the stomach, the least square approximation of the function, the fitting of industrial process or natural science data, power load or the prediction of information flow in multimedia and so on [9]. Especially for the prediction of time series is more practical value, such as the national economy and population development and so on can be used to calculate the BP network modeling and fitting.
- **ART network:**The application of ART network in the field of voice, image, text recognition, pattern recognition widely; in the industrial system can also be used as for control, fault detection, fault diagnosis, accident alarm and other complex production process quality control; ART network can also be used with data mining, search from a large number of data and found a stable and the pattern of meaning. The advantages are: good clustering effect, strong stability, good adaptability to environmental changes, the algorithm is simple and efficient. Deficiency: ART network to determine the reasonable diagnosis model and parameters, the network structure should be further study and optimization.
- **RBF neural network:** RBF neural network has been successfully used in function approximation, pattern classification, system modeling, and pattern recognition,

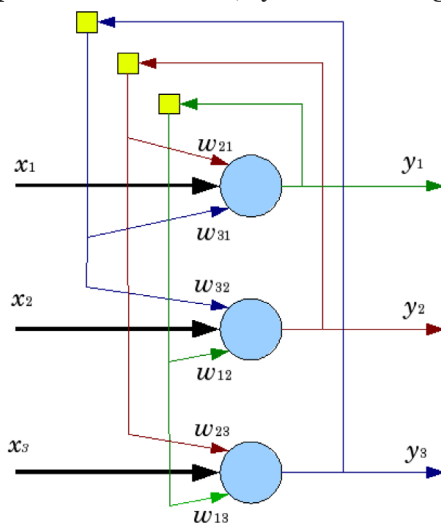


Figure 3 – Hopfield network

signal processing and other fields. The advantage of RBF is that it has the advantages of simple structure, strong nonlinear approximation ability, fast convergence speed and global convergence. There are many aspects to be further studied in terms of function approximation; especially how to select the number of radial basis functions, and the center is still the important question to be studied in depth.

- **Hopfield network:** Hopfield is a kind of feedback neural network model, which has the behavior of spontaneous generation of the neural network under the high connection. The application areas are: image recognition, processing shop scheduling, optimal consumption calculation of power system, LSI optimal layout, linear system model parameter estimation, optimal regulator design, electromagnetic field parallel computation, parallel motion estimation

Because the BP network is relatively simple, it is widely used in industry. In the control system, the BP network is used as a neuron control unit, which can be used in the control system of the device or the information flow control system. BP network advantages: BP network in classification and identification of superior performance can be fast and efficient for the diagnosis of mechanical failure, compared with the traditional spectral analysis of diagnostic technology efficiency greatly improved. The shortcomings are as follows: the network fault tolerance and robustness is poor, it is difficult to guarantee the accuracy of online real-time mechanical fault diagnosis, monitoring and forecasting. The convergence speed of BP algorithm is slow, and the selection of the number of hidden layer nodes in the network is still lack of uniform and complete theory.

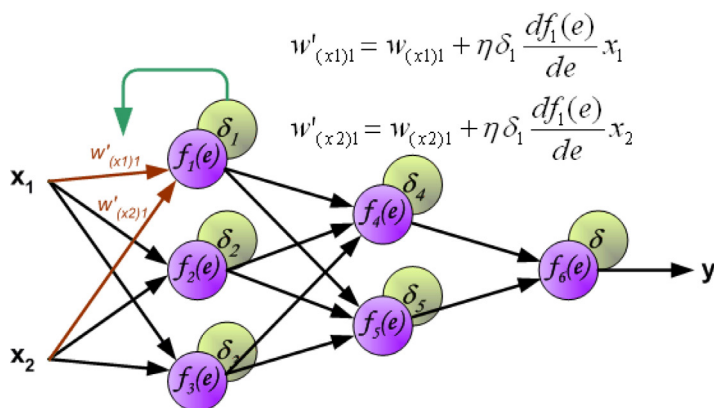


Figure 4 – BP neural network

3. Main research objects and methods

3.1. Object of study

The research objects of 2 universities in Jiangxi province (Jinggangshan University and Jiangxi Radio & TV University sports department) the football training coaches (6 people), athletes (60 people) and football experts (13), a total of 79 people.

3.2. Research method

1. **Literature research:** it is an important basis and theoretical foundation for the study of knee joint college football training injury, sports injury, information integration in Jinggangshan University and the Jiangxi Radio&TV University library to find relevant football training analysis and obtain relevant information to support research. In addition, we collect and study the related data in different forms, and provide the basis for the research and analysis.
2. **Comparative study:** a comparative study of the thinking process and method of determining the similarities and differences between things. Through the comparison, the similarities and differences, to find the law, to solve the difficulties, to ease and prevent the ordinary university football training in sports injury to provide reference.
3. **Theoretical analysis:** theoretical analysis is the key step in the process of investigation and research from perceptual knowledge to rational knowledge. Can make a qualitative analysis on the athletes sports injury of the knee joint, seek the logic relation between the process of athletes training and sports injuries, in order to find out the general characteristics and basic principles of sports college football training injury.
4. **Questionnaire:** (1) questionnaire: according to the basic requirements of questionnaire design, based on the research and analysis of the preparation and design of questionnaire in the type of accident cases of knee injury in the football training of athletes and related information. All of the questionnaires were evaluated by the method of grade five. Score for 10-2 points, very consistent with 10 points, compared with 8 points, the general is very consistent with 6 points, compared with 4 points, very inconsistent with the 2 points, the higher the score, the higher the degree. (2) The questionnaire survey: it is mainly about the coaches and athletes in the football training of ordinary colleges and universities. (3) Questionnaire validity: the validity analysis is mainly observed the validity and rationality of the design, KMO =0.831 and Barlett test value of $P=0.000$, was to have a very significant difference, indicating the structural validity of the questionnaire is very good. (4) reliability: reliability analysis was used to analysis the stability index and consistency of data, of general use Cronbach a coefficient to observe the internal consistency, in this questionnaire, the a coefficient =0.96>0.7, the data stability and consistent performance meets the needs of the research, the data has a good reliability;
5. **Expert interview:** Research on the sports injuries in some colleges and universities football training school leadership, management, football experts, coaches and athletes to interview and semi-structured interviews.
6. **Mathematical statistics:** the use of statistical SPSS18.0 for data entry, sorting, analysis and operation, the main analysis methods include exploratory factor analysis (EFA) and factor analysis.
7. **Logic inference method:** through the investigation of the data and the corresponding data to collate the results of the use of comparison, deduction, induction, analysis, reasoning and other methods to deal with, draw the corresponding conclusion.

8. **Field observation method:** the field of football coaches and athletes to observe and pay attention to the scene for a long time. Including the mentality and activities of college coaches and athletes in training behavior, projects, climatic and environmental conditions of facilities, detailed record of the relevant situation, the appropriate use of photography, camera and other auxiliary tools, to fully understand the risk of sports training, in advance to avoid the occurrence of sports injury.
9. **Case study:** on the basis of dialectical materialism on the unity of opposites of individuality and commonness, the combination of individual and general principles. Taking the knee joint movement injury in the typical soccer training as the individual case to pursue the research.

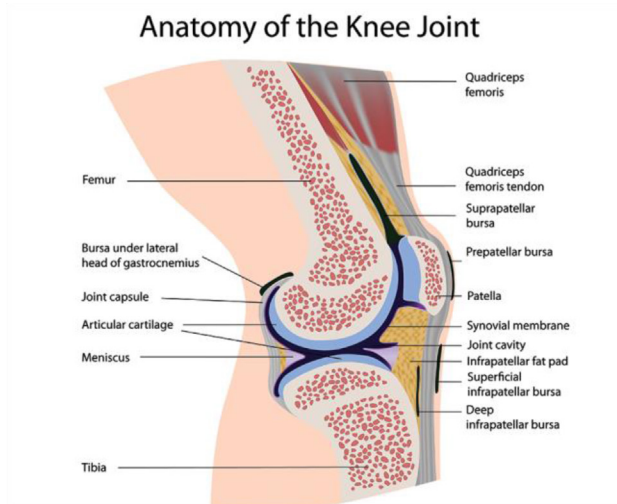


Figure 5 – Knee joint injury

4. Results and analysis

The knee joint sports injuries are caused by the heavy load and unbalanced load in the long time training of the athletes, and the movement function and the range of motion of the knee joint are restricted by the disease. In the long-term college football training, exercise training of the athletes is too large and the movement time is lengthened, the movement adjustment and recovery are not fully rested, very easy to cause the sports injury, football training, knee injury is particularly prominent, will have a significant impact on the athletes' training, cause the knee injury is very complicated, generally the internal cause is all the athletes, coaches and the external cause is the site equipment, emergency and weather etc..

In the study, the analysis of the causes of the injury of the knee joint in the football training of general colleges and universities by using the sports factor analysis

method. 35 causes of the injury of the knee joint in the general college football training of the experts.

A1 - Dangerous movements in the training of athletes; A2 - training equipment does not meet the requirements of the state; A3 - lack of preparation before the athletes training; A4 - preparation before training; A5 - the site is uneven and slippery; A6 - training observation deficiency; A7 - lack of sports knowledge; A8 - the lack of differences in the handling of athletes; A9 - training load; A10 - athletes thinking is not good; A11 - technical action error; A12 - training organizations lack of discipline; A13 - technical action surplus; A14 - site equipment is not regularly checked; A15 - lack of training protection measures; A16 - technical movements greater arc; A17 - the lack of self-protection of athletes; A18 - long training time; A19 - training density; A20 - athletes training before recovery; A21 - a little rest during training; A22 - violent confrontation in the training of athletes; A23 - lack of training preparation activities; A24 - technical movement deformation; A25 - lack of knowledge of self-rescue; A26 - a sudden fight; A27 - site equipment is not regularly checked; A28 - pre class preparation; A29 - unethical behavior in the training of athletes; A30 - athletes are not in a good mood; A31 - athletes training will not be good; A32 - the use of technical movements is not suitable; A33 - athletes sports clothing shortage; A34 - confrontation exercise too much; A35 - sudden violent collision) for factor analysis. By the KMO value and Bach Wright test: KMO = 0.868, Bach Wright test $X^2=186.128$, $P=0.000<0.01$, there are significant differences, indicating that the data is very suitable for factor analysis.

4.1. Common factor

Based on the analysis of the causes of the causes of the injury of the knee joint in the football training of ordinary colleges and universities, the factors of the 35 variables were analyzed. According to the “9 main factors of Keyser” eigenvalue greater than 1, table 1 shows that the first common factor contribution rate was 20.773%, the second factor contribution rate was 19.735%, the three factor contribution rate was 10.576%, the fourth factor contribution rate is 8.569% and the five factor contribution rate was 7.612%, the sixth common factor the contribution rate is 6.426%, the seventh factor contribution rate was 4.464%, the eight factor

Component	Initial Eigenvalues			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.271	20.773	20.773	4.997	14.276	14.276
2	6.907	19.735	40.508	4.529	12.939	27.216
3	3.702	10.576	51.084	4.024	11.498	38.714
4	2.999	8.569	59.654	3.754	10.725	49.439
5	2.664	7.612	67.265	3.385	9.671	59.110
6	2.249	6.426	73.691	3.297	9.420	68.530
7	1.562	4.464	78.155	2.296	6.559	75.089
8	1.435	4.101	82.255	1.792	5.120	80.209
9	1.058	3.024	85.279	1.774	5.069	85.279

Table 1 – Total Variance Explained(n=79)

contribution rate was 4.101%, the ninth factor contribution rate was 3.024%, the cumulative contribution rate was 85.279%, the amount of information can reflect the overall perfect.

Grouping and classifying the original variables according to the steps. First is the determination of the main factor, the actual meaning of the non rotation of the common factor is not good explanation. Therefore, the variance of the common factor is maximized by orthogonal rotation. 35 primitive variables are grouped into 9 main factors. Table 2 shows: F1 named “coach factor”; F2 “athletes factors factors”; F3 “load factor athletes”; F4 “athletes safety knowledge factor”; F5 “athletes preparing factors”; F6 “athletes misconduct factor”; F7 as the “factor” of athletes’ psychological factors; F8 for athletes training ground factor “; F9 as “accidental factor”. Therefore, the causes of knee injuries are the main factors: the athletes coaches factors, technical factors, load factors, athletes athletes safety knowledge factors, athletes are athletes factors, improper behavior factors, psychological factors of athletes, athletes training ground factors and unexpected factors in nine aspects.

index	Component								
	1	2	3	4	5	6	7	8	9
A4 Lack of preparation before training	0.606								
A6 Lack of training observation	0.650								
A8 Inadequate treatment of athletes	0.814								
A12 Lack of discipline in training organizations	0.834								
A15 Lack of training protection measures	0.728								
A28 Lack of preparation before class	0.868								
A11 Technical action error		0.600							
A13 Redundant technology		0.741							
A16 technical action greater arc		0.720							
A24 technology movement deformation		0.660							
A32 technical movements are not suitable		0.754							
A9 training load			0.597						
A18 long training time			0.568						
A19 training density			0.766						
A21 training is less time to rest			0.795						

index	Component								
	1	2	3	4	5	6	7	8	9
A34 against too much exercise			0.848						
A7 athletes lack of sports knowledge				0.912					
A17 athletes lack of self-protection				0.564					
A25 athletes lack of knowledge of self-help				0.513					
A33 athletes lack of sports clothing				0.790					
A3 athletes training before the lack of preparation					0.790				
A20 athletes training before recovery					0.638				
A23 athletes lack of training preparation activities					0.794				
A1 dangerous action in the training of athletes						0.865			
A22 Brutal confrontation in the training of athletes						0.569			
A29 Unethical behavior in the training of athletes						0.721			
A10 athletes thinking is not good							0.543		
A30 players are not in a good mood.							0.896		
A31 athletes training will not be good							0.868		
A2 does not meet the requirements state								0.866	
A5 the site is uneven and slippery.								0.506	
A27 does not have a regular inspection								0.553	
A14 site equipment not regular inspection									0.816
A26 sudden fights									0.509
A35 sudden violent collision									0.579

Table 2 – Causes of knee joint injury Rotated Component Matrix(n=79)

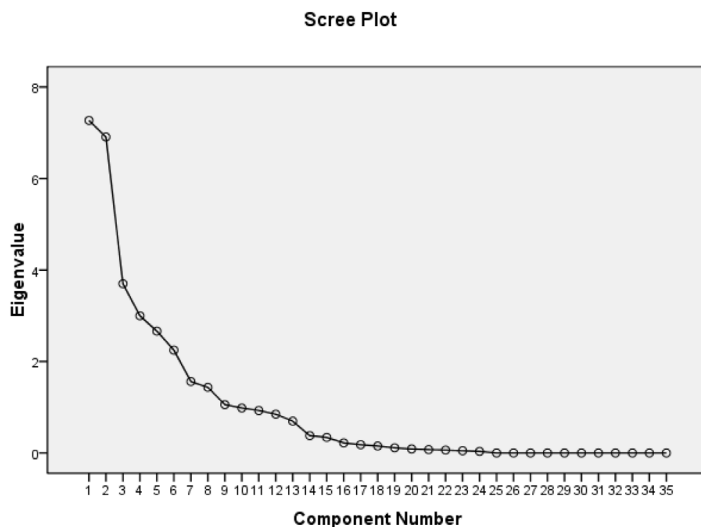


Figure 6 – knee joint injury Scree plot

4.2. Analysis of the causes of the injury of knee joint in school football training

4.2.1. Coaching factors

Table 3 shows that the “coach factor” contains the index and load respectively: “before training, lack of preparation, the load is 0.606”, “training deficiencies, load is 0.650” and the “athlete difference processing problem, load capacity is 0.814”, “training organization and discipline problems, loading amount is 0.834” training “, the lack of protective measures, the load is 0.728”, “lack of preparation before class, the load is 0.868”. Coach factors on knee joint movement of ordinary higher school football training injury causes mainly as follows: lack of preparation before class, training organization and discipline, lack of training, lack of treatment differences between athletes inadequate protection measures, lack of training, lack of preparation before training observation.

Common factor	Serial	Index content	Load	name
F1	A4	Lack of preparation before training	0.606	Coach factor
	A6	Lack of training observation	0.650	
	A8	Inadequate treatment of athletes	0.814	
	A12	Lack of discipline in training organizations	0.834	
	A15	Lack of training protection measures	0.728	
	A28	Lack of preparation before class	0.868	

Table 3 – The first common factor number, content, load and name

4.2.2. Technical factors of athletes

Table 4 shows that the “factor” athletes technical factors contained index and load respectively: “technical movement error, load capacity is 0.600” and the “action redundant, load is 0.741” and the “action load is 0.720 for larger radian,” “technical movement and deformation, load capacity is 0.660”, “the use of technical movements discomfort, loading amount is 0.754”. The athletes technical factors on knee joint movement of ordinary higher school football training injury causes mainly as follows: the use of technical movements, extra discomfort, and action to a larger arc deformation and motion error.

Common factor	Serial	Index content	Load	name
F2	A11	Technical action error	0.600	Technical factors of athletes
	A13	Redundant technology	0.741	
	A16	Greater technical action	0.720	
	A24	Technical movement deformation	0.660	
	A32	Use of technical movements is not suitable	0.754	

Table 4 – Second common factor ordinal, index content, load and name

4.2.3. Load factor of athletes

Table 5 shows that the load factor contained athletes index and load respectively: training load, load capacity of 0.597 “,” long training time, the load is 0.568 “,” training density, the load is 0.766 “,” training rest less, load is 0.795”, “Against the practice too much, the load weight is 0.848”. The athletes load factors on knee joint movement of ordinary higher school football training injury causes mainly as follows: combat exercises too much training, training, and rest less density, training load and long training time.

Common factor	Serial	Index content	Load	name
F3	A9	Large amount of training load	0.597	Load factor of athletes
	A18	Long training time	0.568	
	A19	Training density	0.766	
	A21	Rest less during training	0.795	
	A34	Against too much exercise	0.848	

Table 5 – Third Common factor number, content, load and name

4.2.4. Other factors

Table 6 results show that the factors of safety knowledge, Factors of athlete preparation, Athletes’ improper behavior factors, Psychological factors of athletes, Athletes training site factors and Factor of accident.

Common factor	Serial	Index content	Load	name
F4	A7	Lack of sports knowledge	0.912	Factors of safety knowledge of athletes
	A17	Lack of self-protection of athletes	0.564	
	A25	Lack of knowledge of self rescue	0.513	
	A33	Sports clothing shortage of athletes	0.790	
F5	A3	Lack of preparation before the training of athletes	0.790	Factors of athlete preparation
	A20	Athletes training before recovery	0.638	
	A23	Lack of training preparation activities	0.794	
F6	A1	Dangerous action in the training of athletes	0.865	Athlete unfair behavior
	A22	Brutal confrontation in the training of athletes	0.569	
	A29	Unethical behavior in the training of athletes	0.721	
F7	A10	The athletes' thoughts are not well prepared.	0.543	Psychological factors of athletes
	A30	The athlete is in a bad mood.	0.896	
	A31	Athletes training will not be good	0.868	
F8	A2	Training equipment does not meet the requirements	0.866	Factors of athletes training site
	A5	The field is uneven and slippery.	0.506	
	A27	Site equipment is not regularly checked	0.553	
F9	A14	Site equipment is not regularly checked	0.816	unforeseen factors
	A26	Sudden fighting	0.509	
	A35	Sudden violent collision	0.579	

Table 6 – Four to nine common factor numbers, content, load and name

5. Conclusion

The main causes of the injury of knee joint in football training in ordinary colleges and universities: Coaching factors, Technical factors of athletes, Load factor of athletes, Factors of safety knowledge of athletes, Factors of athlete preparation, Factors of unfair behavior of athletes, Psychological factors of athletes, Factors of athletes training site And unexpected factors. To strengthen the team construction of colleges and universities, promote the coaches and enhance the academic learning and optimization, and further improve the coaches, coaches work style and discipline rectification, not lifting coaches responsibility, develop good learning, training and life style. Ordinary higher school coaches, strengthen the moral thought and safety education of athletes, athletes to enhance self-protection awareness, strict training and orderly, reasonable technical movement and motion attention, let athletes reasonable technology skills, abide by the rules of the game, to prevent the court dangerous actions and uncivilized even brutal foul. Ordinary colleges and universities should strive to improve the conditions of the football training venues, and timely supervision, inspection and maintenance of the training venues, to ensure the basic conditions of the training.

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Design Model of Cellular Manufacturing System under the Constraint of Cost and Delivery Reliability

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Abstract: This paper presents a new design model of cellular manufacturing system, to meet the demand of the market, considering the cost and customer delivery constraints, to minimize the cost and maximize the system delivery reliability as the objective function of the model. Through the construction the cell, we can find the cell with good construction can achieve higher system reliability in the lower production cost at the same time, help in the face of fierce market competition. The cell is constructed by mathematical programming method, a multi-objective 0-1 integer programming model, the system reliability is redefined. The authors also take the reliability of delivery time as a main objective function, and it can meet the requirement of total cost and system delivery reliability by selecting suitable processing routes. In the establishment of the model, in order to facilitate the enterprise to make decisions, the introduction of α constraints in order to select the enterprise's own cellular manufacturing system design.

Keywords: Delivery reliability, Cellular manufacturing system, Multi objective integer programming

1. Introduction

Due to the diversification of customer demand, the production mode of multi varieties and small batch has become the mainstream of today. In order to achieve this transformation, improve their core competitiveness, the research scholars have done a lot of research, Manufacturing Cellular is proposed. Cellular manufacturing integrates the advantages of the principle of group manufacturing and assembly line manufacturing. It has the characteristics of high efficiency, low cost and other characteristics. It also has the flexibility of group principle (Kamal, 2015). Cellular construction is the first and most important step in the design process of the cell manufacturing system. Cellular manufacturing has its advantages, but also to achieve a low production cost and high performance of the system is not easy. According to the construction the cell, the research of many scholars is to solve some problems, through the establishment of mathematical programming model, however, most research on cellular manufacturing system design are based on the assumption that the parts of the customer demand and the production capacity of processing equipment is the same, the processing route is optional. Diallo and Jeon using the optional of the processing route, troubleshooting problems by choosing the appropriate

processing route and processing equipment, established a mathematical model of a cellular manufacturing system design (Diallo, 2001; Jeon,1998). Zhao, Askin, Zhou et al in different articles also consider alternative processing routes, but focus their research on how to choose the processing route for cell construction, can achieve the cell logistics cost minimization, and the article in only considering the production cost under the condition of the establishment of mathematical model (Zhao,2000; Askin, 1998; Askin, 1999).

A multi objective integer programming model is proposed for the design of the cellular manufacturing system with the aim of minimizing the total cost of the system and maximizing the reliability of the machine. In the model, each type of parts can have different processing routes, each device processing different types of parts or the same type of product, the different process costs and reliability are different (K. Das,2007). However, in fact, the demand for parts in different stages and the reliability of the machine are changed, which will affect the construction of the mathematical model of the cellular manufacturing system. Seifoddini and Djassemi using the simulation way to market demand changes on the cell design performance sensitivity analysis, proof of the market demand for the change in the performance of the cell design a great impact on the performance (Seifoddini, 1996). When the parts demand and process changes, manufacturing cells need to re build the dynamic programming model, considering all changes in different stages of a project cycle, the processing cost, reconstruction cost and logistics cost between cells and minimized, to build a sustainable manufacturing system to meet customer requirements of the cell (Chen,1998). KanchanDas studied the modeling of the cell manufacturing system in the case of considering the dynamic change of the machine reliability and the demand of the parts, and solved the problem by building a multi objective integer programming model to solve the problem (KanchanDas,2011).

In the process of designing the cell manufacturing system, Vakhariathrough the establishment of a mixed integer programming model to solve the dynamic change caused by the cell reconstruction problem (Vakharia, 1993). Wicks and Reasor in the case of considering the dynamic change of the market demand in the multi stage the establishment of a similar multi objective integer programming model of the cell manufacturing system design (Wicks,1999). Harhalakis in the market demand definition of multi stage as random variables is established by cellular manufacturing system design model, the manufacturing cell can adapt to all stages of the program, and the market demand is stochastic, more realistic but also increases the complexity of the problem (Harhalakis, 1994). Chen in the case of multi stage dynamic demand, the integer programming model is established, and the heuristic algorithm based on dynamic programming is used to solve (Chen, 1998).

From the above literature review, the construction cell of manufacturing system, not only to meet the manufacturing requirements of low cost and high performance of the system, but also to meet the needs of the market and changes may occur on the basis of this, this paper presents a new design model, in order to minimize production cost and reliability of the system as the objective function of the model. The reliability index of system here is the delivery cell reliability of manufacturing system, the system's ability to meet market demand in the cell time, and establish the static model and dynamic model are designed to allow the manufacturing system, directly facing the demand and market changes.

2. Problem description

In the process of the component parts cluster, we first need to know the process of each type of parts and the processing equipment. In the cellular manufacturing system, the same process can usually be done with different processing equipment, but the processing cost and processing time are different. Therefore, it is necessary to consider the choice of each type of parts processing equipment and processing route in the calculation of delivery reliability, different choices will get different delivery reliability and manufacturing cell is different, the reliability of this difference between the different schemes, it is the focus of this research.

According to the example of K. Das (K. Das,2011), this paper describes the typical processing routes of 4 types of products processed on 5 machines, as shown in Table 1. In this case, each type of product can be based on a choice of one or two in the production process.

Component type	processing plan	Operation		
		1	2	3
1	1	M3,M2	M4,M5	
	2	M2,M4	M3	M1,M4
2	1	M2	M4,M5	M3
	2	M1,M3	M2	M5
3	1	M1,M4	M3,M2	M2
	2	M4,M5	M2,M4	M1,M3
4	1	M1,M3	M2,M4	M5
	2	M4,M5	M1	M4

Table 1 – Product processing route

From table 1 can be obtained, each operation is not less than 1 equipment to process, so you can choose different processing plans and different equipment for the production of parts.

3. Definition and calculation model of delivery reliability

3.1. Definition of delivery reliability

In the case of a given delivery cycle time T and customer demand D , the delivery reliability R_d of the system is defined as the probability that the number of products produced by the cell is not less than the quantity of the product in time T . Therefore, the delivery time reliability of the system can be expressed as $\Pr\{\bar{u} \mid (\bar{u}) \geq D\}$, $V(M)$ means the number of different types of products produced in the condition of the cellular manufacturing system.

3.2. The calculation model of delivery reliability in the cellular manufacturing system

In Table 2 the processing route No. 1201 processing route as an example, each device may become the bottleneck equipment reliability of each equipment will affect the product delivery cycle, delivery reliability can be obtained for the system:

$$R_s(i) = R_2(i) \times R_3(i) \times R_1(i) \quad (1)$$

Here $R_j(i)$ on behalf of the reliability of equipment j for producing the types of products i , said the equipment j can produce the probability the types of products the number of customer needs within a specified time, or expressed as $P_r\{v_j(M_{ij}) \geq d_{ij}\}$, $v_j(M_{ij})$ numbers here represent the equipment for producing the types of products in the state M_{ij} , the customer demand on behalf of the types of products the. Due to the randomness of the ability of the equipment, to meet each state $v_j(M_{ij}) \geq d_{ij}$ one by one to find out is a waste of time, not sensible, so we try to find the minimum capacity $\{v_j(M_{ij}) \geq d_{ij}\}$ in the collection, to be the minimum capacity must meet the following two conditions: (1) $v_j(M_{ij}) \geq d_{ij}$; (2) $v_j(M_{ij}) < d_{ij}$, y_{ij} 'to meet any $y_{ij}' < y_{ij}$. Then, we can draw the following formula as follows:

$$R_j(i) = P_r\{v_j(M_{ij}) \geq d_{ij}\} = P_r\{M_{ij} \geq y_{ij}\} \quad (2)$$

However, the method of solving method of delivery reliability $R_s(i)$ of a type of cellular manufacturing system products delivery reliability and production of all types of products with similar, just and respectively to find out their corresponding minimum capacity vector (Lin, 2012) y_i and Y , the following formula respectively:

$$\begin{aligned} R_s(i) &= P_r\{v(M_i) \geq d_i\} = P_r\{M_i \geq y_i\} \\ R_d &= P_r\{V(M) \geq D\} = P_r\{M \geq Y\} \end{aligned} \quad (3)$$

In summary, it can be concluded that the processing route number is 1201, the reliability of the system is:

$$\begin{aligned} R_s(1) &= P_r\{v(M_1) \geq d_1\} = P_r\{M_1 \geq y_1\} \\ &= P_r\{M_{12} \geq y_{12}\} \times P_r\{M_{13} \geq y_{13}\} \times P_r\{M_{11} \geq y_{11}\} = R_{12} \end{aligned} \quad (4)$$

Here, R_{12} the delivery reliability of equipment for processing, on behalf of the use in the 1201 scheme selected $\{M_2, M_3, M_1\}$, the subscripts are the product type and processing scheme combining $\{1, 2\}$, said each type of product will choose a processing route. According to the similar method, R_{ip} the processing route of the selected product of the first type product and the second processing plan can be defined as the delivery reliability of the processing route. Maximization R_{ip} is one of the reliability targets in the design model of the following cell manufacturing system.

4. Design model construction of cell manufacturing system

Indices

$c \in \{1, 2, \dots, C\}$ cells; $i \in \{1, 2, \dots, n\}$ part types;
 $j \in \{1, 2, \dots, m\}$ machines or stations;
 $j_{ip} \subset \{1, 2, \dots, am\}$ set of machines that can perform operation o of (ip) ;
 $o \in \{1, 2, \dots, O(ip)\}$ operations for part type i under process plan p ;
 $p \in \{1, 2, \dots, P(i)\}$ process plan for part type i ;
 $q \in \{1, 2, \dots, Q(ij)\}$ production capacity number of machine j for part type i ;

Parameters

l_{jq} the ability of number q for the machine j to process the part i
 $d_{oj}(ip)$ the number of all the operations o in the processing route (ip) on machine j ;
 d_i the demand for the part type i ;
 $y_{oj}(ip)$ the minimum capacity required to complete all operations o in the processing route (ip) on machine j ;
 y_i the minimum capacity vector of the machines to satisfy the demand d_i ;
 $CO_{oj}(ip)$ cost of performing operation o of (ip) on machine j ;
 $CR_{oj}(ip)$ cost of refixturing a unit of (ip) for operation o on machine j ;
 CI_{jc} cost of installing machine j in the unit;
 $CP_{oj}(ip)$ penalty cost for non-utilisation of machine j to complete o of (ip) ;
 CM_j average cost of purchasing machine (capacity) type j ;
 $H_{j\hat{c}j\hat{c}}$ cost of moving a batch of part type i of batch size d_i from machine j in cell c to machine $\hat{j}$ in cell $\hat{c}$ to perform the next operation;
 U maximum number of machines in a cell;
 $R_{ojc}(ip)$ reliability to complete operations o in the route (ip) on machine j ;

Decision variables

M_{jc} 1 if machine j is assigned to cell c ; 0 otherwise;
 $X_{ojc}(ip)$ 1 if o of (ip) is performed on machine j in cell c ; 0 otherwise;
 $H_{oj\hat{c}j\hat{c}}(ip)$ 1 if (ip) moves to machine $\hat{j}$ in cell $\hat{c}$ to perform operation $(o+1)$ after performing operation o on machine j in cell; 0 otherwise;
 $Z(ip)$ 1 if part i is processed under process plan p ; 0 otherwise

4.1. Construction of objective function

The first objective function is the total cost function, according to the cost function given by Das, has been improved, including the production process and operating costs (VCM), transportation cost between cells (MHC), the machine is not made full use of the loss cost (MNC) and buy new machines and equipment (NMC) installed on the cell installation (MIC). And increase the constraints in the model, to facilitate business decision-making, constraint representation construction cost decision makers to accept the decision by the cell, can be given directly, can also be specified from the preliminary calculation model of the cost range, range and cost by the system reliability of high and low, because you want to high system reliability theory, the cost is bound to increase, then the model results also proved this point. This model does not take into account the internal logistics costs, assuming that the distance between the cells within the cell is small enough, the logistics cost is 0. The objective function is as follows:

$$\text{Min } (Tc - \alpha) = VCM + MHC + MNC + NMC + MIC - \alpha \quad (5)$$

The operation cost in the production process can be expressed as follows:

$$VCM = \sum_{i=1}^n d_i \sum_{p=1}^{P(i)} \sum_{o=1}^{O(ip)} \sum_{j \in J_{ip}} \{CO_{oj}(ip) + CR_{oj}(ip)\} \sum_{c=1}^C X_{ojc}(ip) \quad (6)$$

The material transport costs MHC between the cells represent the logistics costs required for all products shipped from the cell to the cell, and the delivery volume is the demand for the product type i :

$$MHC = \sum_{i=1}^n \sum_{p=1}^{P(i)} \sum_{o=1}^{O(ip)} \sum_{j \in J_{ip}} \sum_{\hat{j} \in J_{ip(o+1)}} \sum_{1 \leq c, \hat{c} \leq C} H_{ijc\hat{j}\hat{c}} X_{ojc}(ip) X_{(o+1)\hat{j}\hat{c}}(ip) \quad (7)$$

After the equation is linearized, the following expressions are obtained:

$$MHC = \sum_{i=1}^n \sum_{p=1}^{P(i)} \sum_{o=1}^{O(ip)} \sum_{j \in J_{ip}} \sum_{\hat{j} \in J_{ip(o+1)}} \sum_{1 \leq c, \hat{c} \leq C} H_{ijc\hat{j}\hat{c}} H_{ijc\hat{j}\hat{c}}(ip) \quad (8)$$

After the calculation of the device is not fully utilized the cost of the loss, its expression is as follows:

$$MNC = \sum_{j=1}^m \sum_{i=1}^n \sum_{p=1}^{P(i)} \sum_{o=1}^{O(ip)} cp_{oj}(ip) \frac{y_{oj}(ip) - d_{oj}(ip)}{l_{ijQ(j)}} \sum_{c=1}^C X_{ojc}(ip) \quad (9)$$

Then calculate the total cost of the purchase of new equipment, and its expression is as follows:

$$NMC = \sum_{j=1}^m CM_j \sum_{c=1}^C M_{jc} \quad (10)$$

Finally, the installation cost of the device is calculated to be installed to the allocated cell, and the expression is as follows:

$$MIC = \sum_{j=1}^m \sum_{c=1}^C CI_{jc} M_{jc} \quad (11)$$

The second objective function is to calculate the reliability of the whole cell manufacturing system during the selection of different processing routes and different processing equipment. The target ions as shown in the following function:

$$Max \ R_d = \prod_{i=1}^n \prod_{p=1}^{P(i)} \prod_{o=1}^{O(ip)} \prod_{j \in J_{ip0}} \prod_{c=1}^C R_{ojc}(ip)^{X_{ojc}(ip)} \quad (12)$$

4.2. Model induction and constraint conditions

Objective function:

$$Min \ (Tc - \alpha) = VCM + MHC + MNC + NMC + MIC - \alpha \quad (13)$$

Auxiliary function:

$$R_d = \prod_{i=1}^n \prod_{p=1}^{P(i)} \prod_{o=1}^{O(ip)} \prod_{j \in J_{ip0}} \prod_{c=1}^C R_{ojc}(ip)^{X_{ojc}(ip)} \quad (14)$$

Constraint condition:

$$\sum_{p=1}^{P(i)} Z(ip) = 1 \quad \forall i.$$

$$\sum_{j \in J_{ip0}} \sum_{c=1}^C X_{ojc}(ip) = Z(ip) \quad \forall i, p, o$$

$$\sum_{c=1}^C M_{jc} \leq 1 \quad \forall j$$

$$\sum_{j=1}^m M_{jc} \leq U \quad \forall c$$

$$\sum_{i=1}^n \sum_{p=1}^{P(i)} \sum_{o=1}^{O(ip)} X_{ojc}(ip) \geq M_{jc} \quad \forall j, c$$

$$d_{oj}(ip) \leq l_{ijQ(ij)} \quad \forall i, o, j, p$$

$$M_{jc}, X_{ojc}(ip), H_{ojc\hat{j}\hat{c}}(ip), Z(ip) \in \{0, 1\} \quad \forall i, p, o, j, c, \hat{j}, \hat{c}$$

$$X_{ojc}(ip) + X_{(o+1)\hat{j}\hat{c}}(ip) - 2H_{ojc\hat{j}\hat{c}}(ip) \geq 0$$

$$\forall i, p, o \in \{1, 2, \dots, O(ip) - 1\}, j \in J_{ip_o}, \hat{j} \in J_{ip(o+1)}, c, \hat{c}, c \neq \hat{c}, \hat{c} \in \{1, 2, \dots, C\}$$

$$X_{ojc}(ip) + X_{(o+1)\hat{j}\hat{c}}(ip) - H_{ojc\hat{j}\hat{c}}(ip) \leq 1$$

$$\forall i, p, o \in \{1, 2, \dots, O(ip) - 1\}, j \in J_{ip_o}, \hat{j} \in J_{ip(o+1)}, c, \hat{c}, c \neq \hat{c}, \hat{c} \in \{1, 2, \dots, C\}$$

$$Tc_{\min} \leq \alpha \leq Tc_{\max}$$

5. Numerical examples and results analysis

5.1. Input data in the model

In this paper, the numerical examples include seven devices and 12 types of parts, each type of parts in a production of T_1 demand vector for (90, 50, 80, 50, 60, 45, 100, 125, 110, 120, 200, 125). Purchase cost of different equipment and install to the cell cost of different equipment as shown in table 3.

cost	M1	M2	M3	M4	M5	M6	M7
Purchase cost	4200	5000	7600	6400	5800	6300	4900
Installation cost	500	400	800	600	550	480	350

Table 3 – Purchase cost and cost of equipment

Assume that each type of product has 2 processing plans, each processing plan includes 2~3 Road, each process can be assigned to 1~2 equipment to complete. Each type of product can be selected for processing equipment, as shown in table 4, the length of the list only part of the data, the table also includes each device to complete the different types of products of different processes.

type	data type	Processing plan										
		1						2				
		working procedure						working procedure				
		1	2	3	1	2	3	1	2	3		
1	Equipment	M5	M2	M4	M1	M4	M1	M6	M2	M4	M1	
	Cost	14.4	6.2	16.4	11.6	12.2	14.8	14.8	11	12.6	13.2	
2	Equipment	M5	M2	M7	M2	M6	M4	M5	M3	M7	M1	M6
	Cost	13.6	6	8.2	15	6	7.2	15	14	8.2	18.6	9.6
3	Equipment	M7	M3	M4	M1	M6	M3	M3	M1	M7	M4	M6
	Cost	11.8	6.2	5.6	16.2	15.6	10.4	14.4	11.6	13.4	10.2	15.6

Table 4 – Route list of processing equipment for each type of product

M equipment in the production phase in T₁, random capacity and probability of different types of products of different processes are shown in Table 5, the table also includes the equipment of M1 has not been fully used in the processing cost of different types of parts process. Space is limited, in this only gives the device M1 and product type 1 of the part of the data. The last digit of the number in the table indicates the working procedure number, the reciprocal second digit indicates the processing plan number, and the remaining one or two digit numbers indicate the product type. If the process number 112 represents the first types of products in the first processing program the first 2 processes. Here should be noted that although the static construction of cellular manufacturing systems in this study only in a production stage, but the processing ability is actually equipment dynamic changes in different stages, and the market demand, and the construction cell dynamic problem is the next step of the research objectives.

Processing number								
112			113			121		
ability	probability	loss cost	ability	reliability	loss cost	ability	probability	loss cost
80	0.01	256	80	0.01	245	80	0.01	251
90	0.02		90	0.02		90	0.01	
100	0.02		100	0.03		100	0.02	
110	0.95		110	0.94		110	0.96	

Table 5 – Random capacity of equipment M1 and corresponding probability

In this paper, the material transport between the elements of the bulk of the logistics mode of transport, in order to facilitate the calculation, the logistics cost of each transport is assumed to be 500 yuan. As long as the mass transport between the occurrences of the cell, it will produce 500 yuan of logistics costs. In addition, the upper limit of the number of 4 cells, that is, a cell can accommodate up to 4 processing equipment.

5.2. Solving mathematical model

In this paper, the ILOG software is used to solve the problem. We will produce T₁ data as an example to the model, using the ILOG function to calculate the ions as the objective function, the mathematical model for the function of ions of the auxiliary function, the system of the manufacturing cell in case of cost minimization and the construction results of delivery reliability. In solving the function of ions as the objective function, the mathematical model for function ions of the auxiliary function, because this model is nonlinear 0-1 integer programming model is more complex, the computation is very large, so this solution, in the choice of processing plan and processing equipment, through the choice of processing all types of products, the largest capacity of random the highest reliability of equipment, and ultimately achieve the overall system reliability value $R_{d\max}$. After the processing route selection and processing equipment, the ILOG algorithm used to solve the function of ions as objective function and function as the auxiliary function mathematical model of ions ions in order to get the minimum cost in the cellular manufacturing system choice, the equipment assigned to the cell to go by minimizing the cost, complete the construction of manufacturing cell.

Decision variable	Equal to 1 variable					
	Z(1,2)	Z(2,1)	Z(3,1)	Z(4,1)	Z(5,1)	Z(6,1)
Z(i,p)	Z(7,1)	Z(8,2)	Z(9,1)	Z(10,2)	Z(11,1)	Z(12,2)
M(j,c)	M(1,1)	M(2,2)	M(3,2)	M(4,2)	M(5,1)	M(6,1)
	M(7,1)					
X(i,p,o,j,c)	X(1,2,1,2,2)	X(1,2,2,4,2)	X(2,1,1,2,2)	X(2,1,2,2,2)	X(2,1,3,4,2)	X(3,1,1,3,2)
	X(3,1,2,4,2)	X(3,1,3,3,2)	X(4,1,1,5,1)	X(4,1,2,6,1)	X(4,1,3,5,1)	X(5,1,1,1,1)
	X(5,1,2,7,1)	X(6,1,1,4,2)	X(6,1,2,3,2)	X(6,1,3,2,2)	X(7,1,1,1,1)	X(7,1,2,1,1)
	X(7,1,3,6,1)	X(8,2,1,3,2)	X(8,2,2,2,2)	X(8,2,3,3,2)	X(9,1,1,7,1)	X(9,1,2,6,1)
	X(9,1,3,6,1)	X(10,2,1,1,1)	X(10,2,2,2,2)	X(11,1,1,5,1)	X(11,1,2,1,1)	X(11,1,3,4,2)
	X(12,2,1,7,1)	X(12,2,2,1,1)	X(12,2,3,7,1)			
H(i,j,c,j,c)	H(10,1,1,2,2)	H(11,1,1,2,4)				

Table 6 – The solution obtained when the cost is minimized as the objective function

Table 6 gives the value of all the decision variables, through this table can be known for each type of product processing plan selection, each process to choose which equipment processing and manufacturing cell composition. The above solutions correspond to the cell building results shown in table 7.

type	route	cell one				cell two		
		1	5	6	7	2	3	4
1	2					O1		O2
2	1					O1&O2		O3
3	1						O1&O3	O2
4	1		O1&O3	O2				
5	1	O1			O2			
6	1					O3	O2	O1
7	1	O1&O2		O3				
8	2					O2	O1&O3	
9	1			O2&O3	O1			
10	2	O1				O2		
11	1	O2	O1					O3
12	2	O2			O1&O3			
VCM	28470	MHC	1000	MNC	2234	NMC	40200	
MIC	3680	TC	75584		R	0.801		

Table 7 – Cost minimization as the objective function

We can find the table 7, when the cost objective function considered separately, the 7 devices are divided into 2 manufacturing cells, including M1 M5, a cell of equipment, M6 and M7, including two cell equipment M2, M3 and M4, got the least cellular manufacturing system total cost 75584 yuan, also get the delivery a minimum of 0.814 corresponding reliability. The next single object function of ions ions solution, first of all to find for each type of product delivery reliability the largest processing route and processing equipment, as shown in table 8:

type	route	equipment		
		O1	O2	O3
1	2	M2	M1	
2	2	M5	M7	M3
3	1	M7	M1	M3
4	1	M5	M3	M5
5	2	M5	M3	
6	2	M7	M2	
7	2	M1	M4	
8	1	M5	M7	M7
9	2	M7	M3	M2
10	2	M1	M2	M4
11	1	M3	M1	M2
12	1	M2	M1	

Table 8 – Maximum processing route of delivery reliability

Table 8 shows the processing route choice of delivery under the condition of maximum reliability and processing equipment, followed by minimizing the logistics cost to complete the construction cell, the equipment assigned to the cell, so that the delivery reliability maximization as the objective function of the construction of the cell, as shown in Table 9.

From table 9 can be found, when considered separately delivery reliability of objective functions, to maximize the total delivery cell of manufacturing system reliability is 0.906, corresponding to get the maximum total cost of 82309.4 yuan, 6 of each equipment (without the use of equipment M6) divided into 2 manufacturing cells, including M1, a cell of equipment M4 and M2, including two cell equipment M3, M5 and M7. As a result, the upper and lower bounds of the design cost and the upper and lower bounds of the system delivery reliability are obtained, which can be expressed as follows:

$$Tc \in [75584, 82309.4]$$

$$R_a \in [0.801, 0.906]$$

type	route	cell one		cell two			
		1	4	2	3	5	7
1	2	O2		O1			
2	2				O3	O1	O2
3	1	O2			O3		O1
4	1				O2	O1&O3	
5	2				O2	O1	
6	2			O2			O1
7	2	O1	O2				
8	1					O1	O2&O3
9	2			O3	O2		O1
10	2	O1	O3	O2			
11	1	O2		O3	O1		
12	1	O2		O1			
VCM	32929	MHC	2500	MNC	9780.4	NMC	33900
MIC	3200	TC	82309.4		R	0.906	

Table 9 – The maximum reliability of delivery time is the objective function

After that, the relationship between the total cost and the reliability of the intersection is established. Here is the total cost of the decision maker according to the requirements of the system, which should meet the following constraints:

$$75584 \leq \alpha \leq 82309.4$$

The values of a set of stochastic satisfying constraints (5.2) are given, and the formula (4.9) to (4.20) is used to solve the problem, and the corresponding value of the reliability of the delivery period is obtained. The corresponding values are shown in table 10.

α	N/A	78500	80500	81500	82000	N/A
Total cost (yuan)	75584	78504	80521	81501	82003	82309.4
Delivery reliability	0.801	0.838	0.872	0.894	0.902	0.906

Table 10 – Cost and delivery reliability

Through this table can be roughly the total system cost and delivery reliability of the corresponding curves, as shown in figure 1.

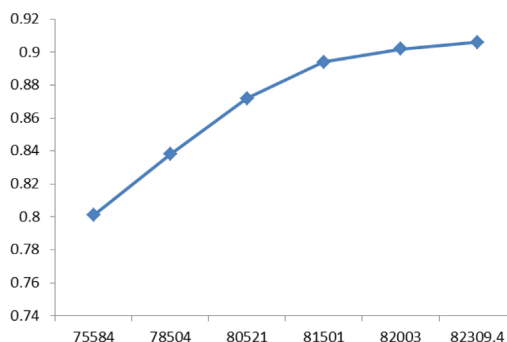


Figure 1 – The relationship between total system cost and delivery reliability

Figure 1 can help managers to better conduct a single production stage of decision-making, to find the balance between system delivery reliability and the total cost of the point. For example, when an enterprise can provide 80000 yuan of capital construction cellular manufacturing system, that is $\alpha = 80000$, through Figure 1 can get the system's delivery reliability is about 0.865. By using formula to solve the problem, the following cell construction scheme and objective function value are obtained. At that time $\alpha = 80000$, the cellular manufacturing system consists of two cells, including the cell of the cell M1, M6 and M7, cell 2 including equipment M2, M3, M4 and M5. The actual cost required in this scheme is 80012 yuan, and the delivery reliability is 0.866. By Figure 1, it can be found that when the reliability of the delivery period is close to the lower limit, it is easy to improve the reliability of the delivery period, and the cost is less. However, when the reliability of the delivery period is close to the upper limit, it is very difficult to improve the reliability of the delivery period.

6. Conclusion

The manufacturing system reliability is redefined by changing the traditional equipment reliability delivery reliability, a performance index of manufacturing system reliability as a delivery cell for cell construction, designed to better meet customer demand for personalized cell manufacturing system. The establishment of the total cost and delivery reliability as the objective function of the model to complete the construction cell, through the establishment of constraints, can be designed to meet the requirements of cost and can achieve the highest reliability of the delivery cost of the cellular manufacturing system. The corresponding relationship between the delivery reliability and the total cost is given by solving the model, which can help the decision maker to make a better choice.

This paper solves the problem of static cell construction cost and delivery reliability constraints, and then the author will build to solve the problem of dynamic cell of market demand and equipment capacity in different stage of production changes under the condition of cell construction problems, and make a comparative analysis to fit the actual production.

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Analysis of the Impact of Corporate Cash Holdings on Product Market Performance Based on DID Evaluation Model

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Abstract: Since the start of worldwide financial troubles, corporate cash holdings have increasingly been taken into account when companies are making corporate strategies. Some scholars began to study the effects of corporate cash holdings on competition and profitability in the United States. This paper combines theoretical analysis and empirical analysis method to identify the real effects of corporate cash holdings on product market outcomes based on Chinese listed corporations. Regarding the Chinese twelfth “Five-year” industrial policy as a reinforcement of exogenous investment opportunities, this paper mainly adopts Difference-in-Difference (DID) Evaluation Model to identify positive implication of cash on market share growth. The main findings of this study indicate that cash-rich companies are probably able to gain more future market share against their cash-poor industry rivals, and this relationship is more obvious for enterprises with more investment opportunities.

Keywords: Corporate Cash Holdings, Competitive Effect, Product Market Performance, DID model

1. Introduction

The role of cash holdings in corporate strategy has shifted swiftly and greatly in the aftermath of the financial crisis. Several decades ago, the accumulation of cash position of a firm is regarded as a waste of capital. Firms with much cash on hand are seems to be thought strange and suspicious (Fresard, 2010). Moreover, large stock of cash can allow managers to invest in programmes that cannot bring monetary profit but undermine shareholders value (Jensen, 1976; Kim, 1998). The main purpose of companies hold cash is nothing but maintaining necessary liquidity. The strategy of cash holdings has been turn on its head in the beginning of twenty-first century. Companies begin to holding more stock of cash to cope with the possible negative variation from the market. Especially, during the global financial crisis broke out in 2008, many cash-strapped companies went bankrupt as a result of lack of adequate liquid assets, while some companies seized the opportunities of their industries in which they can grow fast, due

to the large amount of cash holdings. After experiencing the crisis, a growing number of corporations began to pay considerable attention to the cash holdings and liquidity issue. In the meantime, a large number of scholars start to attach importance to effect of cash holdings based on the precautionary motive of cash.

With the improvement of the status of cash holding in corporate strategy, the effects of cash holdings are examined in many aspects. Especially, Researching on the effect of cash on product market has attracted considerable attention recent years. In the early stage, some scholars have put forward that cash holding has potential effect on companies' strategy choices and competitive behaviours. Their main argument is that companies with large cash position are able to rely on their war chest to fund competitive strategies and competitive actions. For example, Bolton and Scharfstein (1990) claim that cash-rich companies may adopt aggressive pricing strategy to challenge the bottom lines of their rivals thereby enlarge their market share. Furthermore, According to Compello (2006), a company can take advantage of its abundant cash on hand and fast grasp future great investment opportunities to growth up when there are great investment opportunities. However, few of them empirically examine such potential effect of cash on companies' product market. Only few scholars such as Fresard (2010) identify the competitive effects of cash on future product market performance based on American listed companies. As a typical representative of the emerging market, China is undergoing the upgrading industrial structure. However, seldom has current research examined the causality from cash reserves to product market performance based on Chinese companies. First, Will the effect of cash holdings on future product market growth be significant in Chinese market? Furthermore, if competitive cash holdings can bring future product share growth, what is the possible mechanism? Third, based on the demand of industry transformation and upgrading, Chinese companies are exposed to the influence of macroeconomic regulation policy by governments. How industrial policies such as the Chinese twelfth "Five-year" industrial policy influence the effect of cash on product market outcomes? Current relevant literature such as Fresard (2010) does not give the answer.

2. Literature Review and Hypothesis Development

Traditional studies regarding cash holdings mainly focus on the why companies hold cash or the determinants of cash position. All the theoretical foundation and empirical evidence of these studies together form the motive theories of cash holdings. Regarding the effects of cash, in early stage, a great number of scholars analyse the effect of cash on capital market, and a majority of them concentrate on the precautionary effect of cash and agency problems caused by cash holdings. Research on the effect of corporate cash holdings on product market begin to be conducted in developed countries such the United States in recent years. According to Fresard (2010), there is a causal relationship between current corporate cash position and future market share growth on product market. Furthermore, the effect of cash on product market growth is also significant based macro condition variation.

2.1. The Motive of Cash Holdings

Regarding why companies are willing to hold cash reserves, this paper reviews previous relevant theories and evidence. According different motives related to holding cash,

this paper classifies them into three main categories: The transaction motive, the precautionary motive and the agency theory. The transaction motive stems from the demand that a firm desires to use a certain amount of cash to satisfy the basic routine demand of cash outflow exactly (Miller and Orr, 1966). To wit, due to the fact that there is a convertible cost when companies attempt to convert non-cash financial assets into cash to pay daily expense, companies prefer to keep an optimal level of cash for purely meet daily demand of payment, avoiding too much redundant cash on hand. Supported by Ferreira and Vilela (2004), they demonstrate the transaction motive based on EMU countries and find that companies with high dividend pay-out will hoard less cash position, because they are capable of satisfying daily payment need by lowering their dividend pay-out ratio. Other research related to the transaction motive has been conducted by some scholars in detail (Miller, 1966; Mulligan, 1997). For example, Miller and Orr (1966) build a model of the demand for money by firms and find that the motivation of transaction has economies of scale. Much evidence comes from scholars such as Mulligan (1997) supported the economies of scale with the transaction motive. Based on the fact that large firms required larger capital, large companies are more likely to benefit from the economies of scale to obtain external funds by comparison of small firms. Klasa et al. (2009) present evidence that when the corporates negotiate with the labour union, they tend to reduce the cash holdings technically to obtain the dominant position in the negotiation. The precautionary motive can be understood as the demand that companies hoard cash to deal with future possible adverse market shocks and avoid missing indeterminate investment opportunities (Miller, 1966; Opler, 1999; Han, 2007).

Many scholars verify the precautionary motive by examining correlation between the cash positions and other factors including investment opportunities, the volatility of cash flows and financial constraints (Kim, 1998; Opler, 1999; Almeida, 2004; Han, 2007). Kim et al. (1998) point out companies are inclined to hold more cash reserves when they are uneasy to obtain external capital. Opler et al. (1999) demonstrate the precautionary motive and find enterprises are willing to invest in cash when they face with riskier cash inflows or more investment opportunities. Likewise, following the method of Opler et al. (1999) adopts, Almeida et al. (2004) further suggest that firms with tighter financial constraints prefer to hold larger cash positions. Han and Qiu (2007) extend the precautionary demand model by using quarterly cash flow in a form of consecutive distribution and investigating U. S. public companies in the period of 1998-2002. Results from them suggest that financially-constrained companies increase their stock of cash along with the increase of cash flows volatility. Doubting the method of coping with the error of Tobin Q in the previous research, Riddick and Whited (2008) correct the measurement error in Tobin Q and find that there is a negatively significant relationship between cash holding and the safety of cash flow, probably companies will choose to reduce cash ratio after they obtaining positive cash inflow.

The agency theory highlights the conflicts between shareholders and management resulting from the inconformity of interests. Jensen and Meckling (1976) first put forward the agency theory and state that larger cash positions of companies may enable the management to invest in project that with less pecuniary benefit, even their NPV is negative. In this consideration, shareholders hope their companies can remain a lower cash position.

2.2. The effects of Cash Holdings

Corresponding to research on motive of cash holdings, the effects of cash holdings have been analyzed in two main aspects: capital market and product market. Traditional research mainly focuses on the effect of cash from the perspective of capital market. It is not until the beginning of this century that studies on the effect of cash reserves on product market occur and attracts considerable attention.

Existing research related to the impact of cash on capital market mainly focuses on the various aspects of companies, especially the impact of cash position on firm value. Many scholars examine the effect of cash on firm value and profitability (Opler, 1999; Harford, 1999). Most of them believe that companies hold large cash cannot bring future promotion of profitability to some extent, even destroy value of enterprises (Opler, 1999; Harford, 1999; Faulkender, 2006; Liu, 2011). For instant, Opler et al. (1999) find that the excessive amount of the stock of cash does not have significant effect on capital expenditure, M &A, and dividend payment. Likewise, Harford (1999) conducts a study and finds that the companies with excessive cash reserves tend to carry out more acquisitions and choose a diversified operation path. Moreover, Faulkender and Petersen (2006) research the cash holdings of different companies via a revised event study method and argue that the value of cash holdings can be influenced by the financial policies, consistent with precautionary motive. They also claim that the value of cash holdings will decrease in the following situations: the increase of the stock of cash; the increase of leverage ratio; the decrease of limitations to the financing activities and the increase the dividend payment. Liu and Mauer (2011) find that, the excessive cash holdings sometimes can result in an increase of the probability of adventure actions by the managers, which in turn lower the value of firm.

Apart from research on traditional effects of cash holdings on capital market, some researcher start to focus on the product market dimension and study the effects of cash holdings on the investment and real operation activities systematically at the beginning of the 21st century, especially Fresard (2010), he model the casual link between cash and product market growth and identify the competitive effect of corporate cash on future product market performance.

Many scholars study the dynamic interaction between cash holdings and product market, which is related to motive of cash holdings. For example, Haushalter et al. (2007) document the cash holdings based on product market competition, and they find the more predation risk of a company face, the more cash on hand it tends to hoard. Accord with the precautionary motive theory, large competitive cash enable companies to cope with future uncertainty and grasp more investment opportunities than opponents. Denis and Sibilkov (2007) find that cash is positively significant to investment for financially constrained companies. To wit, corporates with financial constraints tend to attract more investments and obtain a higher value of cash holdings, compared to those companies without financial constraints.

Given existing literature of cash and product market competition, a great amount of literature actually concentrates on the relation between capital structure and product market behaviour (Korajczyk, 2003; Faulkender, 2006). Many scholars focus on the motive of cash holding and document the determinants of cash holdings involving

financial constraints, investment and cash flow; see Bolton and Scharfstein (1990); Haushalter et al. (2007); Denis and Sibilkov (2010). However, they are silent about the competitive impact of cash on product market. Only few scholars such as Fresard (2010) build a causal relationship from cash reserves to the outcomes on product market and verify the strategic effect of relative-to-industry cash holdings on future product market based American listed firms.

As a typical representative of the emerging market, China is experiencing the upgrading industrial structure. However, seldom has existing literature examined the causality from cash reserves to product market performance in China. In order to bridge the gap, it is necessary to put forward the first hypothesis:

Hypothesis 1: The relative-to-rivals cash level of a company has a positively correlation with its future product market share growth. That is to say, holding larger relative-to-rivals cash, companies can expand more future market share than their opponents.

Regarding how the cash influence on corporate product market performance, current existing literature has mentioned two main possible mechanisms: First, the perspective of financing constraint, namely, cash holdings may help companies survive and earn more market share, especially when companies faces tighter financing constraints; see Bolton and Scharfstein (1990) and Fresard (2010). Second, the perspective of investment, which means the larger relative-to-rivals cash reserves help companies obtain larger market share by seizing significant investment opportunities; see Benoit (1984) and Compello (2006).

Considering the evidence in literatures, some scholars such as Fresard (2010) manage to model the impact of cash on future product market response to a sharp variation of exogenous conditions. He argues that the competitive effect of cash reserves is more significant for companies with serious financial constraint. However, seldom scholars empirically identify the impact of cash reserves on product market outcomes when companies face more investment chances. Thus, given the fact that enterprises within encouraged industries by the Chinese twelfth “Five-year” industrial policy have more investment opportunities than others, to further identify whether the impact of cash reserves is stronger or not when companies have more investment opportunities, this paper put forth the second hypothesis:

Hypothesis 2: For companies within encouraged industries, their cash reserves are related to their future product market growth; for companies without encourage, their cash reserves are not related to their future product market growth.

2.3. Macroeconomic Conditions and Enterprise Behaviours

Undergoing the industry transformation and upgrading, Chinese companies are exposed to the influence of macroeconomic regulation policy by governments. As a representative of industrial oriented policy, the Chinese “Five-year” industrial policy strongly encourages companies in some specific industries, especially in project approval, tax or land concessions. It is important and practical for Chinese companies to be aware of how is the effect of cash holdings on their future product market. Thus, this study use the Chinese twelfth “Five-year” industrial policy as an exogenous experiment, which can also further pin down the effect of cash holdings on product performance and exclude

the endogenous interference such as cash policy endogeneity. Thereby, this study can test how the predetermined cash level can impact on future market growth. The third hypothesis is as follows:

Hypothesis 3: The influence from the policy can significantly affect the impact of Cash reserves on future product market performance.

3. Data, Variables and Methodology

3.1. Sample Data

The study gathers annual firm level data of all firms listed in Shanghai and Shenzhen stock market from 2005-2015. The sample data is eliminated of the study by the following four rules: First, this study removes firms-year data that lack of cash, sale or total assets. Second, it removes firms without available continues 4 years information on cash, sales or total assets. Third, it removes observations with abnormal value including negative sales, equity and total asset growth larger than 200%. Fourth, this study does not consider the firms in financial industry. Finally, this study receives 22201 annual firm-level observations from 2469 qualified firms listed in Shenzhen and Shanghai stock markets. Considering the key variables cash ratio and all control variables with 1-year lag, the sample period is from 2006-2015. In addition, all original data is collected according to the industry classification, this study adopts the “Guidance for Industry Classification of Listed Companies” issued by CSRC (China Securities Regulatory Commission) revised edition 2012, which is the authoritative classification, also available from Wind Financial Information.

3.2. Variables

As Fresard (2010) argues that, a company enlarges their market share probably at the cost of its opponents within the industry. This paper follows Fresard (2010) taking the relative-to-industry sales revenue growth as the proxy of product market growth. The relative-to-industry sales revenue growth is characterized by a firm’s relative product market performance compared with all other rivals within their industry. More specifically, the relative-to-industry sales revenue growth $GROWTH_{i,t}$, is defined as follows:

$$GROWTH_{i,t} = (\text{Sales revenue}_{i,t} - \text{Sales revenue}_{i,t-1}) / \text{Sales revenue}_{i,t-1} - INDMEANGROTH_t \quad (1)$$

Among them, $\text{Sales revenue}_{i,t}$ represents the sales revenue of the company i in the year t . $\text{Sales revenue}_{i,t-1}$ represents the sales revenue of the company i in the year $t-1$. $INDMEANGROTH_t$ which represents the industrial mean of the growth rate in market share based on all firms within this specified industry in the year t .

Competitive cash holding is the sole key variable in this paper. We follow Fresard (2010), adopting Z-scored cash holdings to measure cash level of a company, more specifically, $ZCash_t$ is the annual cash holding ratio minus the mean of industry-year cash ratio based on all companies within the industry and divide standard deviation of industry-year level

of cash holdings, also can be referred as relative-to-industry cash. Due to the fact that the product market competitions are between industry rivals, relative-to-industry cash has to reflect the characteristics of cash position relative to rivals. Furthermore, relative-to-industry cash of a firm also needs to reflect the specific industry characteristic. Take a firm with a 10% cash position has surpassed the average opponents as an example, it fails to shed light on this 10% excess portion because different industries have different cash ratio dispersion. It is different for 10% more cash holdings in an industry with low cash standard deviation such as Accommodation Industry or high cash standard deviation such as Internet & Services. The Z-scoring procedure enables relative-to-industry cash holdings to describe such characteristics. In detail, the relative-to-industry cash position, $ZCASH_{i,t}$ can be defined as:

$$ZCASH_{i,t} = (CASH_{i,t} - INDMEANCASH_t) / INDSTDCASH_t \quad (2)$$

Among them, $ZCASH_{i,t}$ represents the relative-to-industry cash position of the firm i in the year t . $CASH_{i,t}$ represents the proportion of cash to total asset for firm i at the end of year t . More detail of $CASH_{i,t}$ can be seen in the Table 1. $INDMEANCASH_t$ represents the industrial mean of $CASH_{i,t}$ based on all enterprises within this industry for year t . $INDSTDCASH_t$ represents the industrial standard deviation of $CASH_{i,t}$ based on all enterprises within this industry. All key variables and their corresponding symbols including the relative-to-industry cash position and relative-to-industry sales revenue growth are shown in Table 1.

Variable	Description
Dependent variable	
GROWTH	relative-to-industry sales revenue growth of a firm
Explanatory variable	
CASH	Cash ratio= (Money funds+ Financial assets held for trading (short-term investment before 2007)) / Total assets
ZCASH	relative-to-industry cash ratio of a firm
Control variables	
SIZE	Firm size equals logarithm of total assets
LEV	Leverage equals long-term debt divided by total asset
PB	Market-to-book ratio equals market value of a firm divided by its book value

Table 1 – Variables and Definition

3.3. Methodology

In this empirical study, Fixed Effects Model and Difference in Difference Model (DID) are adopted. Fixed effects model takes all other unspecified characteristics of samples into account, all these unobserved individual traits based on samples can be referred as heterogeneity (Bhargava et al., 1982). More specifically, it assumes the effects of unobserved variable on dependent variable are time-invariant, which can reflect the real

causal link from explanatory variables and control variables to dependent variable by eliminating a large part of heterogeneity when heterogeneity problem is serious. Many scholars adopt DID model to measure effectiveness of a certain policy by calculating the difference in difference. It creates this difference in difference as a coefficient of cross-item. Thereby, the results of DID model can be used to do consistent estimates, asymptotic variance estimates and significance test. As Fresard (2010) put forward, it is hard to recognize whether the causal relationship between competitive cash holdings and product market outcomes because of potential endogeneity. First, this empirical study follows Campello (2006) to use fixed effects model to analyse the effect of corporate cash on future product market performance. Second, following Fresard (2010), this study treats the Chinese twelfth “Five-year” industrial policy as an exogenous intervene, which can isolate the impact of cash on increase of future market share and dissect the influence of industrial policy to the competitive effect of cash. Apart from its large-scaled and profound influence to most firms within industry, this industrial policy provides us treatment group and control group naturally.

According to the content Chinese twelfth “Five-year” industrial policy and “Guidance for Industry Classification of Listed Companies” issued by CSRC, we pick up firms in industries such as Agriculture A01, automotive manufacturing C36 and comprehensive utilization of Waste resources C42 as policy treatment group, the rest is regarded as control group. Then according to the conduct time of Chinese twelfth “Five-year” industrial policy, 2011-2015, we consider 2006-2010 as the time before policy and 2011-2015 as time of policy lasts. In order to examine the Hypotheses 1, to wit, the relative-to-rivals cash level of a company has a positively correlation with its future product market share growth, this paper use all the annual firms-level samples to regress relative-to-industry sales revenue growth, relative-to-industry cash ratio and other control variables (Size, Leverage and market-to-book ratio) though fixed effects model in equation (5).

$$GROWTH_{i,t} = \alpha_0 + \alpha_1 ZCASH_{i,t-1} + \alpha_2 SIZE_{i,t-1} + \alpha_3 LEV_{i,t-1} + \alpha_4 PB_{i,t-1} + \varepsilon_{i,t} \quad (3)$$

Where $GROWTH_{i,t}$ the dependent variable, the relative-to-industry sales revenue for the firm i in year t . $ZCASH_{i,t-1}$, the explanatory variable, the relative-to-industry cash level for the firm i in year $t-1$. $SIZE_{i,t-1}$ a control variable, the firm size for the firm i in year $t-1$. $LEV_{i,t-1}$ another control variable, represents the leverage ratio for the firm i in year t . $PB_{i,t-1}$, a control variable, represents the market-to-book ratio for the firm i in year $t-1$. It is the future product market that the cash impacts on. Thus, all variables except dependent variable need to be lagged for 1 year. In light of the characteristics of sample, this model accord with Panel data model. Panel data model can eliminate most of endogeneity problem caused by individual heterogeneity. Thus, we follow Campello (2006) to use fixed effect regression (firm and year controlled), and Hausman Test is adopted to check by whether it is appropriate to adopting fixed effects model based on these samples.

In order to examine the Hypotheses 2, namely, whether the impact of cash reserves is stronger or not when companies have more investment opportunities, this empirical study also adopts fixed effects model. According to whether an industry encouraged by Chinese twelfth “Five-year” industrial policy or not, using sample of 2011 to 2015,

this study divides all firms into two groups (firms with encourage and firms without encourage) and does fixed effect regression with relative-to-industry operation revenue growth, relative-to-industry cash ratio and control variables including Size, Leverage and market-to-book ratio through equation (3).

In order to test the Hypothesis 3: The influence from the policy can significantly affect the impact of cash reserves on future product market performance. This study takes this industrial policy as an exogenous experiment to overcome the potential endogeneity problem and dissects the effect of cash on future market share growth under the influence of such policy. We follow Fresard (2010) to build a DID Model:

$$Growth_{i,t} = \alpha_1 + \psi ZCASH_{i,t-1} + \phi ENC_k * Period_t + \psi ZCASH_{i,t-1} * ENC_k * Period_t + \quad (4) \\ + \alpha_2 SIZE_{i,t-1} + \alpha_3 LEV_{i,t-1} + \alpha_4 PB_{i,t-1} + \varepsilon_{i,t}$$

3.4. Descriptive Analysis

The summary statistics including the relative-to-industry cash of 2469 Chinese listed firms from 2006-2015 are displayed in the Table 2. From the full sample part, the sample mean of relative-to-industry operation growth is -0.208, and the mean of relative-to-industry cash ratio is -0.005, as negative as the mean of Growth. The standard deviation of Growth and ZCash are also similar. There may be a relationship between future product market outcomes and ZCash, but need to be further tested. For Chinese firms listing on Shanghai and Shenzheng market, the mean of leverage of Chinese companies is 45.8%, which seems not low but still within normal range generally.

Full sample 2006-2015					
Dependent variable	Independent variables				
	GROWTH	ZCASH	SIZE	LEV	PB
N	22201	22201	22201	22201	22201
Mean	-0.208	-0.005	21.459	0.458	3.324
Stdev	0.949	1.001	1.434	0.215	6.042
25%	-0.282	-0.19	20.556	0.301	1.351
50%	-0.118	-0.119	21.369	0.47	2.447
75%	0.046	0.034	22.261	0.621	4.217
Min	-4.023	-2.418	12.314	0.014	-97.313
Max	4.835	5.578	28.509	0.894	97.612
Group with encourage 2011-2015					
Dependent variable	Independent variables				
	GROWTH	ZCASH	SIZE	LEV	PB
N	4161	4161	4161	4161	4161

Full sample 2006-2015							
Dependent variable		Independent variables					
Mean	-0.06	-0.051	21.941	0.466	3.159		
Stdev	0.605	1.033	1.653	0.216	7.075		
25%	-0.258	-0.743	20.819	0.311	1.372		
50%	-0.115	-0.306	21.831	0.475	2.316		
75%	0.051	0.348	22.999	0.618	3.98		
Min	-3.446	-2.418	12.314	0.014	-96.522		
Max	4.835	5.578	28.509	0.763	97.612		
Group without encourage 2011-2015							
Dependent variable		Independent variables					
	GROWTH	ZCASH	SIZE	LEV	PB		
N	8151	8151	8151	8151	8151		
Mean	-0.235	-0.004	21.37	0.457	3.354		
Stdev	0.997	0.995	1.371	0.215	5.832		
25%	-0.286	-0.175	20.52	0.298	1.349		
50%	-0.119	-0.114	21.299	0.469	2.472		
75%	0.045	0.014	22.129	0.622	4.261		
Min	-4.023	-1.668	14.108	0.019	-97.313		
Max	4.206	5.178	27.547	0.898	94.091		
DID sample 2006-2015							
Dependent variable		Independent variables					
	GROWTH	ZCASH	Period *ENC	ZCASH*Period *ENC	SIZE	LEV	PB
N	19709	19709	19709	19709	19709	19709	19709
Mean	-0.205	0.008	0.11	-0.008	21.461	0.447	3.117
Stdev	0.969	0.909	0.323	0.217	1.434	0.213	6.075
25%	-0.282	-0.187	0	0	20.556	0.301	1.268
50%	-0.024	-0.113	0	0	21.369	0.462	2.395
75%	0.174	0.039	0	0	22.261	0.591	4.326
Min	-4.023	-2.148	0	-2.418	12.314	0.014	-97.313
Max	4.835	5.578	1	5.578	28.509	0.894	97.612

Table 2 – Descriptive statistic

4. Results and Empirical Analysis

4.1. Correlation Analysis

Table 3 shows the correlation between all variables based on all sample will be used into fixed effects model (panel model). As discussed previously, this study follows scholars to adjust these key variables. Therefore, correlations between variables are probably not simple linear correlation. This paper analyses the correlation no longer use some benchmarks of linear correlation coefficient to measure the degree of correlation. Result in Table 3 suggests there may be positive relationship between GROWTH and ZCASH, in other words, companies hoard larger cash position relative to their competitors may contribute to earn more product market share. The result also reveals SIZE may negatively correlated to GROWTH, which can possibly explained as that most small companies are in their initial development stage, they have more potential to enlarge their product share than large-size companies. The relatively high correlation between ZCASH and LEVERAGE is reasonable.

	GROWTH	ZCASH	SIZE	LEVERAGE	PB
GROWTH	1				
ZCASH	0.0151	1			
SIZE	-0.039	0.0135	1		
LEVERAGE	0.0123	-0.1436	-0.0022	1	
PB	0.0099	0.0447	0.0472	0.1696	1

Table 3 – Correlations and Covariances

4.2. Analysis of Variance

Results of large one-way ANOVA are presented in Table 4. R-squared display to what degree variance of dependent variable and variance of control variables are correlated. F value provide a ratio of between group variance and the within group variance. The significance test based on F value and P value shows that, ZCash, Size, Leverage, PB are possibly correlated with Growth respectively.

Response Variable	Group Variable	df1	df2	F	P value	No. of Obs	R-squared
GROWTH	ZCASH	3357	18843	2.34	0.000***	22213	0.294
	SIZE	5989	16211	1.61	0.000***	22213	0.373
	LEVERAGE	990	21210	2.10	0.000***	22213	0.089
	PB	7678	14522	1.50	0.000***	22213	0.441

Table 4 – AONVA results

4.3. Empirical Findings

The first column of Table 5 represents the results of fixed effects model regression based on panel data. For all sample panel data, this study has controlled variables including Size, Age, Leverage, PB ratio, and it also eliminates a large part of potential endogeneity derived from ignored or unobserved important variables. The estimator of coefficient of $ZCASH_{i,t-1}$ is positively significant (0.023***). The larger cash position (but within reasonable scale), the more future market share firms probably gain, consistent with the conclusion of Fresard (2010) based on American manufacturing firms. The coefficient of $ZCASH_{i,t-1}$ is 0.023, ceteris paribus, 1-standard deviation increase in cash adjusted to industry opponents in year t, will cause 2.3% increase in product market in year t+1. The coefficient of $SIZE_{i,t-1}$ is negatively significant (-0.112***). Generally, ceteris paribus, firms with smaller size are easily to enlarge future product market share because small companies have relatively more development potential. The estimator of coefficient of $LEVERAGE_{i,t-1}$ is significant at 10% significance level, which suggests current leverage condition can also influence firms' product market performance in the near future. In short, Hypotheses 1 turns out to be verified. The second and third columns of Table 5 represent the results of group with encourage and group without encourage respectively. We can see that $ZCASH_{i,t-1}$ is positively related to $GROWTH_{i,t}$ in encouraged industries, and the coefficient estimator is significant (0.071), which is as three times as 0.023, the all sample coefficient. It suggests that the effect of cash holdings on product market

	Dependent variable: $GROWTH_{i,t}$		
	(1)	(2)	(3)
Estimation time period	2006-2015	2011-2015	2011-2015
$ZCASH_{i,t-1}$	0.023***	0.071***	-0.002
	(-0.008)	(-0.017)	(0.0124)
$SIZE_{i,t-1}$	-0.112***	-0.072***	-0.049***
	(-0.007)	(-0.024)	(0.0147)
$LEVERAGE_{i,t-1}$	0.072*	0.072***	-0.047
	(-0.037)	(-0.037)	(0.062)
$PB_{i,t-1}$	0.001	0.001	0.003**
	(-0.001)	(-0.001)	(0.001)
Firm fixed effect	Yes	Yes	Yes
Time fixed effect	Yes	Yes	Yes
No.ofObs	22201	4161	8151
R-squared	0.0378	0.0378	0.0378

Table 5 – Fixed effect result based on panel data

outcomes is stronger in encouraged industries. Regarding regression result of firms in industries without encourage, the coefficient of $ZCASH_{i,t-1}$ is negative, which is not significantly correlated to $GROWTH_{i,t}$. It shows the impact of cash holdings on future product market is not obvious. Hypothesis 2 turns out to be rational. To wit, firms in encouraged industries are more likely to use their stock of cash to gain product market growth rather than firms without policy encourage, and the effect of cash holding on product market turns out to be magnified when the industry faces great investment prospect. Furthermore, under such encouraged policy, the effect of cash is probably shown as contributing cash-rich to seize great investment chances to compete with rivals.

In order to examine whether the influence from the policy can significantly affect the impact of cash reserves on future product market performance or not, we do DID OLS regression.

Dependent variable: : $GROWTH_{i,k,t}$		
	(1)	(2)
Estimation time period	2006-2015	2006-2015
$ZCASH_{i,h,t-1}$	0.010	0.010
	(0.012)	(0.012)
$ENC_{k,t}$	-0.020	-0.020
	(0.022)	(0.022)
$ZCASH_{i,h,t-1} * ENC_{k,t}$	0.134***	0.134***
	(0.034)	(0.034)
$SIZE_{i,t-1}$	-0.094***	-0.094***
	(0.018)	(0.018)
AGE	-0.042	-0.042
	(0.177)	(0.177)
$LEVERAGE_{i,t-1}$	0.103*	0.103*
	(0.055)	(0.055)
$PB_{i,t-1}$	0.001	0.001
	(0.001)	(0.001)
Firm fixed effect	Yes	Yes
Time fixed effect	Yes	Yes
No.ofObs	19710	19710
R-squared	0.029	0.029

Table 5 – OLS DID result and Robust Check

The first column of Table 6 presents the OLS DID result. As we can see, the coefficient of $ZCASH_{i,h,t-1} * ENC_{k,t}$ is positively significant (0.134*** significant under the significance level of 1%), which suggests that the Chinese twelfth “Five-year” policy can significantly affect the impact of cash reserves on future product market performance, and this policy has a positive influence on cash holdings effect. A probably explanation is that such policy brings more decent investment opportunities, companies with large cash positions are easier to seize great investment opportunities to compete with other industry competitors. Hypothesis 3 has been proved right. These results further verify the positive effect of cash holding on product market is stronger when the industry faces great investment opportunities. The second column of Table 6 is the result of robust check of DID model, and the coefficient of the cross term $ZCASH_{i,h,t-1} * ENC_{k,t}$ is positively significant as well (0.134*** significant under the significance level of 1%). That is to say, heteroscedasticity problem is not so serious that has no bearing on the conclusions.

5. Conclusions

The aim of this paper is to study the impact of cash reserves on product market outcomes. This paper draws four main conclusions: First, the larger relative-to-industry cash position, within reasonable scale, the faster future market growth firms probably achieve. Second, the effect that cash can help firms to seize great investment opportunities to compete with rivals is significant based on the Chinese twelfth “Five-year” policy. Third, such effect of cash holdings on product market is stronger when the industry faces great investment opportunities. Finally, the policy can significantly affect the impact of cash reserves on future product market outcomes, and this policy has a positive influence on cash holdings effect.

To summarize, it can be clearly seen that the corporate cash reserves probably positively effect on firms’ future growth of product market, especially when firms face more excellent investment opportunities, which broadens the understanding of one kind of possible implementation mechanism that cash impact corporate future market share growth. It also suggests that firms need to take this competitive effect of cash into account when they consider their corporate strategy and cash positions. For policy makers, macroeconomic regulatory policies such as the “Five-year” industry policy need to be deeply and carefully considered. In this way, such policy can effectively contribute to the transformation and upgrading of industries and enterprises.

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Analysis on the Badminton Sports Teaching Mode based on Data Mining

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Abstract: With the development of computer technology, big data and sports information technology is widely used in the teaching of physical education. In this paper, the author analyzes the badminton sports teaching mode based on data mining. By watching the multimedia course and analyzing the past data, college sports teachers can more effectively carry out badminton teaching. At the same time, badminton teaching can be more targeted through the analysis of student data. Through data mining analysis, the results show that the teaching mode of autonomous learning has a significant promoting effect on improving the teaching effect and quality of badminton course.

Keywords: Data mining, Information technology, Badminton training, Sports teaching

1. Introduction

With the continuous improvement of China's scientific and technological level, the level of physical education in Colleges and universities in China has been fully improved; most of the colleges and universities have a more comprehensive record and statistics of the sports performance and physical data (Sigala, 2015). Faced with a large number of original data, database management and data statistics method has been gradually adapted the country of "health and sports" sports talent echelon construction, the competitive index data cannot establish connections (Jian, 2012; Zhang, 2012). Data mining and data warehouse technology just makes a better reflected, it has double attributes and solve the problems that can carry out the deep analysis of the data (Crespo, 2015; Gonçalves et al., 2015)), timely and accurate to provide the required information can also help us to find the relationship of various factors from the vast data of deep, find some due to many factors, the dynamic changes of the new guidance of school physical education research and teaching of classroom training (Hu, 2012; Kim, 2014). Therefore, in practice, how to apply the data warehouse and data mining technology for information management and the deep analysis of the students' physical data, is an important subject in current sports scientific research personnel to study, but also better adapt to the inevitable development of modern information science and technology.

Badminton is an item involving various body places of leisure sports in the teaching activities of college sports students especially female college students love, effectively

carry out badminton teaching activities can not only enrich students' campus life, but also can cultivate students lifelong sports consciousness shift change in potential, to help students realize the importance of sports the students good sports view formed in the movement of consciousness in a positive and healthy(Dai, 2012;Krstev,2014). In recent years, with the deepening reform of education system in China, the change of physical education in Colleges and universities turn the world upside down core development, badminton teaching also timely reform of the teaching idea and teaching mode, however, because of the impact of examination oriented education, PE teachers in the teaching reform thinking way have not reached the same standards and goals, therefore facing the new situation, the new development, reform and innovation, in the way of reform of physical education in the US must inject a new strength and wisdom(Huang, 2013). Therefore, in order to effectively improve college students' lifelong physical education consciousness and "health first" education concept, we should open up new teaching ideas and take the road of sustainable development in badminton teaching.

2. Data mining technology

Data warehouse is a subject oriented, integrated, and persistent data set that supports decision making process. The traditional database technology is a single database resources, it is suitable for the operation of transaction processing, but the analytical processing (or information processing) ability is weak. The appearance of data warehouse, the operational and analytical environment were separated, to draw a line between the data processing, analysis of the operational circumstance and in the system the students' physique, function, grade, each semester, the data of physical performance and quality indexes such as data warehouse the theme, form the small size of the data warehouse for a particular topic, namely data mart. In this way, it can be developed from the original data environment with a single database as the center of the data warehouse as the center of a new system environment.

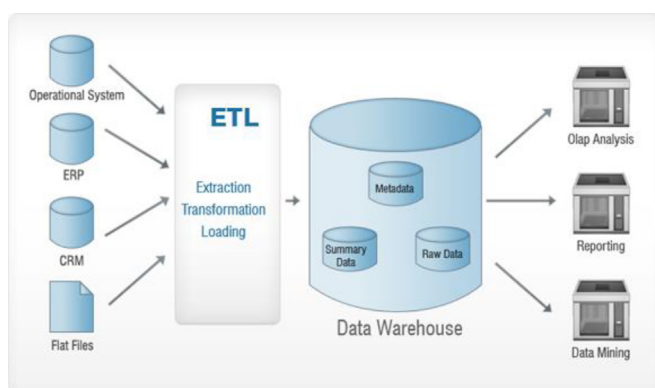


Figure 1 – data warehouse

Data mining (Data Mining), also known as knowledge discovery in database (KDD), in short, is from the large, incomplete, fuzzy and random data, in which the extraction of implicit,

useful information and knowledge process is a kind of deep level data analysis method. From the perspective of data mining, data warehouse is a platform for the implementation of data mining. Mining technology is a kind of analysis and decision making method, mainly based on the principle of artificial intelligence, machine learning, statistics, data warehouse and data mart in the basis of analyzing and mining historical data, find out the relationship between the patterns hidden in these data, reflect the intrinsic characteristics of the data contained in the data, the information of higher level abstract.



Figure 2 – Data Mining

Data acquisition and processing are the data points in the data source to load the data into the data warehouse. In a data warehouse system, data from the loading process of the data source database to the data warehouse is part of the larger workload, for each one of the data warehouse, the relevant database to conduct a series of data processing, including: (1) data extraction and find the part of the data from the current theme need data from the source database. (2) Data cleaning: data cleaning is the data portal of the entire data warehouse, through data cleaning, data extraction will be cleaned up after the data, to obtain effective data. (3) Data conversion: because each data warehouse in the data is stored according to the front end of the application requirements, so the data cleaning is completed there must be a data processing and conversion process. (4) Pre calculation: in addition to data organization, data warehouse and data source database and an essential difference is, contains a lot of information value in the data warehouse. The calculation of this value-added information is likely to be very complex, the need to use some of the advanced computing and analysis tools. (5) Data aggregation: one of the important applications of data warehouse is the multidimensional query for all data. To carry out multi-dimensional query and analysis, it is necessary to make a summary of all the data according to different dimensions, and keep the results in the data warehouse. (6) Data loading. After data extraction, cleaning, sorting, pre calculation and collection, the results need to be loaded into the data warehouse. This process should be carried out regularly, and different topics of data loading tasks have their own different implementation schedules.

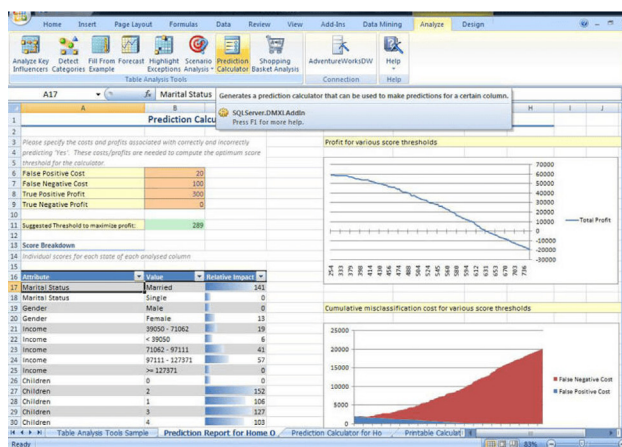


Figure 3 – Data mining model

Mining mode according to the law of the data can be divided into (1) dependent mode: according to the dependence between the data, to find out the correlation between the data. Data association is a kind of important knowledge that can be found in the database. (2) Sequence patterns: given a set of different sequences. Each sequence is ordered by different elements, each of which is composed of different items. (3) Prediction model: according to the time series data from the historical and current data to predict the future data, it can be considered to be the key attribute of time. (4) Classification model: reflecting the common nature of similar things of the characteristics of knowledge and the difference between different things of knowledge. (5) Cluster model: cluster is a set of data in accordance with the similarities and differences into a number of categories. (6) Hierarchical model: the general description of the characteristics of the categories of knowledge. In the practical application of each mode of knowledge discovery, there are a series of mining methods and the corresponding, and most of the mining methods can also dig out several data mining pattern mining methods are commonly used: association rules, decision tree method, neural network method, genetic algorithm, rough set method, covering it cases of rejection method, counterexample fuzzy set method, visual method, signal analysis method, concept tree method.

3. Badminton technology teaching mode

3.1. Badminton technology courses

Over the years, research on the autonomous learning theory has been a hot issue, the teaching theory has been widely applied in the field of network teaching, and the empirical research in the field of physical teaching is even fewer. As a professional sports college students during the school to learn science and technology nearly ten, in addition to their own course, many subjects teaching time is not more than one semester, in the traditional “Teacher centered” and “exam centered” teaching method, students better

grasp of a few doors skills are very difficult, a lot of skill to graduation is not to mention to There is not much left., jobs, fresh sports and exploration of independent research, and the social demand for a sports workers far. Based on the above understanding, this paper tries to construct autonomous learning teaching model and empirical in badminton skill teaching in order to improve the quality of teaching and development of students' autonomous learning ability.

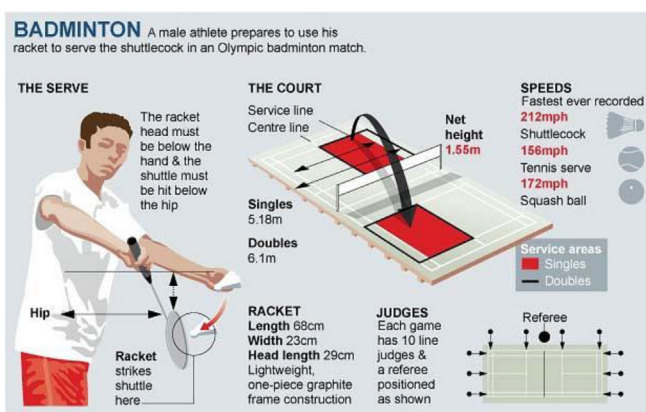


Figure 4–Badminton technology teaching

- **Stimulate learning motivation strategy:** At the beginning of teaching let students head clear learning objectives and evaluation methods, let the students into learning; guide the students in the teaching process through the creation of context; encourage students through competition; actively create a good learning atmosphere to keep students.
- **Guide students to experience the strategy:** Asked the students in class by watching multimedia and reading textbooks, establish the concept of action; in class, the teacher in the explanation and demonstration, guide students in independent practice to obtain preliminary experience, and then combined with the guidance of teachers to deepen the understanding of knowledge and skills to master; class requires students writing self-evaluation report, active on the class performance summary
- **Personal practice and group exercises:** After the teacher has arranged the practice content, the student may freely choose the practice method and the practice form which is suitable for oneself. Such as playing the lofty ball in the learning process, students can choose individual swing practice can also choose two or three people hit better practice.

3.2. Teaching procedure

Taking into account the development of cognitive ability of students, in the absence of diagnostic evaluation of students, the use of absolute fixed teaching procedures is not desirable. According to the guiding role of teachers to organize the classroom on the

size, according to the time sequence of teaching activities, the teaching mode of teaching procedures are divided into three stages: actively guide and comprehensive perception stage; accelerate the internalization, consolidate and enhance the flexibility and innovation stage; development. Each stage of the operation of the program is roughly the same, the time span of each stage according to the development of students' ability to decide. Stimulate students' interest in learning, guide students to take the initiative to explore the technical action of the experience. Before the class, the teacher arranged for students to read textbooks on the part of the teaching content of the chapters, to provide students with an authoritative badminton teaching. Through a further study, students will understand, grasp the knowledge of action on some confusion, eager to get the teacher's guidance, the teachers should guide the correct explanation and demonstration seize the opportune moment. In the course of instruction, teachers should instill the knowledge of learning strategies to the students. Then put forward the teaching goal and the corresponding practice method of this class.



Figure 5 – Badminton learning

Because of the lack of students' cognitive strategies, there are still some difficulties in choosing a reasonable practice method, so the group exercises in this stage are mainly carried out under the unified arrangement of the teachers. But in the process of practice, but also to encourage students to actively explore, communicate with each other, questioned. Such as: students in time of trouble, to the name of the group to ask teachers, to encourage students of mutual assistance between. Choose a form of exercise to evaluate the effectiveness of the practice of students. After the end of this phase, students are required to write a self - Assessment of the stage. In the second stage, appropriate to reduce the role of teachers in the classroom teaching, so that students have more freedom to choose the space to promote the exchange of students.

4. Optimization of badminton teaching mode

4.1. Autonomous learning badminton teaching mode

With the rapid development of modern information technology, college badminton teaching we need to quality education as the guiding ideology, the modern teaching methods is an important measure, to the needs of social development as the basis of teaching, to better address the integration of the system of students' all-round development mechanism, teaching knowledge system reform and meet the needs of social development of the three. As the teaching content based badminton teaching in colleges should always adhere to the "health first" and "Happy Education" and "lifelong sports" the new concept of teaching, so that students in mastering the basic skills and tactics of badminton change at the same time, help students establish good psychological health and self-health evaluation in badminton activities, through scientific and rational and plan to teach, to enable students to grasp the. Therefore, teachers in the actual teaching process, in terms of badminton teaching content should be more substantial, into the fitness and entertainment some badminton sport has its own and leisure, make more harmonious, natural, leisure and entertainment with contemporary college students' fitness needs, lay a solid foundation for the realization of sustainable development of University Badminton teaching.

Through the selection of badminton elective classes of students, the experimental group of 50 people, 50 people in the control group. Before the experiment the subjects were randomly divided into 2 groups, and two groups of students on the shot, hit the body was tested, and high clear back to the lofty ball technology, and the "t" test. The results showed that there was no significant difference between the two groups of students, and the two groups of subjects were from the same population. The results show that the teaching mode of autonomous learning has a significant effect on improving the teaching effect and quality of badminton technology courses. (See Table 1)

content	Group	N	$\bar{x} \pm s$	t	p
high clear	Experimental group	50	8.55±1.20	4.13	P<0.05
	control group	50	7.49±1.04		
	Experimental group	50	8.31±1.17	3.84	P<0.05
	control group	50	7.26±1.42		
Net ball	Experimental group	50	8.10±1.16	3.57	P<0.05
	control group	50	7.62±0.94		
	Experimental group	50	8.41±1.21	3.62	P<0.05
	control group	50	7.05±1.04		

Table 1 – Badminton technology comparison

4.2. Mastery of motor skill

To improve the students of new technical skills in the past cognitive theory in teaching badminton, often meet the students in the learning of simple action, still can by imitating the master, when faced with complex technology, will appear. The key lies in the students to grasp the connotation of the technology are not allowed, the composition of the action structure, there is no complete awareness of the matters needing attention. “Research oriented learning” mode is more emphasis on training students on the basis of the understanding of the technical action to engage in practical learning ability

As in the study of badminton forehand split hanging technology teaching, let students use their spare time to watch the video, access to information, to understand the development and evolution of the badminton ball techniques; in addition, the teacher told the students to preview before class to watch that split hanging technology focuses on the ball, the ball shooting angle, force direction, waving the racket trajectory the flight of the ball, the ball direction, and other key links. Let the students with questions to learn, and through classroom questioning or interactive way eventually let students understand the reasons and working principle structure of split hanging technology used now in badminton matches, to deepen the cognition of the technology. In the investigation on students before class by watching the video and related professional books will help improve your understanding of new technology and skills “, 42 students fill in the” very helpful “, accounting for 57% of the total number of students; 23 students think that” help “, accounting for 43%. This also shows that the students through a period of time before the class preview, and gradually realized the theoretical guidance for the effective acquisition of skills play an important role.

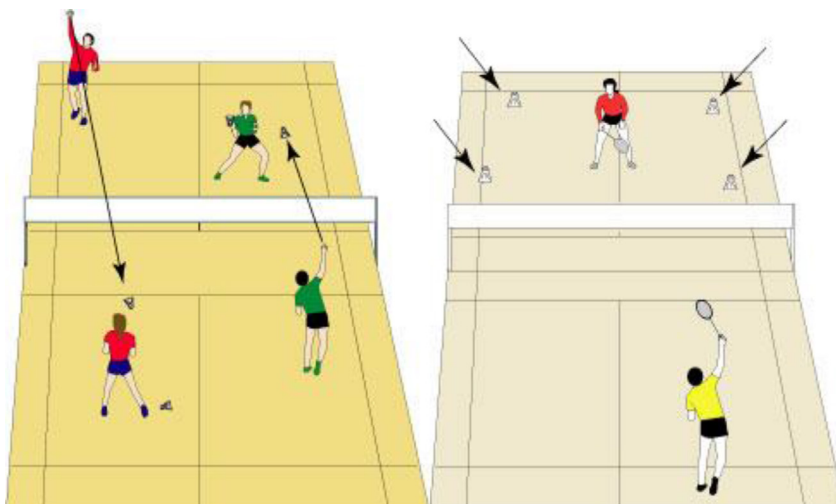


Figure 6 – Badminton sport skill

4.3. Enhance the interest in learning

In the process of teaching practice, students with the early accumulation, the quality of the shot was significantly improved, to experience the joy of success. And this strong interest is not only reflected in the classroom, but also to take to practice after class. For example, in the actual teaching of badminton courses, teachers encourage students to actively participate actively in many aspects, such as the concentration of technical action principle discussion, the preparatory activities, game creation, technology demonstration lecture and grouping guidance etc. Every student has an opportunity to show themselves in front of the group. Although there will be a demonstration to explain the phenomenon is not accurate, at this time the teacher to give timely encouragement and support, classroom atmosphere and therefore become active. For the original special basis is relatively weak students, encourage their efforts in the preparatory activities, creating games, better show themselves in front of the students

The different technology level of the students into a group, there are more sources of learning for students with no previous basis; secondly, teachers create a learning environment for the students, between students communicate with each other, increase the chance of error correction; again, for the class to participate in demonstration of students, will urge the class more carefully prepared, but for me, had no foundation of students through the preview, deepened the understanding and mastery of sports technology. In skill learning, for example, focus on discussion and group learning is a frequently used method.

5. Conclusions

In badminton technology teaching, the use of autonomous learning teaching mode is conducive to the transformation of the traditional teacher centered injection teaching mode. To foster the students' subject consciousness, play the main role, to improve students' thinking ability, cultivating innovation consciousness and innovation ability, to cultivate students to participate in the teaching activities, more conducive to the understanding and knowledge of badminton skill. In the rapid expansion of the current information society, education is inseparable with the information, education is the essence of the transfer, acceptance and processing of information, physical education in Colleges and universities are also unfavorable. Data warehouse and data mining technology as effective information processing and data analysis tools, can make the deep analysis of the data, which promotes the improvement of PE teaching quality and form a healthy sports mode of people will play a certain guiding significance.

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Computer Multimedia Application in Soccer Movement and Sports Teaching Research

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Pages: 251–260

Abstract: With the rapid development of science and technology and the deepening of educational reform, computer multimedia technology as a modern teaching means has been widely used in the teaching of physical education. In this paper, the author analyzes the computer multimedia application in soccer movement and sports teaching. In football teaching, using multimedia technology can make classroom teaching more vivid and efficient. By using demonstration courseware, teachers can effectively play a leading role in the control of teaching progress, to master the learning situation of students. Therefore, multimedia soccer learning is conducive to students' intuitive understanding of the action, speed up the mastery of the technical action.

Keywords: Computer simulation, Multimedia education, Soccer movement, Sports teaching

1. Introduction

With the rapid development of science and technology and the deepening of education reform, computer multimedia technology as a modern teaching and training method, has been widely used in the practical teaching of various disciplines, and has played an important role, has made great achievements. Multimedia teaching, training is the use of multi body courseware, text, with the image, sound, animation and other means, to arouse students' interest in teaching and training methods (Dai, 2012; Kim, 2014). Teaching and training courseware mode is applied to the teaching of football, which will challenge the traditional single soccer teaching and model, and is also the development trend of the future. College football as a discipline should also be aware of the impact of multimedia technology on teaching, the traditional classroom teaching methods must be reformed to adapt to the development of the times (Hu, 2012; Jiménez, 2015). But football teaching is different from other subjects, mostly in the outdoors, the application of multimedia technology with the difficulty in teaching sports technique class now still adopts the traditional teaching method, infiltration of modern means of teaching is extremely slow, seriously hindered the reform of physical education in the process of modernization (Huang, 2014; Lino et al., 2016). Therefore, change the traditional teaching mode, the classroom video and multimedia courseware teaching combined with modern technology, the penetration in the teaching, through the experimental test to test its feasibility, in order to provide reference for the improvement of sports technique course (Sigala, 2012).

The teaching and training content of basic technology in football is an important link in the football teaching and training of college physical education department (Krstev, 2014; Jian, 2015). The content of teaching and training effect is good or bad, directly affect the students' interest in football learning and technical mastery, as well as the follow-up of the effect of football tactics teaching and training. Therefore, the aim of this study is to enrich the network multimedia resources in China, and also to provide experience and reference for the teaching and training of large-scale soccer network and for the teaching and training of soccer.

2. Computer multimedia

2.1. Multimedia

The media is often referred to as the media, is often seen in daily life and work and the vocabulary used. As we often take the newspapers, radio, television and other news media. The newspaper called through the text, voice broadcast through television, through image and sound transmission of information. Information required by the media to spread. So it is the variety of information/media representation and dissemination of the carrier is the mediator between people's communication and exchange of ideas such as text, graphics, images, sound, animation, video and other media. Multimedia is belonging to a variety of media, but it is often closely linked with the computer, so the multimedia mainly refers to the diversification of computer information processing. Because the information processing procedures, processes or activities can be regarded as the media, computer, TV, etc. can be regarded as the tool of the multimedia. Therefore, broadly speaking, more the media is a field refers to all information processing techniques and methods related, including radio communication, household appliances, printing and publishing. In a narrow sense, it is the use of computer multimedia text, transfer graphics, images, sound, animation and video information collection.



Figure 1 – Computer multimedia

- **Sensory media:** Refers to the direct role in the human sensory organs, help the media of human perception of its surroundings. It includes a variety of sounds from nature, human music and language for the exchange of text, also includes a variety of human use, static graphics, animation and other activities.
- **Representation media:** it is an intermediate media processing, storage and transmission media and feeling research out. It includes a variety of voice encoding, music, text encoding, image encoding and image encoding.
- **Display media:** used for converting media communication between electrical signal and sensory media, is essentially some input and output information of the tools and equipment. The media can be divided into two types: one is the input media, such as keyboard, mouse, camera, scanner, light pen, and a microphone; is the output media, such as a printer, display and the loudspeaker.
- **Storage media:** is a data carrier for storing information, for storing media, computer or other device to call at any time or store the data encoding files. Storage media tape, floppy disk, hard disk, disk and memory.
- **Transmission media:** for a transmission from the media said to another physical entity. Many types of transmission media, such as cable transmission line, twisted pair, coaxial cable and optical fiber, with wireless transmission of free space.

2.2. Characteristics of multimedia technology

The multimedia technology is multimedia computer technology, is a kind of information processing technology, refers to the text, graphics, images, sound, animation, video and other media information by computer digital acquisition will capture, compression decompression, editing, storage, processing, integration of technology in the form of individual or synthetic performance the essence. Thus, multimedia technology is a process and provides text, graph, and sound, like a variety of computer information system.



Figure 2 – Multimedia feature

1. **Diversity:** The first computer is mainly used for calculation. With the popularization of computer, the computer can process information to gradually expand the scope of text and images, and these are the range of visual processing. With the development of multimedia technology, the computer can process is extended to auditory and tactile. As a result, the expression forms of multimedia information are varied, which breaks through the former single form of media expression.
2. **Interactive:** The interaction is our access and use of information initiative is the most important performance, learners can effectively control according to their own needs. In the early stage of a single text space when learning, is very difficult to control and intervention information. When the interaction is introduced, the activity itself as a kind of media information into the process of knowledge, the learner with the help of activities, they may obtain more information. No interactive multimedia works is any vitality. It is this interaction; the user can be faster and more efficient access to information.
3. **Integration:** The early technology in multimedia can be a single use, but it is difficult to have as big, because they are single, scattered, such as a single image, voice, interactive technology. The information space is not complete; the information organization will limit the information space, effective use of the limited information. Also, further demand the monotonicity of the information interaction method will limit the application. Therefore, the integration of multimedia is mainly manifested in two aspects, one is the multimedia technology to various media information organically simultaneously become a combination of multimedia information.

3. The application of multimedia in football teaching

3.1. Multimedia teaching

Multimedia teaching refers to the dissemination of information theory and the teaching process of design, implementation, and evaluation system of the educational process. With the development of science and technology, education has undergone profound changes, but also changes constantly learning theory and teaching theory, the application of multimedia teaching has a profound theoretical basis. The multimedia computer, the teaching content according to the order of the development of natural materials, in the form of multimedia image, vividly rendered. It can show the image of realistic graphics, images, animation, film, and can be equipped with the background sound and music moving, can make classroom teaching more vivid, vivid and efficient. The use of computer to demonstrate those who use language to express the teaching content change process complex can effectively make the students thinking and understanding, to the good teaching effect. The use of demonstration courseware, teachers can Enough to effectively play a leading role in controlling the progress of teaching, master the learning situation of students, also can avoid the hard copy the blackboard. This courseware can also be used for individual students to learn, play a certain role in accordance with their aptitude.



Figure 3 – Video teaching

Simulation teaching mode, mainly refers to the use of computer simulation to some abstract theory content, or not easy to observe clearly, dangerous, difficult to operate, through 2D or 3D animation form, information processing and image output on the display screen on micro macro amplification, narrow, instant slow, short time to mobilize students to participate in a variety of senses, and make students obtain the dynamic image information, thus forming a distinct perceptual knowledge, to further the formation of the concept, the level of rational knowledge to lay the foundation of state. Simulation teaching is teaching a part of the process, than the traditional maps, models or video are more truly close to things look, and can be repeated, so more conducive to the students' understanding of knowledge, cultivate their ability of thinking in images.



Figure 4 – Simulated soccer teaching

Individual teaching mode, the main part is the use of computers instead of teachers, in accordance with the procedures of teaching principles and teaching approaches to design different levels of students according to their learning level, select the required learning content. Teachers should guide students to find ways to solve the problem, but also practical for students, carefully designed program, so that students can use the shortest time to find ways to solve problems, so as to help students form good learning quality and self-learning method, realize the individualized education goal. Interactive network teaching, which is a relying on computer network teaching model in teaching activities, students use the interactive function of the computer, first in the LAN with other users or local network server. For the exchange, if the content cannot meet the requirements, can further apply to the wide area network, and further the user or resource center to exchange information. This model can be easily monitored for all students, and to learn the results of the analysis, to understand the overall level of the students and individual differences, so as to adjust the teaching content.

3.2. The influence of multimedia technology on Football Teaching

The teaching content is the transmission of teaching information in the teaching process; students acquire knowledge, skills training, and the main source of development ability. Soccer theoretical teaching time is short, single teaching method; students in a relatively short period of time to master the theoretical knowledge of football there are great difficulties. How to make the students in the limited teaching time number can master a lot of theoretical knowledge, the traditional teaching mode has been unable to meet the needs of teaching, multimedia has map, text, sound, like with the characteristics, can provide the most ideal teaching environment, shows the superiority of the traditional teaching methods and incomparable, can solve the conventional teaching methods can not effectively solve the problem is, and effectively complement the development of conventional teaching methods, but can reflect the advantages of multimedia teaching in football theory teaching, depends largely on the teaching content Choice.

Should pay attention to the choice of teaching content, not all content is suitable or necessary for teaching by using multimedia technology. The teaching content should be based on teaching needs to decide, but also give full consideration to the advantages of multi-media teaching, overcome the shortcomings of traditional teaching. The difficulty of teaching content choice should be the focus of teaching, should be. The traditional media expression is not clear, or difficult to express with language can express clearly but very low efficiency, or some of our practical difficulties, through the multimedia technology for animation, demonstration of the content. And for some at a glance or other teaching media can be very simple, quick to let students master the content no need, the use of multimedia to teaching. The traditional teaching form of organization is based on class teaching, class teaching system mainly adopts the method of classroom teaching, teachers are teaching in Heart, the teaching content by teachers to choose a class, select the specific teaching methods and teaching schedule, teaching plan, teaching methods inherited is to teach, students always in a passive learning environment. The development and application of multimedia technology, will enable the teacher centered classroom teaching the form is broken, the teaching organization will develop centralized teaching form from the class teaching system for modern distance education, individual teaching and computer interactive network teaching and other forms of organization.

Due to hardware limitations, the multimedia teaching football theory class now still can only use the form of classroom demonstration teaching.

4. Analysis of multimedia soccer courseware and action

4.1. Multimedia soccer courseware

According to the college football elective teaching outline, starting from the actual teaching objectives, need to better accomplish the task of teaching, the teaching aim and teaching key points of the design of multimedia courseware. The multimedia material preparation, material preparation is making a good courseware is an important step to, and should establish the courseware on the pictures. The image mainly refers to the use of football theory courseware interface in the pictures, photos and graphics. This part mainly has two sources: one is through the scanner to the needs of the football course in the picture after scanning the generated image file, and then treated with Photoshop, two is taken from the students teaching video game technology, excellent athletes in the video or download the good image, graphics, photography students from technical teaching, tactical exercises video interception of the video clip; or From the ready-made VCD or video clips, we use PowerPoint courseware production software, the material in accordance with the prior design of the organic combination, to produce the required Football Theory multimedia courseware.



Figure 5 – Football teaching PPT

- **Scientific principle:** Football Theory courseware presents teaching information must reflect scientific knowledge and modern science and technology, mainly reflected in: knowledge represented by the drawing must be scientific; the simulation animation must comply with the scientific principle; animation, graphics, real color to keep the objective things.
- **Interactive principle:** The interaction is an important feature of multimedia courseware is different from other forms of teaching, whether you need a

computer courseware, will you need the content pushed to the front of you; you can control the speed. Many of the teaching process in football teaching is happening at the moment, however, in order to clarify the principle, action must, multimedia can completely be controlled. Suitable for the teachers and students of different, can slow down the speed of movement, also can accelerate the decomposition; cans action, but also continuous operation.

- **Benefit principle:** Benefit principle is in the multimedia courseware creation must adhere to the most important principle is the starting point and destination of the multimedia courseware creation. Modern educational technology can enhance the quality of education, but also can strengthen the exam oriented education, the guiding ideology of the multimedia courseware must be in order to improve the quality of education. The benefits of a wrong direction, a difference Trinidad, courseware do fine but also a failure of the courseware.
- **Flexibility principle:** Teachers can pause courseware presentation, when you don't need at any time to make the screen black, may need to call at any time; according to the need to play a repetition of content; the content can be arbitrary jump; freely on the screen painting, columns, writing or input Chinese characters, it is the teacher in the teaching process of the heart the operation of courseware.
- **Interest principle:** Interest is the internal motivation to learn a lesson. Therefore, in the courseware material, special attention should be paid to make the students interested, stimulate the curiosity of students, so that they are in active status. In the process of knowledge, not to increase the memory and associative memory components, to reduce the mechanical memory, make learning become more active and interesting.

4.2. Analysis on the action of Football Teaching

The multimedia set text, graphics, images, sound, animation, film and television information transmission means as a whole, has a strong sense of reality and expression, can stimulate students' interest in learning interest. As a kind of personality, plays a positive role in the process of people's understanding of it is positive thinking and active learning. Football Theory Teaching in the past, how many teachers, students learn how to complete, mainly teachers, students on the correct theory, understanding is not clear, should grasp the extent to which is not clear. But the multimedia teaching is different, it is intuitive, can be text, image, sound, vivid animation, network together function, can be illustrated, combining visual and use, can be difficult or complicated by slow motion Action and normal action let students see, hear, is conducive to creating a good situation, provide a realistic performance for teaching, and language expression can help students establish action representation and understand the action essentials as soon as possible, to help students master the correct concept of action. In the analysis on the technology of modern football, we will football a technical action mechanism through the multimedia teaching, action essentials by pictures, video and other ways to show to the students, and combined with the technical movement of elite athletes on the football action video was shot and students in the learning process of the video, through comparative analysis, is conducive to the students more intuitive understanding of the concept of action, to speed up the technology master the action.



Figure 6 – Runs in the Attacking Third



Figure 7 – Defensive Technique

Teachers arrange the teaching materials, application of teaching methods, improve teaching quality and teaching efficiency of the important factors, difficulties, one very important point is to highlight the teaching focus. The multimedia technology is to achieve this goal is the most effective means of multimedia teaching. There is a abstract theory image can be manifested in the key to solve the difficulties. Such as teaching materials, teaching practice, in football technique requires more training, the students had mastered the action structure, action essentials, and explain the principle of technical movements such as we must use the multimedia technology, we will need to grasp the key and difficult points out, or decomposition, or analysis. The students can not only understand and grasp the principle, and can visually see the specific demonstration, to correctly grasp the entire action, so as to successfully solve the difficulties focus on teaching, and cultivate students that ask Problems, analysis and problem solving skills.

5. Conclusions

Modern information technology has greatly expanded the boundaries of time and space of education; greatly improve students' learning interest, learning efficiency and subjective initiative. So that, multimedia technology as a modern educational technology in football theory teaching role is conditional. It only in some aspects than the traditional teaching method, but is not a panacea of course. It has many advantages, many defects can make up the traditional teaching method, but it also has its own defects, the use of multimedia technology in football theory teaching, due to the combination of audio-visual teaching, attracting the attention of students. The amount of information of the multimedia, transmission speed, some students only see the novelty of animation without thinking, to show the essence of animation, some students only take into account the sound that I forgot to look at the phenomenon, forget learning content, if used improperly, the transfer student's note differently The effect of the football theory teaching, therefore, the teacher cannot appear to rely too much on the phenomenon of teaching media in teaching.

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Factors Influencing CO₂ Emissions: A Framework of Two-level LMDI Decomposition Method

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Abstract: The energy consumption and related CO₂ emissions do not persistently increase as gross domestic product grows. This paper aims to refine the contributions of demographic, economic and technological factors to the CO₂ variations. Method: Two-level LMDI perfect decomposition method is proposed to verify the CO₂ emissions and influencing factors in industry and residential consumption sectors, using the data from 8 sub-sectors in Jiangxi Province, China. Results: (1) From 1995 to 2012, the CO₂ variation shifted from negative to positive after 2000. (2) The major contributors of CO₂ decline are the reduction of workers and the sharp decrease of energy intensity in production sector. (3) The driving forces of the CO₂ incline from 2000 to 2012 are total labor productivity, economic structure, income, residential energy consumption pattern, and urbanization. Conclusions: Demographic effect is positively related to CO₂ emissions variation. Economic effect is the largest positive driving force of CO₂ emission changes. Technological effect exhibits positive effect to the mitigation of CO₂.

Keywords: Regional co₂ emissions, Two-level LMDI decomposition method, Driving factors

1. Introduction

Climate change has been an issue highly associated with national security and even global security. In the Paris Agreement signed in G20 summit in 2016, Chinese government promises to control its overall CO₂ emissions and reach the summit in 2030, accompanied by the decline of emission intensity. It is of significance to study the driving forces of CO₂ emissions from socio-economic perspectives. This paper uses the data from Jiangxi Province, since it is a typical province in Mid-region of China, indicating the average socio-economic development level in industrialization, urbanization, income enhancement, resource endowment, etc. The mechanism of CO₂ emission variation is studied and corresponding countermeasures are put forward. The results can provide better understandings of future trend of CO₂ emissions and effective emissions reduction policies.

The energy consumption and related CO₂ emissions do not persistently increase as gross domestic product (GDP) grows. From 1995 to 2012, the CO₂ variations in China shifted from negative to positive after 2000 despite the steady growth of GDP. Besides economic factors, what are the other factors influencing CO₂ variations? By reviewing related

literatures, we categorize the driving factors of CO₂ emissions into three generalized effects: economic, demographic and technological effects. Regarding economic effect, it is traditionally proved that GDP per capita and economy structure is positively linked to CO₂ emission increase (Zhong 2012; Wang, 2014). Population size and urbanization level are two major demographic factors of regional CO₂ emissions (Deng, 2014; Chen, 2014). Technological effect on CO₂ emissions is verified in terms of energy efficiency and energy intensity (Fan, 2013). How to quantify the contributions of selected factors to CO₂ emission changes? Decomposition analysis has been applied in various literatures but there are several limitations: First, related literatures are based on one-level index decomposition, with very little comparative description of end-use energy consumption of production and residential sectors (Zhu, 2009; Zhong, 2012; Wang, 2014). Second, regarding the driving forces, very few literatures provide deep insights into economic, demographic and technological factors and put them into one model. Third, most of related researches focus on the decomposition at the level of the 3 basic sectors: agriculture, industry and service industry, while residential sector is not specifically analyzed (Chen, 2014).

To analyze how socio-economic factors influence the trend of CO₂ emissions, we apply two-level Logarithmic Mean Divisia Index (LMDI) Method, and address multiple sub-sectors from the production and consumption sides: agriculture, industry, construction, transportation, warehousing, post and telecommunications, wholesale and retail trade, and urban and rural residential sectors. We also extend some influencing factors based on previous research in selecting variables. In terms of economic effect, the labor productivity should be considered in this model as it implies economy scale and the productivity efficiency in production sector. In terms of demographic effect, the number of workers is taken into account because it has positive influence on socio-economic activity intensity and therefore drives the increasing volume of energy-related CO₂ emissions (Pang, 2014; Wu, 2005). Energy consumption pattern is included in technological effect, as the primary energy including fossil fuels is restrained by resource endowment while secondary energy and new energy are closely linked to the exploiting technology.

This paper aims to systematically examine the effects of economic, demographic and technological factors on CO₂ emissions, with a specific focus on the production sector and residential sector. For this purpose, two-level LMDI method is proposed and extended variables in generalized effects are introduced in our model. We also compare our estimates with the results using one-level index decomposition model.

2. Methodology and data

2.1. Two-level LMDI decomposition and one-level index decomposition in Kaya Model

Index decomposition method is widely used to examine the influencing factor of CO₂ emissions includes Index Decomposition Analysis (IDA) and Structural Decomposition Analysis (SDA) (Burnett, 2013; Li, 2016). SDA method requires Input-output tables which are released every 5 years, so this method is not suitable for time series analysis. IDA is a better approach for analyzing the driving forces of energy-related CO₂ emissions (Ang, 2004). Moreover, LMDI method leaves no residual term and is able to solve the problem of zero value in the data sets.

Compared with one-level index decomposition (OID) in Kaya Model, two-level LMDI decomposition model (TLDM) has several advantages (Kaya, 1990). First, it provides deeper insights into more diversified categories of regions, sectors and energies to quantify the relative contributions of selected influencing factors to the variations in CO₂ emissions. Second, the CO₂ variations and driving forces in residential and production sectors can be compared in this model.

Based on Kaya Identity Model, IDA index decomposition builds up the relationship among economy, population and CO₂ emissions, expressed as:

$$CO_2 = \frac{C}{PE} \cdot \frac{PE}{GDP} \cdot \frac{GDP}{POP} \cdot POP \quad (1)$$

C, PE, GDP, POP refers to CO₂ emissions, primary energy consumption, gross domestic production and population size, decomposing them into scale, economy and intensity effect.

Previous research extended one-level index decomposition into more diversified models (Ang, 2001). To study the CO₂ changes and corresponding influencing factors in production and residential sectors, we propose TLDM to quantify the contributions of each factor on CO₂ emissions in Jiangxi province from 1995 to 2012. The decomposition model is expressed in the following formulae:

$$C = \sum_{i=1}^8 \sum_{j=1}^{19} C_{ij} = \sum_{i=1}^6 \sum_{j=1}^{19} C_{ij} + \sum_{i=7}^8 \sum_{j=1}^{19} C_{ij} = C_1 + C_2 \quad (2)$$

$$C_1 = \sum_{i=1}^6 \sum_{j=1}^{19} C_{ij} = \sum_{i=1}^6 \sum_{j=1}^{19} \frac{C_{ij}}{E_{ij}} \times \frac{E_{ij}}{E_i} \times \frac{E_i}{Y_i} \times \frac{Y_i}{Y} \times \frac{Y}{WP} \times WP = \sum_{i=1}^6 \sum_{j=1}^{19} F_{ij} \times ESM_{ij} \times EIM_i \times S_i \times G \times WP \quad (3)$$

$$C_2 = \sum_{i=7}^8 \sum_{j=1}^{19} C_{ij} = \sum_{i=7}^8 \sum_{j=1}^{19} \frac{C_{ij}}{E_{ij}} \times \frac{E_{ij}}{E_i} \times \frac{E_i}{TI_i} \times \frac{TI_i}{P_i} \times \frac{P_i}{P} \times P = \sum_{i=7}^8 \sum_{j=1}^{19} F_{ij} \times ESL_{ij} \times EIL_i \times AI_i \times PD \times P \quad (4)$$

In the formulae above, i indexes sector, i=1,2,...,8 for agriculture (S1), industry (S2), construction (S3), transportation (S4), warehousing, post and telecommunications (S5), Wholesale and retail trade (S6) and urban and rural residential sectors (R1, R2); j indexes energy type, j=1,2,...,19 for 17 primary fuels and 2 secondary energies respectively. The meaning of each factor in the formulae is described in Table 1.

There are two types of decomposition in LMDI model: additive form and multiplicative form. Additive form is applied in this paper and each influencing factor can be explained by the following formulae:

$$\Delta C = C^t - C^0 = \Delta C(F) + \Delta C(ESM) + \Delta C(EIM) + \Delta C(S) + \Delta C(G) + \Delta C(WP) + \Delta C(ESL) + \Delta C(EIL) + \Delta C(AI) + \Delta C(PD) + \Delta C(P) \quad (5)$$

Item	Meaning	Item	Meaning
C_{ij}	CO2 emissions by energy j in sector i	Y_i	Economic output of sector i
E_{ij}	Energy consumption by energy j in sector i	WP	The number of employed labor force
C1	CO2 emissions in production sectors	T_i	Total household income in urban/rural residential sectors
C2	CO2 emissions in consumption sectors	P_i	Urban/rural population size
ESM_{ij}	Energy consumption pattern in production sector	ESL_{ij}	Energy consumption pattern in residential sector
EIM_i	Energy intensity in production sector	EIL_i	Energy intensity in residential sector
S_i	Economic structure	AI_i	Average income of residents
G	Labor productivity	PD	Urbanization rate

Table 1 – Meaning of each factor in formulae (2)~(4)

$$\Delta C(ESM) = \sum_{i=1}^6 \sum_{j=1}^{19} W_{ij} \ln \frac{ESM_{ij}^t}{ESM_{ij}^o} \dots \Delta C(WP) = \sum_{i=1}^6 \sum_{j=1}^{19} W_{ij} \ln \frac{WP^t}{WP^o} \quad (6)$$

$$\Delta C(ESL) = \sum_{i=7}^8 \sum_{j=1}^{19} W_{ij} \ln \frac{ESL_{ij}^t}{ESL_{ij}^o} \dots \Delta C(P) = \sum_{i=7}^8 \sum_{j=1}^{19} W_{ij} \ln \frac{P^t}{P^o} \quad (7)$$

$$W_{ij} = (C_{ij}^t - C_{ij}^o) / \ln(C_{ij}^t / C_{ij}^o) \quad (8)$$

2.2. Data source

The absolute value of energy consumption by sectors in Jiangxi Province from 1995 to 2012 is from Provincial Energy Balance Sheet in China Energy Yearbook. Due to the data accessibility, the data from 1997 to 1999 and after 2012 is not calculated in this research. Carbon content of combustion per unit of all primary fuels and oxidation rate of combustion are from Provincial Greenhouse Gas Inventory Guideline. The standard coal coefficient and average low calorific value of all primary fuels are from China Energy Yearbook. The standard coal coefficient and emission factor of heat is referred in Xiong's article (2012). The standard coal coefficient and emission factor of electricity is from China Regional Power Grid Baseline Emission Factor released by the Department of Coping with Climate Change in National Development and Reform Commission.

Population (permanent resident population), GDP and income data is from Jiangxi Statistical Yearbook. Income and GDP data is standardized into 2012 constant price.

Our estimate on the volume of CO₂ emissions follows the Guideline for National Greenhouse Gas Inventories suggested by IPCC containing 17 primary energies and 2 secondary energies (Qi, 2013).

3. Results and discussion

3.1. Overall trend of regional CO₂ emissions from 1995 to 2012

From 1995 to 2012, the regional CO₂ emissions in Jiangxi Province decreased from 67.8 Mt in 1995 to 58.7 Mt in 2000 and then increased at 203.8 Mt in 2012. Both production sector and residential sector experienced the similar trend. These trends are also consistent with CO₂ emissions at national level.

Domestic production sector not only provides goods and services to satisfy the demand of urban and rural residential consumption, but also undertake the emission responsibility for other regions. Residential sectors consume goods and services provided by both domestic and exotic producers. Therefore it is necessary to distinguish production and residential sectors separately and address their contributions to regional CO₂ emissions.

CO₂ emissions in production sector rose from 59.5 Mt to 180 Mt at an annual increasing rate of 11.1%, accounting for 87.01% in total CO₂ emissions. CO₂ emissions in residential sector rose from 8.3 Mt to 24.1 Mt at an annual increasing rate of 10.33%. With the speed-up of industrialization in Jiangxi Province, emissions in S1 increased from 49.5 Mt to 149 Mt ranking the first among the 6 sub-sectors in production sector, followed by S4 and S5 which increased from 3 Mt to 12.3 Mt. Emissions in S2 and S6 account for trivial proportions in the production sector, but they inclined at the rate of more than 20%.

In residential sector, emissions from urban residents rose from 5.9 Mt to 12.7 Mt, while its proportion dropped from 71.1% to 52.6%. Emissions from rural residents rose from 2.4 Mt to 11.4 Mt at an annual increasing rate of 13.8%. The gap between urban and rural residential CO₂ emissions is shrinking, since rural residential CO₂ emissions increased from 0.8 kt to 4.8 kt while urban CO₂ emissions remain almost the same. This can be attributed to the energy transition from traditional fuels to commercial fuels such as natural gas, etc.

3.2. Decomposition results of TLDM and OIDM

As illustrated in Section 2.1, two-level LMDI decomposition model (TLDM) addresses the contributions across diversified sub-sectors and energy types. Compared with one-level decomposition model (OIDM) extended from Kaya Identity, TLDM contains such factors as the number of workers, urbanization, economic structure and energy consumption pattern. By addressing more diversified influencing factors, sub-sectors and energy types, we avoid the underestimation and overestimation of the contributions of demographic, economic and technological effects. We estimate the contributions of each influencing factor by the generalized effects and compare the results of TLDM and OIDM in Table 2.

			1995~ 2000	2000~ 2005	2005~ 2010	2010~ 2012	ACR,%
Demographic effect	OIDM	P	130	294	468	175	8%
		WP	-98	695	1101	379	15%
	TLDM	P	16	41	59	20	1%
		PD	66	115	54	21	2%
Economic effect	OIDM	G	2606	4098	7942	4048	137%
		S	205	1215	1672	-70	22%
	TLDM	G	2427	3050	6237	3358	111%
		AI	256	475	738	424	14%
Technological effect	OIDM	EI	-4073	-409	-1480	-1298	-53%
		CI	542	369	-236	428	8%
	TLDM	EIM	-3678	-1298	-2445	-943	-62%
		EIL	-434	-272	-338	-203	-9%
		ESM	515	21	-413	230	3%
		ESL	61	306	32	138	4%

Note: CI refers to CO2 emission intensity, ACR refers to Accumulative Contribution Rate

Table 2 – Decomposition results using TLDM and OIDM (kt CO2)

In OIDM, economic effect includes GDP per capita and its accumulative contribution rate (ACR) is 137.4%. In TLDM, the ACR of economic effect is 146.9% considering labor productivity, income per capita and economic structure. In OIDM, population size contributes 7.8% to the CO2 increase. In TLDM, the number of workers and urbanization rate lead to the ACR of demographic effect up to 18.1%. OIDM may underestimate the technological effect and its ACR is -45.2%. In TLDM, energy intensity and structure in both production and residential sector are in the analysis framework, indicating that the ACR of technological effect is -64.1%. The decomposition result in TLDM is shown in Figure 1. In the next section, the influencing factors by generalized effects and periods are analyzed.

3.3. The decomposition analysis of CO2 decline from 1995 to 2000

1. Economic effect

In OIDM, GDP per capita drives 26 Mt CO2. In TLDM, economic structure, income per capita and labor productivity contributes 2, 24 and 3 Mt CO2. Though the aggregate results are similar, TLDM refines the positive contributions of income and labor productivity on CO2 emissions.

2. Demographic effect

In OIDM, population size contributes 1.3 Mt CO2. In TLDM, population size only contributes 0.2 Mt CO2, and urbanization rate contributes 7 Mt CO2, while the number

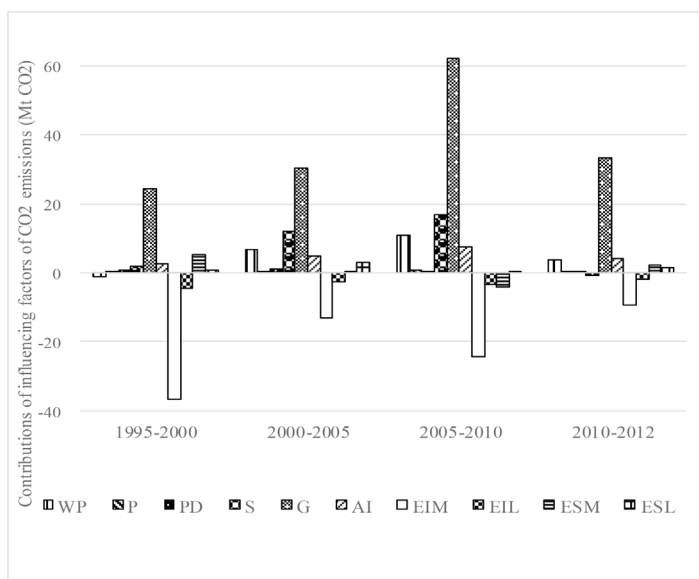


Figure 1 – Contributions of influencing factors of CO₂ emissions in TLDM (Mt CO₂)

of workers plays a negative role in reducing 9.8 Mt CO₂. The overall demographic effect drives to the decline of CO₂ emissions.

From 1995 to 2000, the number of workers declined from 21 million to 20.6 million. The reform of state-owned enterprises leads to the shrinking scale of the employed. Based on Jiangxi Statistic Yearbook, the number of workers in state-owned enterprises and collective economy decreased sharply, from 4.04 million to 2.65 million, with the declination of capital-labor ratio from 24.6% to 16.7%. The state-owned enterprises experienced the slowdown of capital stock and their total losses exceeded profits. Though their status of monopoly started to falter, they still took charge of the financial and industrial essence in China. Therefore the declination of production scale resulted in the decrease of labor productivity and the number of workers, exhibiting positive effect to the CO₂ emissions mitigation.

3. Technological effect

In OIDM, energy intensity is the only inhibitory factor of CO₂ emissions, reducing 41 Mt CO₂. In TLDM, the influencing factors are energy intensity in production and residential sectors, reducing 37 and 4 Mt CO₂ respectively. Coal dominated the energy consumption pattern, leading to 5.5 Mt CO₂.

From 1995 to 2000, the most energy-intensive sectors were: S2, S4, R1, R2. The energy intensity of S2 had the most negative impact on CO₂ reduction. After 1995, energy intensity of S2 declined sharply from 2.61 to 1.24 t CE/10⁴ Yuan. There are two reasons. First, some changes occurred in the ownership of industrial enterprises, and the amount of industrial enterprises dominated by state-owned enterprises and collective economies decreased while the amount of other types of enterprises (mainly invested by firms

from Hongkong, Macao, Taiwan and overseas countries) rose. The energy efficiency of the latter economies is higher than that of the former ones. Second, the power law was passed in April, 1996. This law aimed at improving the management efficiency of manufacturing and operation in power industry, and led to such reforms as shutting down small-scale power stations and reforming old power plants, etc. These acts were beneficial to improve the efficiency of end-use energy consumption in power plants. The socio-economic factors above resulted to the improvement of industrial energy efficiency and sharp decrease of energy intensity of production sector.

Compared with OIDM, TLDM refines the technological effect on the CO₂ decline from 1995 to 2000 and implies that the demographic effect was also the negative driving force.

3.4. The analysis of CO₂ increase from 2000 to 2012

1. Economic effect

The ACR of economic structure is 19.5%. The average proportion of six sub-sectors in production section is 4.44%, 79.46%, 0.43%, 12.54%, 1.40%, 1.74% respectively. The proportion of S1 dropped from 32% to 11.8%, while S6 increased from 26.8% to 29.7%. In spite of the optimization of economic structure, it still drove the increase of CO₂. CO₂ emissions in S2 inclined steadily, and its high contribution rate offset the negative influence of other sectors.

The ACR of labor productivity is 87.8%, making it the dominant contributor to the CO₂ increase in the production sector. The labor productivity rose from 15,600 to 50,700 Yuan per capita, with the annual growth rate at 9.1%-10%. The result is similar with Wang's research (2014), economic output of each labor unit significantly drove the increase of CO₂.

The ACR of income per capita is 11.4%. With the enhancement of income, residents have more demand of cars, motorcycles, televisions and other durable goods. The car ownership rose from 0.39 to 14.9 in every 100 urban households. The ownership of motorcycles and colored televisions increased from 17.5 and 30.2 to 69.5 and 120.5 respectively in every 100 rural households. Regarding fuels for cooking, residents rely less on traditional fuels such as coal and biomass and shift to electricity. In terms of transportation, the coverage of cars stimulated petroleum consumption and drove the increase of CO₂ emissions in residential sectors.

2. Demographic effect

The ACR of the number of workers is 15.1%. The number of workers increased from 20.6 million to 25.6 million, and the utilization rate of labor force rose from 71.1% to 73.1%. Production sector tended to be more capital-intensive, but the development mode relied on the input of labor, therefore the increase of workers has positive effect on CO₂ emissions.

The ACR of urbanization rate is 1.32%. The urbanization rate rose from 27.7% to 47.5%. Residents not only change their residence but also lifestyle and consumption patterns. Related goods and services caused the increase of energy demand and CO₂ emissions.

The ACR of population size is 7.41%. The number of permanent residents rose from 41.5 million to 45 million. It stimulated residential energy consumption, infrastructures

and buildings. These led to the growing demand of cements, iron and other building materials, and the related manufacturing and transporting process resulted in the increase of CO₂ emissions (Liddle, 2010).

3. Technological effect

The energy consumption pattern in production sector negatively affected CO₂ emissions, with the ACR of -1.13%. The reason could be the decreasing proportion of coal consumption with high carbon emission factor. The proportion of coal use in S₂ dropped from 56.9% to 47.6%.

Different from the negative effect of energy consumption pattern in production sector, energy consumption pattern in residential sector made positive contribution to CO₂ emissions with the ACR of 3.3%. Though the urban residents' demand for coal decreased from 2.4 Mt to 0.22 Mt, reducing 4.1 Mt CO₂, electricity consumption rose from 948 million Kwh to 6,576 kWh, resulting in 16.8 Mt CO₂ increase. As the increase of cars in urban households and motorcycles in rural households, the demand of gasoline and diesel rose continuously, contributing 1.2 and 0.65 Mt CO₂.

The ACR of energy intensity in production sector is -32.5%. The energy intensity of S₂, S₄ and S₅ were the highest. Due to the elimination of equipment of low energy efficiency, the rising energy prices and the investment of research and development, the energy intensity of S₂ declined from 2.05 to 0.649 tons SCE/104 Yuan. This is a key factor leading to the CO₂ decrease. How to improve the energy efficiency in S₄ and S₅ should be concerned in energy-saving and carbon-mitigation policies.

With the improvement of energy efficiency in households, the ACR of energy intensity in residential sector is -5.6%. The dependency on coal and other fuels of high carbon emission factors in households declined. The difference between R₁ and R₂ in energy intensity is obvious. The energy intensity in R₁ decreased from 0.21 to 0.07 tons SCE/104 Yuan while it increased from 0.08 to 0.11 tons SCE/104 Yuan in R₂. The negative impact is more evident in R₁ than in R₂. The income elasticity of residential energy consumption varies across different regional economy levels.

4. Conclusions

From 1995 to 2012, the overall trend of CO₂ emissions in Jiangxi Province is similar as national trend, decreasing from 1995 to 2000 and then increasing from 2000 to 2012.

The proportion of CO₂ emissions of residential sector in regional CO₂ declined annually. The gap in overall volume and per capita volume of CO₂ emissions between urban and rural residents is narrowing. CO₂ emissions per capita increase continuously. With the development of industrialization and urbanization, the supply for residential energy requirement faces challenge.

The economy structure in production sector has been optimized, but the proportion of industry is still large and it makes large contribution to the CO₂ emissions in production sector. The energy intensity in S₄ exceeded that in S₅ from 2009, and communications and transportation is the key sector of carbon mitigation process.

Compared with OIDM, TLDM refines the contributions of demographic, economic and technological effects. OIDM does not imply the negative influence of demographic effect on CO₂ declination from 1995 to 2000. TLDM explains that the shrinking number of workers and the energy intensity of residential and production sectors are the main reasons for the declination. And we explain the association between the decreasing amount of state-owned enterprises and the slowdown of economic output and the shrinking amount of workers. We also point out that the decrease of energy intensity in production sector was due to the ownership change of industrial enterprises and the implementation of power law.

From 2000 to 2012, the total amount of regional CO₂ emissions began to increase. The positive contributions of labor productivity, economic structure, the number of workers, income per capita, energy consumption pattern in residential sector and urbanization rate surpass the negative effects of energy intensity in residential and production sectors and energy consumption pattern in residential sectors.

Demographic effect is positively related to CO₂ emissions variation. Economic effect is the largest positive driving force of CO₂ emission changes. Technological effect exhibits positive effect to the mitigation of CO₂.

5. Policy implications

Other provinces in Mid-China have experienced the similar trends in demographic transition, economic growth mode and energy consumption increase. The policy implications from the empirical results can be applied to other provinces.

In 2014, the economic output of industry accounts for 52.1% of total GDP, while the proportion at the national level is 43.9%. The rising-up policy for Middle region boost the economy, however the share of industry is dominant in the production sector. As economic structure is a positive driving force of CO₂ emissions based on the decomposition results, the optimization of economic structure is a long-term strategy for Middle regions. With the shift of industry transfer, there will be rapid inverse flow of population, urbanization and population agglomeration, and this will drive more energy consumption and related CO₂ emissions. In the preliminary phase of economic structure transition, Middle provinces need to pursue the sustainable development and carbon emission reduction policies. With the combination of local resource endowment and existing advantages, current industry structure ought to be adjusted aiming at low-carbon target. Utilizing and upgrading economic structure can exert positive impact on improving environment quality.

Energy intensity contributes to the CO₂ emissions in production and residential sectors negatively. Decreasing energy intensity is a good approach to control the increasing speed of greenhouse gas emissions. Reducing the proportion of high-energy-intensive industries such as chemical raw materials, chemical product manufacturing, non-metal mineral product industry ferrous metal and nonferrous metal smelting and rolling processing industry, petroleum processing and coking, nuclear fuel processing industry, electricity and heat production and supply. The proportion of industries with high output and low energy consumption should be increased substantially, including clean energy industry, wholesale and retail trade, catering industry and tourism.

Energy consumption pattern is a positive driving factor of CO₂ emissions; therefore the energy consumption pattern ought to be optimized to achieve the low-carbon development target. There are several ways. First, the proportion of coal consumption should be lowered while the proportion of cleaner energy should be increased. Second, the regional resource endowment should be made full use of, especially in terms of abundant renewable resources and clean energy such as wind power, hydro power, solar power, biomass power, geothermal power. The focus of energy consumption pattern adjustment should be on developing and exploiting these energies. Third, the proportion of thermal power should be reduced and hydro power and new energy power should be exploited continuously to make positive contribution to emission mitigation.

Income enhancement and urbanization result in the increasing residential energy consumption and related CO₂ emissions, and. From the perspective of sustainable development, consuming energy rationally and improving energy-saving consciousness of residents should be advocated. There are several measures. First, urban public transportation system should be improved to encourage citizens to reduce private cars usage. Second, energy-saving technologies and buildings should be promoted in large-scale enterprises, schools and government by the means of transforming the central air-conditioning system and auxiliary power supply system, therefore to improve overall energy efficiencies in large buildings.

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Research on the Data Aided English Literature and Culture Corpus based on Decision Tree and Natural Language Processing Models

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Abstract: With the rapid advancement of the NLP and information system assisted English literature and culture research, the integration of the machine learning method with literature discussion is becoming the trend. Under this background, this paper proposes the research on data aided English literature and culture corpus based on the decision tree and natural language processing models. Natural language processing has a fundamental basic solution to the problem of good man-machine dialogue prospects. However, the current level of natural language processing cannot be any of the text in-depth analysis, do not have the ability to understand the natural language. Different from natural language understanding, information extraction generally does not make a thorough analysis of the text and its main function is based on pre-set tasks that extract a specific type of information. By implementing this feature, this paper proposes the new English literature and culture research pattern. The simulation result proves that our method can perform better compared with the other NLP methods.

Keywords: English Literature, Culture Corpus, Decision Tree, Natural Language Processing, Model and Analysis, Data Aided System

1. Introduction

The NLP is using the natural language carries on the communication with the computer the technology, because processes the natural language is the key to make computer “understand” natural language, therefore NLP is called the natural language understanding which is also called the computational linguistics. From the computer processing point of the view, the study and processing of natural language generally should go through the following three aspects of the process.

1. The need to study the problem in the linguistics to be formalized, so that it can in a certain form of mathematics, tightly and neatly expressed.
2. This strict and structured mathematical form is expressed as an algorithm, so that the formalized in the calculation.
3. According to the algorithm to write computer programs, so that it can be achieved on the computer.

In the past similar research, all expansion language materials that obtained directly are treated as training language materials. Some wrong replaces of will definitely bring many noises, no matter the synonym and target word are similar, this is hard to avoid (Agerri, 2015; Carrell, 2015). Therefore we candidate sample central area that must from obtain branch out the noise sample and filter them. Therefore, in order to study natural language processing, not only have the linguistic knowledge, but also have mathematics and computer science knowledge and philosophy, cognitive psychology, logic and other fields of knowledge, so that natural language processing has become a boundary between multiple disciplines of the marginal interdisciplinary (De, 2012; Fannes, 2013), it also involves the liberal arts, science and engineering three areas. In the following figure one, we show the classic natural language processing model.

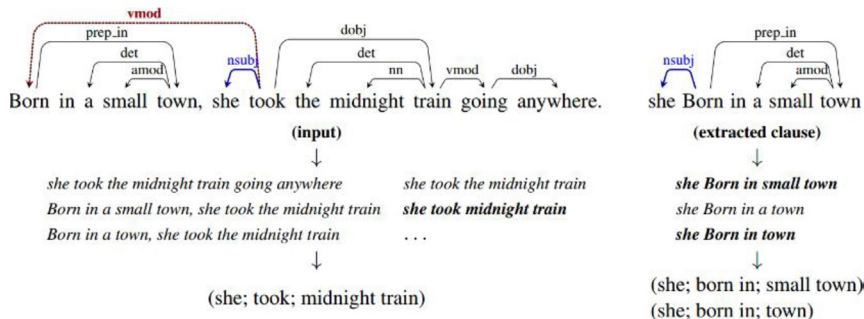


Figure 1 – The Demonstration of the Natural Language Processing Model

In the following sections, to integrate the NLP and machine learning algorithms into the research of data aided English literature and culture corpus, we conduct the theoretical analysis. The rest of the paper is organized as the follows. In the sections two, we propose the new NLP model; in the section three, we integrate the decision tree theory into the model to reduce the complexity; in the section four, we discuss the English literature and the culture; in the section five, we illustrate the integration of the proposed model and English literature and culture corpus as well as conducting the experimental simulation on the proposed method; in the section six, we summarize the work and set up the further research plan.

2. The Natural Language Processing Model

Natural language processing includes natural language processing techniques and resources. The technology can be divided into the basic and advanced two and this classification on the one hand according to the natural language processing depth and level on other hand we should consider technical complexity and difficulty (Heidari, 2013; Guo, 2014). In the NLP, the most essential issue is information extraction. Information extraction is based on an unknown natural language document as input that produces a fixed format, unambiguous output data process. The data can be displayed directly to the user can also be used as an index of the original information retrieval, or stored in a database, spreadsheet, in order to facilitate further analysis (Gonçalves et al., 2012; Jain, 2013). Broadly speaking, the object of information extraction can be text, image, voice, video and other media. For this, the classification pattern can be summarized as the follows.

1. Analyzes in the documents among the entities refers to generation of basic relations, in the chapter that the same entity in analyzes, possibly many different refers to generation of methods refers to generation of analyses differently refers to involving to receive in the same entity.
2. Relates the descriptive information to the entity, the essential information extraction besides locates classification to the name entity that generally also requests some descriptive message distribution different entities that forms the complete description of entity.
3. The information content of the name, place name, organization name, date, time and amount of the name, date, time and amount of the document are extracted. At present, the named entity recognition technology is the most simple and reliable technology in information extraction.

To enhance the traditional NLP model, we consider the granular computing model. In human thinking, judgment and reasoning is mainly by language, and language is a very coarse grain size, how to use the language for reasoning judgment, this is to “word count”. Fuzzy words narrow calculation theory refers to the use of the usual sense of the mathematical concepts and operations, such as the add, subtraction, multiplication and division of mathematical systems with uncertain or fuzzy value calculation (Litman, 2016; Lopez, 2016). It uses word concepts of the fuzzy logic and classical group ring domain algebra structure that construct the words with similar structure domain. Here, we should provide the following definitions before further processing.

Definition one. Granularity. It cannot differentiate the relations, the function close relations, the similar relations, the equal relations, restraint, the compatible relations, the compound relations, the fuzzy relationship, attribute, projection, the structural relation and general function on behalf of the equivalent relation.

$$\forall i, j \in \tau \Rightarrow G_i \cap G_j = \emptyset \quad (1)$$

Definition two. Granule size. When universe of discourse for separate situation, integral representation information granule G contains the total integer of the individual, possibly may row of when the universe of discourse is the continuous-state, the distance scale of integral representation information granule G length that is infinity or is possibly uncountable.

$$Grad(G) = |G| = \int dx \quad (2)$$

Definition three. The information granularity is thick or thin. We know that the information of particle size affects the validity of the computational complexity and solving problems. In the process of problem solving, the information content of the world or the world to describe the different size of the same size and the mutual transformation determines the thickness optimization of information granularity.

$$\forall x, y \in U, xR_1y \Rightarrow xR_2y \quad (3)$$

The quotient space theory and random theory are the use equivalent class state “granularity”, described the concept with “granularity” again. However, the starting point of discussion differs from. The stress point of the quotient space theory is the relations of basic interconversion and mutual interdependence between research different granularity world, describes the theory of spatial relationship theory, but the random theory is mainly interdependence relations between showing, portray and the granularity and the concept research granularity. The quotient space theory exists to have under the premise of topologic relations to conduct the research in universe of discourse elements, namely the universe of discourse is a topological space, but the universe of discourse of random theory is only the set of points of the object, among the elements the topologic relations not within the consideration, these differences have certain influence to the problem solving. For the better NLP processing accuracy, we adopt the core maximum entropy principle. How to use maximum entropy frame model to obtain and optimal the probability distribution under the characteristics limit that gets down carries on the formal description technique facing this model, and introduced the related algorithm.

Suppose we have the training data set as follows.

$$\{(x_1, y_1), (x_2, y_2), (x_3, y_3), \dots, (x_N, y_N)\} \quad (4)$$

For this training sample, we obtain empirical distributions (x, y) as formula 5.

$$\bar{p}(x, y) = \frac{1}{N} \text{Num}(x, y) \quad (5)$$

Where the $\text{Num}(x, y)$ represents the time of occur times. It has not mentioned the issue of parameter estimation in the introduction of LSI generally, but we can still relates and the LSI to regard as LSI and the EM algorithm through the main part analysis has separately made the main part analysis to two similarity matrices, but the main part analysis can carry on the solution through the EM algorithm. Under this basis we can get the conditional probability as the follows.

$$p(f) = \sum_{x, y} \bar{p}(x) p(y|x) f(x, y) \quad (6)$$

The idea of principal component analysis is fully reflected in basic LSI, that is, constructing the similarity matrix between the original coordinates, transforming the samples by eigenvectors, statistically independent among the coordinates in the new coordinate space, and the new spatial dimension is generally far away less than the original space dimension and the problem can be transferred into the formula 7 as the mathematical optimization task.

$$p^* = \arg \max_{p \in C} H(p) \quad \text{s.t.} \quad \sum_y p(y|x) = 1 \quad (7)$$

To dig out the logistic values, in the table one, we show the sample terms.

Language Form	First-order logic value	Second-order logic value	Named Feature
OKBC	+	+	+
OIL	-	+/-	+
CYCL	+	+	+/-
DAML	+/-	-	-
FLOGIC	+	-	+

Table 1 – The Sample Terms of the NLP Referred Issue

Illustrated from the table one, both's difference is very obvious. LSI is not the probability production model, therefore is unable to explain basic LSI with the generation process of documents, thus is unable introduces in LSI different types of semantic structures and the grammar roles. pLSI as the production model has the probability foundation, is easy to carry on the model expanding. In addition, LSI and objective function of pLSI optimization is different: LSI takes the optimal low order to approach for the objective function of optimization, but pLSI takes the likelihood value of the observed value as the optimal objective function. Moreover, what the SVD decomposition of LSI obtains is the globally optimal solution, but what the pLSI obtains is the local optimization. As the sample demonstration, in figure 2, we show the NLP processing steps and language based implementation.

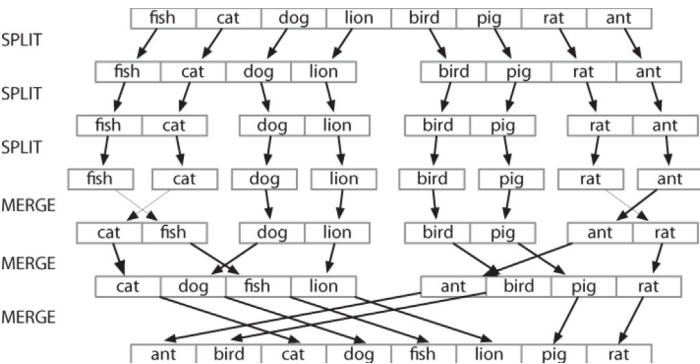


Figure 2 – The NLP Processing Steps and the Language based Implementation

3. The Decision Tree and the Related Theories

The data in the primitive data set typically has the following characteristics: The imperfection lacks the attribute value or only contains the accumulation data; The non-uniformity, the source of primary data is different, the data definition lacks the unified standard to cause that among the systems the data connotation not to be considered as the inconsistent components. As the result of these characteristics, many primary data are not useful in the training stage of learning algorithm. In recent years some

researchers believe that before producing the core decision tree reduced the training data quantity as far as possible compared with after the decision tree produced simplified the decision tree to enhance the performance of decision tree again. Stochastic decision tree should focus on the following aspects.

1. Data in libraries and data warehouses can be thought of as having different granularities or the different levels of abstraction, and can be thought of as being composed of some different attributes and dimensions. Data can be described in a variety of visual ways, such as box charts, three-dimensional cubes, data distribution charts and so on.
2. Had determined after target attribute, it needs to be possible to analyze according to the attribute, to reduce attribute, thus is easy to understand the model result, but in the general data many attributes possibly with the classification and forecast duty are not related.
3. The information entropy as a standard of choosing the test attributes, classifying training instance set, and how to construct the decision tree to predict by the test attribute for the whole instance space division. The algorithm is a greedy algorithm, it with the recursive top-down divide-and-conquer method to construct the decision tree, the essence of which is to construct the entropy by the fastest average decision tree.

Because the structure of decision tree is simpler more can summarize the thing the rule, expected that the non-leaf node arrives at the descendant node the average way to be always shortest, namely production the average depths of decision tree are smallest, this requests in each node selection good division that uses the information gain in each node of tree as the target of weight node split quality. The choice has the attribute of highest information gain as the current node fission plan. This attribute makes the sample grading in result division to the information content that needs smallest, and reflects the smallest randomness of division or the “impure”. Through the above research and analysis, we can draw the conclusion that the key to construct a good decision tree lies in how to choose good logic judgment or attribute. The challenge of decision tree technology is that with the increase of data, the efficiency of decision tree method needs to be improved, The mining method of decision tree adapting to various types and tolerant noise needs further study. Favors in view of the algorithm the value many test attribute shortcomings, optimizes the algorithm, directing person parameter P to restrain the attribute choice, namely acts according to the Apriori knowledge or the domain knowledge by the policy-maker determined that a hazy concept restraint parameter P , $0 < P < 1$, refers to the decision tree study in the decision tree training process besides being used to produce and revise the example collection of the decision tree, the factor of all influence decision tree rule generation and choice making the test attribute choice tend to be reasonable as avoids the big data covering the small data the phenomenon making the decision tree reduce to value many attribute dependence and solved the ID3 algorithm to be partial in the value multi-attribute.

Search space is full of the hypothesis space, the objective function must be in the search space and there is danger of not solution the overall use of the training data rather than like a candidate pruning algorithm to consider a training case should be considered. The entropy for evaluation can be revised as the formula 8.

$$Entropy(A) = \sum_{j=1}^v \left(\frac{s_{ij} + \dots + s_{mj}}{s} + P \right) Info(s_{ij}, \dots, s_{mj}) \quad (8)$$

For the clustering center, when the re allocation of cluster center with non-center data center to replace the data when the total cost of replacement of the non-center object because instead of using non center data center data generated and the costs will be calculated. The ID3 through the unceasing circulation processing, stepwise refinement decision tree, until finding an absolutely correct decision tree, decision tree of algorithm structure induced to form one group of similar judgment rules from top to bottom. The most primitive procedure is used to differentiate walking in chess or language classification, therefore the category of discrimination has two types, namely really or false, its attribute value is also some of separation limited values. The figure 3 shows the principles.

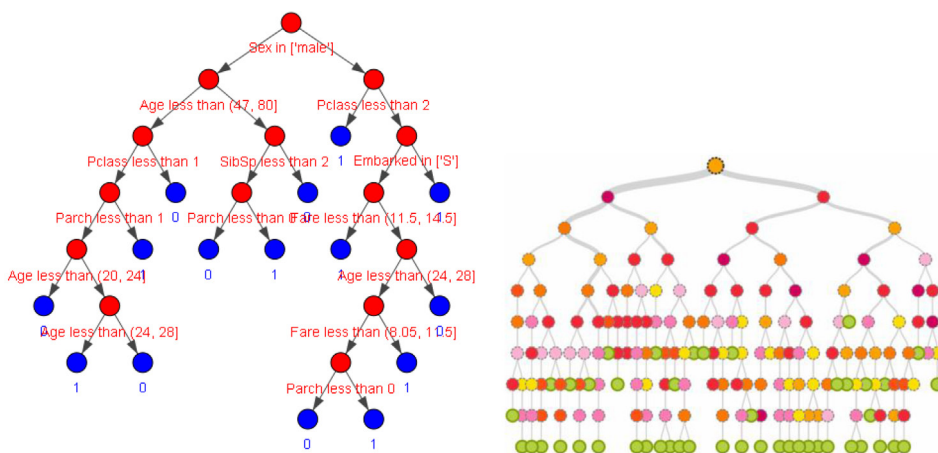


Figure 3 – The Revised Decision Tree Architecture

4. English Literature and the Culture Review

4.1. English Literature

It is the very important work to analyze the hotspot of foreign literature research, because it can reflect the development direction and the latest achievements of the subject research. It is of great guiding significance to the research progress of this discipline and the papers written by various scholars. Because the international academic development is dynamic, but is not fixed, the new research key and front thesis will appear continuously and therefore the research will also change with the situation. The foreign literature research needs to innovate and development as this requests us to track and confirm promptly early the hot spot of research and makes it the effective reference coordinate.

The study of literary ontology involves the study of the art features, text analysis, literature style, language style and so on. In foreign literature the consciousness of ontology is

being strengthened. Among them, the study of foreign novels is the first priority, and poetry is also a major research area. In the novel research, in recent years, and focus of attention are long short stories, metafiction, detective fiction, novel narrative theory and the character image modelling. However, foreign folk literature, children's literature and mythology become a new focus, and importance of mass culture is also worth noting.

Now, latter the colonizing literary studies become English literary criticism focus in world many places, shoulders to the Chinese readers was introducing that our country English literary world of world English literary achievement to has not started as a research of overall latter colonizing English literature.

Undeniably, colonialism theory of foreign literature criticism of our country while accepting and for commenting the west has almost neglected after colonizes the introduction of English literature. In view of this phenomenon, the English literary world of China should after colonizes the theory does further re-examines, in order to the colonialism theory seeks for the beneficial enlightenment. The emergence of new English literature will further expand our reading space and provide us with the opportunity to learn more about today's multi polarized society. Our country has many English workers, study interest in English literature to many people, but some could not find a good topic. The appearance of the new English literature has opened another door of hope for us.

4.2. English Culture

As day-by-day intensifying of globalization, any culture is unable to insulate in the influences of other cultures. The global character or the local politics, economy, science and technology education, recreation, sports and the military ties develop between the different nationalities and cultures frequently, the working language usually is English. Even if in Britain and US, massively from all over the world the different the immigration of ancestors, belief and culture has injected the new vigor and element to the UK-US culture, thus makes English evolve unceasingly is more colorful, becomes the international language.

Therefore, we must seek one type to be the international language satisfied the method of English culture and education demand. The information of social life, economic globalization and internationalization of the Internet make English one of the most important carriers of various information and culture, and the most widely used inter-ethnic language in all fields of human life. Information and globalization are forcing us to abandon the old ideas of learning English just to communicate with native English speakers. The education of English and culture cannot only focus on the British English, the American English, the British culture and US culture, but should take a broad view at the world English and the culture, including our mother tongue culture expressing in English, contacts and is familiar with various English anomalous forms, the modes of life, the values, the thinking mode that cannot think solely study English to exchange with the English and the American, similarly for with the non-English mother tongue exchange, as even uses English in our native place.

5. Experiment and Systematic Implementation

In natural language processing, the topic can be seen as the probability distribution of the general term. We use the theme model to document the generation process simulation,

and then through the parameter estimation to each subject. When a document is represented as a word bag, its dimension may be tens of thousands. If the theme of the theme model is designated as the number of themes, through the training of the theme model, and ultimately the formation of the theme, we can lexical space in the document transform to the subject space, the new expression of the document as the number of topics is usually much smaller than the number of the items while often using the theme model to drop.

Based on the prior discussion on the NLP and decision tree, we can finalize the core simulation procedures as the follows.

- The underlying assumptions in the topic model. An important assumption in the topic model is the assumption of the words, that is, words within a document can be exchanged in order without affecting the training results of the model. Swapping can be simply understood as order independent and conditionally independent of the same distribution.
- The inference of new sample. After the topic model training is completed, we then can use to train the good topic model to infer the new sample will transform by the documents of lexical item space expression through the topic model to the new subject space, obtains one to take the subject as the lower-dimensional table of coordinate.

In the figure 4, we show the simulation result. The result can reflect the truth that the multilingual corpus is different from the traditional corpus. The corpus of the multilingual corpus is more scientific and multi-lingual. The corpus of multilingual corpus is one of the main data sources of scientific corpus. The multilingual corpus includes multilingual science and general technology vocabulary, multi-language technology parallel corpus data resource, multilingual grammar resource library and so on. Among them, the vocabulary is one of the effective organization tools of the scientific literature resource information.

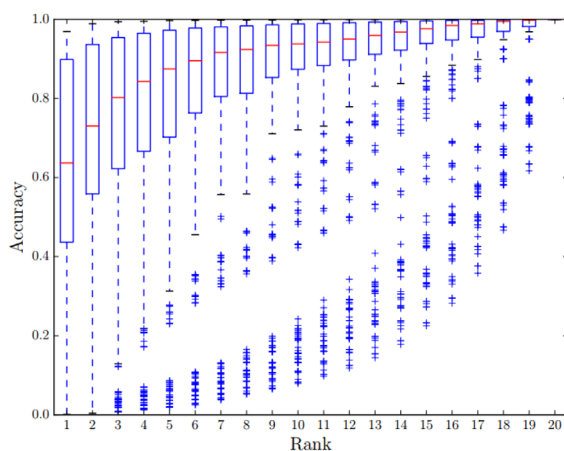


Figure 4 – The Simulation on the Performance of the Proposed Methodology

6. Summary and Conclusion

This paper proposes the research on the data aided English literature and culture corpus based on decision tree and natural language processing models. Along with the computer rapid growth of popularization with Internet, the information is also the explosion growth. The excessive growth of information brings certainly negative impact: Facing the great quantity information, it is hard for the information that discovers the true need. How to carry on the extraction, and to reorganize and to organize help inquiring the form of retrieval the information of massive disorder promptly accurately became the focal point of research development. In the NLP, the most essential issue is information extraction. Information extraction is based on an unknown natural language document as input that produces a fixed format, unambiguous output data process. We simplify the procedure by integrating the decision tree and the experiment result proves the effectiveness of the proposed method. In the future, we will collect more English document to extend the current simulation for testing the broaden effectiveness.

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A Novel ECG Signal Processing and Abnormal Heart Beat Classification Algorithm based on Particle Swarm Optimization (PSO) Model and the Neural Network

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Abstract: This paper proposes the novel ECG signal processing and the abnormal heart beat classification algorithm based on particle swarm optimization (PSO) model and neural network. Briefly, the electrocardiogram is the comprehensive electricity activity of the myocardial cell in the one reflection of body surface. Small electric current that the cardiac muscle activity produces may conduct the body surface after the tissue making the different parts of the body surface have the different electric potentials. From the signal processing perspective, how to classify the patterns is the essential work for the further processing. The PSO algorithm is one of colony intelligence optimal algorithm main representatives, because its principle and mechanism are simple and does not need the gradient information. The correct characteristics of the neural network sorter possibly are because the generalization ability and excitation function of the neural network have some saturation areas. With the integration of the mentioned two major techniques, we propose the revised wavelet based method. The experiment result proves that the proposed method can achieve satisfactory efficiency.

Keywords: ECG Signal Processing, Abnormal Heart Beat, Data Classification, Particle Swarm Optimization, Simulation

1. Introduction

The ECG analysis is the important means of current examination heart disease. The bio-electrical signal of human body is low frequency faintness signal under the strong noise background (Alickovic, 2015; Bortolan, 2015). In the ECG collection process, how to take the measure to filter the industrial frequency interferences of 60 Hz, the baseline wander caused the signal distortion disturbing wave to decide the final results analysis fit and unfit quality (Civicioglu, 2013). At the same time, in order to record enough useful signals, the ECG signal must be taken to a certain degree of compression processing, in the limited storage space to store more useful information to meet the actual clinical needs and reduce hardware costs (Chen, 2013; Oster, 2015). Briefly, the

electrocardiogram is the comprehensive electricity activity of the myocardial cell in the one reflection of body surface (Mukhopadhyay, 2013). Small electric current that the cardiac muscle activity produces may conduct the body surface after the tissue, making the different parts of the body surface have the different electric potentials (Gradl, 2012; Huang, 2015), records in the electric potentials body surface two points which will form a continual curve according to the heart excited time sequence, this is the electrocardiogram (the basis of the ECG). ECG signal is very weak it is very easy to be submerged in a strong noise signal. The traditional method of using the various filtering methods to process the ECG signal (Gawali, 2014; Ren, 2014), but this method in the short term low energy transient signal, after smoothing filter, not only the signal-to-noise ratio is not improved, but the signal position has also been blurred, these are fuzzy location information off transient it is very important for the analysis of ECG.

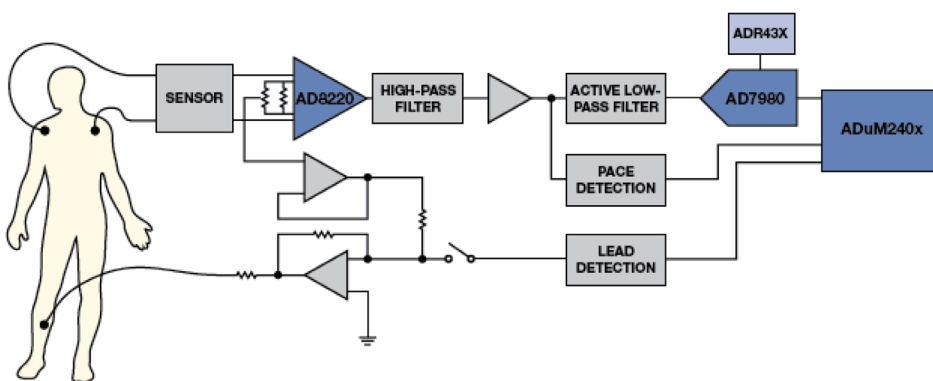


Figure 1 – The systematic architecture of the ECG signal processing extraction model

As shown in the figure one, we demonstrate the systematic architecture of the ECG signal processing extraction model. In order to enhance the signal-to-noise ratio, often uses the correlation method. The correlation method not only can examine the QRS wave, but can also withdraw QRS wave under the arrhythmia but it floats to the high frequency noise and base is very sensitive (Garg, 2013). If the form changes, it will not be best, but the ECG has the obvious time-variable and non-linear response that is very big regarding time-varying signal its profile and template difference with the possible omission, and therefore it has not grasped fully to treat examines signal certain priori information under the foundations, this method lacks the validity (Wang, 2014; Lino et al., 2016).

To deal with this drawback, in this paper, we conduct research on the novel ECG signal processing and the abnormal heart beat classification algorithm based on the particle swarm optimization model and the neural network.

2. The Particle Swarm Optimization (PSO) Model

Regarding the biological population, the individual can gains the information in the process of search food from the experiences and experiences of other community

members, when search unknown, the uncertain fragmentary distributed food and the superiority of this cooperation behavior is much greater than the pressure of the competition. Particle swarm optimization is a kind of evolutionary computation technology based on swarm intelligence. Its idea comes from the theory of artificial life and evolutionary computation (Rai, 2013; Duan, 2013). The PSO algorithm is one of colony intelligence optimal algorithm main representatives, because its principle and mechanism are simple and does not need the gradient information, the adjustable parameter are few, the algorithm is easy programming implementation, and operating efficiency is high, the convergence rate is fast (Yu, 2013). Therefore the PSO algorithm since publication has caught wide attention. After several years of research and the development, the PSO algorithm had been widely used in the function optimization, multi-objective programming and the neural network training, the fuzzy system control and other domains with satisfactory and result and has put forwarded enough modifications.

The basic concept of PSO stems from the study of bird predation behavior, people from the bird prey model was enlightened, and as used to solve the optimization problem. In PSO, the solution to each optimization problem is a bird in the search space which is called a particle. All particles have a fitness value that is determined by the optimized function, and each particle has the velocity that determines the direction in which they fly and the distance. PSO indicates each possible solution for a particle in group, each particle has own position vector and velocity vector, with one by the sufficiency of objective function decision, makes various granules swim to the sufficiency function value highest direction group through the similar gradient descent algorithm. Each particle evaluates the merits of current position of the particle by an optimization function related to the objective function, and then iteratively finds the optimal solution or approximate optimal solution and in each iteration the particle updates its speed and position by tracking two “extremes”.

The PSO algorithm can be described as follows. Suppose we are in the n dimension searching space, the group $X = \{x_i\}$ is consists of m particle, the i -th particle's location and velocity can be defined as formula 1 and 2, respectively.

$$x_i[\text{location}] = \{x_{i1}, x_{i2}, \dots, x_{in}\}^T \quad (1)$$

$$v_i[\text{velocity}] = \{v_{i1}, v_{i2}, \dots, v_{in}\}^T \quad (2)$$

Each iteration of the particle update itself by updating the individual extremum and the global extrema. The update paradigms are defined as follows.

$$v_i(t+1) = w \times v_i(t) + c_1 r_1 \times (p_i(t) - x_i(t)) + c_2 r_2 \times (p_g(t) - x_i(t)) \quad (3)$$

$$x_i(t+1) = x_i(t) + v_i(t+1) \quad (4)$$

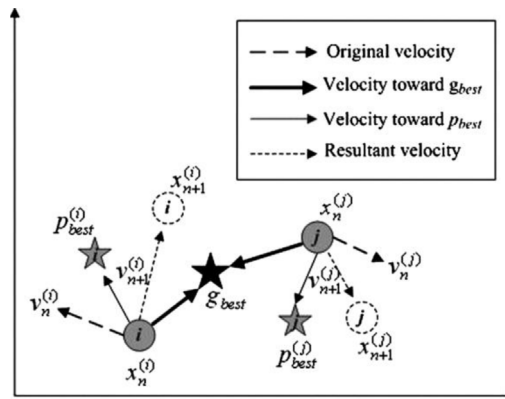


Figure 2 – The training steps of the particle swarm optimization algorithm

As shown in the figure 2, we illustrate the training steps of the particle swarm optimization algorithm we can therefore summarize the features of the basic PSO as follows. (1) The convergence speed is fast. In the iterative evolution, only the best particles pass the information to other particles which belong to the unidirectional information flow. (2) Has the memory, the historical best position of granule and community to remember and transmit to other granules. The parameter that must adjust are few, the structure is simple and is easy to realize. (3) With the decimal code that is decided by the solution of issue directly, the variable number of issue solution directly as granule dimension.

We need to optimize the PSO to achieve for the better performance. The granule renewal algorithm can potentially be modified based on the listed guidelines.

1. For in the middle of the difference. In the thought of the organic evolution survival of the fittest according to the nature, with increase of population evolution algebra, the average adaptation value of population will increase at the big probability. Like this under the elite algorithm condition, there is a reason to suppose the adaptation value of population with increase of the evolution algebra, but increases monotonously as random selection bodies from neighboring two generations or several generations of the population, then the difference of the two individuals represent the direction that the population adaptation value increased at the certain probability that is the evolution direction that hopes.
2. Compiler principles. Variation in nature or breeding is one of the reasons for the emergence of new varieties, the variation may be a good direction to develop and it may be the opposite. The mutation operation can effectively guarantee the diversity of information in the population and avoid falling into the local optimum.
3. Diffractive optical element. From perspective of organic evolution, the final outcome of although evolving is makes the species to most adapt to the direction of environment develops, but inherits and intermediate result of evolution by no means always fine that might also appear in the process of evolution is worse than the improved seed individual, they cannot certainly exclude from the species, but should be in species whole and this point has been reflecting the thought of diffractive optical element.

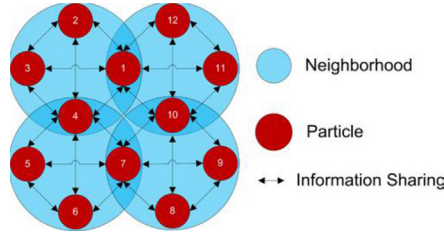


Figure 3 – The optimized PSO with the jointed area information

In our modification strategy, we need to integrate the area information. The inertia weight w is an important parameter in the PSO algorithm and is used to adjust the degree to which the particles have affected the present. And a good inertia weight adjustment strategy is: the early stage of the evolution uses a larger inertia weight, while the latter uses a smaller inertia weight. Because the larger inertial weight can enhance the overall exploration ability, and the smaller the weight can improve the local excavation ability. To balance the weight, we update it as follows.

$$w = (w_{\max} - w_{\min}) \times \exp\left(-\beta(t / T_{\max})^2\right) + w_{\min} \quad (5)$$

3. The Neural Network based Signal Classification

3.1. The Traditional Signal Classification Methodologies

Traditional data classification algorithm has achieved success in basic applications, the traditional two-class SVM has been applied to a large number of the practical applications such as digital recognition, face recognition, etc. It has been proved to be a good classification machine learning algorithm for small sample classification problem. A class of support vector machines, originally proposed by Harry et al. that was used to estimate minimum area containing the samples, and probability of occurrence of the samples outside the determined region is very small. Specifically, original spatial data are implicitly mapped to the high-dimensional feature space through the kernel function, and then the hyperplane is constructed such that the sample data is separated from the origin of the feature space as much as possible, one class of problems in the original space is transformed into two kinds of SVMs in the feature space. The kernel classification function can be listed as below.

$$Kernel(x, x') = \exp\left(-\|x - x'\|^2 / 2\sigma^2\right) \quad (6)$$

$$f_{classification} = \sum_i \alpha_i k(x_i, x) - \rho^* \quad (7)$$

In KFDA, the choice of kernel function is important, designs whether directly affects the classified effect appropriately. So long as although satisfies the Mercer condition function to elect for the general kernel function theoretically, but the performance of some different kernel function sorter is completely different. When chooses Gauss RBF kernel function, so long as chooses the appropriate parameter, the limited sample can always be been linearly separable in the feature space, therefore this article chooses the Gauss RBF kernel function as the kernel function of sorter, the expression is shown as the follows.

$$k(x, x') = \exp \left[-\frac{\|x - x'\|^2}{\sigma^2} \right] \quad (8)$$

For the KFDA in regularization coefficient C, it also needs to be chosen to achieve highest classification accuracy. The commonly used parameter selection method of K-fold crosses validation method, steepest descent method, genetic algorithm and ant colony algorithm. The K-fold cross validation method is an unbiased estimate of the generalization error, its essence is through the training model in the training set, which has the certain accuracy and has good generalization performance. The distinction number of OAR method is K, because each criterion function needs all samples to participate in the training, therefore the support vector number in each criterion function is biggest. But in the OAO many kinds of classifications each criterion function only needs two kinds of samples to participate in the training, the support vector number of each criterion function is smallest. Figure 4 illustrates the mentioned optimal function finding procedures.

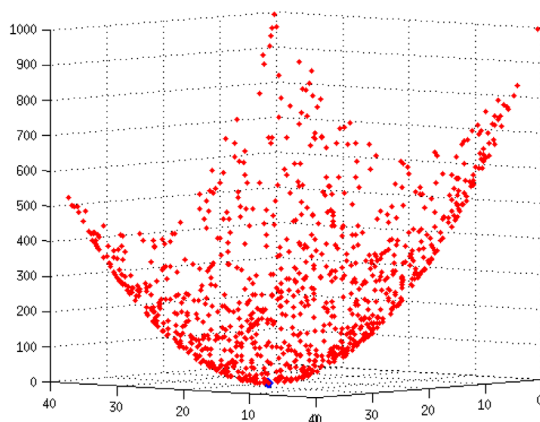


Figure 4 – The reduced high dimensional data classification illustration

3.2. The Neural Network based Signal Classification

The one most commonly used application of general neural network is the pattern classification. The correct characteristics of the neural network sorter possibly are because the generalization ability and excitation function of neural network have some saturation areas. However most neural networks are the neuron constitution by use two-

level excitation function, the output of this excitation function only has two saturation areas. However, in the neuron can also use to have the excitation function of saturated rank, at this time this neuron was also called the multistage neurons. Each sub-network in the network is only trained only by the two modes corresponding to its row and its corresponding column. In the recognition, a sub-network is judged as a pattern A instead of the pattern B. We can only understand that the sub-A instead of Mode B. Thus each sub-network cannot determine the mode, but can exclude another mode and the corresponding pattern. Under this basic guidance, we propose the multi-layer pattern as the follows.

$$f(net) = \frac{1}{L} \sum_{r=1}^L f_s(\beta(net - \theta^r)) \quad (9)$$

For the classifier, it is important that the output values of the output layer neurons lie in the saturation region. So when the input mode becomes fuzzy, the output of the neural network classifier will not change greatly, that is, the output is not very sensitive to the input, which is also very important for the classifier. For accuracy concern, we take the rough set theory into basic consideration. Minimal attribute reduction set B set to the original condition attribute, regardless of any property removed from the B, are likely to cause the whole universe U reduced reliance, and decrease indirectly reflects the important degree of attribute importance that can be any attribute according to the definition in B.

$$\Delta = \frac{card(Pos_B(d))}{card(U)} - \frac{card(Pos_{B-\{a_p\}}(d))}{card(U)} \quad (10)$$

Uses rule that the random unearths to help to construct the BP neural network for decision-making. The regular antecedent refers to some condition correspondences the neural network input level and the consequent refers to conclusion some output levels of correspondence as each rule is equal to an implicit strata node. This time rule after the knowledge of straight run, eliminated the information of redundancy and disturbance, the dimension of input vector greatly reduced, making the neural network the training price reduce, and was helpful to reducing fitting phenomenon.

4. The Proposed ECG Signal Processing and the Abnormal Heart Beat Classification Algorithm

4.1. ECG Signal Processing Paradigm Demonstration

The traditional frequency range de-noising method uses the Fourier transformation then maps the entire quite territory generally the signal through a filter of low-pass or bandpass. But because the Fourier transformation does not have the topicality, therefore throws over after the filtration image enhancement that not only the signal-to-noise ratio cannot be improved, the CI of signal was also blurred. Wavelet analysis is a new method of general signal frequency analysis appears when it has characteristic of multi-resolution can handle the non-stationary signals like ECG signals. The wavelet de-noising

method of wavelet threshold denoising mainly and modulus maxima de-noising while the modulus maximum primary value method of computation and convergence of non-linear wide slow. Method of calculation is small that can effectively remove the noise in the signal singularity at the same time as it has wide adaptability and the general originality.

For the wavelet analysis, the basis selection is the essential issue. Most signals R peak strange, because the R wave has certain frequency range. R wave ridge strange characteristics and a high frequency noise peak irregularity differ from. Separate DYWT can describe the irregularity of signal singular point approximately, based on this can use it to differentiate the R wave and high frequency noise. There are many kinds of base of wavelet analysis. In the process of noise reduction, the selection criteria are usually from the following aspects: (1) self-similarity principle, if the selected wavelet has a certain similarity to the signal, the transformed energy will be compared; (2) support the length of the signal for the local analysis requires wavelet function in time domain with the tight support; (3) symmetry in image processing to avoid the significant phase shift; (4) regularity, the signal or image reconstruction to obtain smooth The effect is very useful.

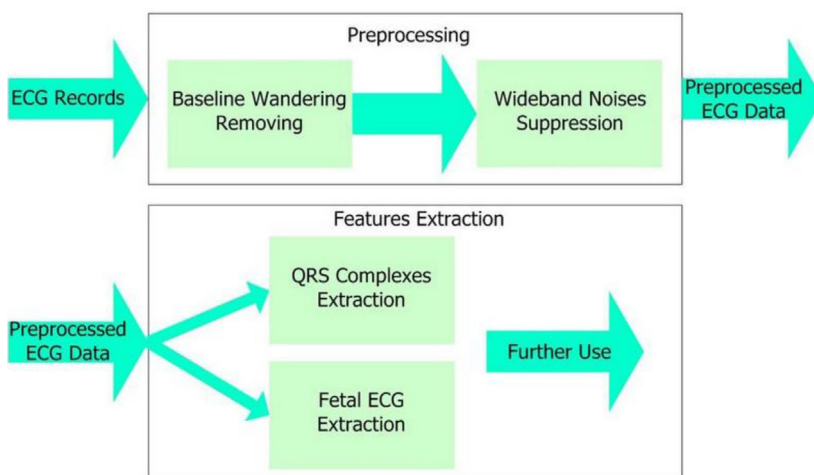


Figure 5 – The ECG signal processing systematic flowchart

4.2. The Abnormal Heart Beat Classification

Wavelet transform is the common method of classification, but it cannot effectively improve the accuracy of the partial classification, even the loss of some key special cylinder. The Gabor transformation is a time-frequency domain method, may show that at temporal frequency from near time-frequency characteristics that often was used in the compression and feature extraction of signal. Therefore, in this paper, we conduct research on the novel Gabor based system. The significance that Gabor launches is primary function can construct to causes it is easy to locate and gather to the time and frequency highly. From now on, it launches coefficient may the display

signal fall frequency nearby time-frequency characteristics. In the formula 11, we show the transformation of the Gabor model.

$$c_{m,n} = \sum_{k=0}^{L-1} x(k) \chi^m(k - mN) W^{-nK} \quad (11)$$

Pats when to the heart the sample enters the young Gabor transformation needs to choose appropriate comprehensive window. The Gauss function had guaranteed the time domain and frequency range energy comparatively is quite centralized that may obtain the best time and best frequency resolution. In addition to the feature based on the Gabor transform, the continuous two QRS waves of the RR period is another important feature, which describes the location of many heart pumping R waves in many cardiac the arrhythmias. Gabor transform coefficient and RR period together constitute characteristics of the. Classification performance is evaluated based on sensitivity, specificity, and overall accuracy. Sensitivity is defined as the percentage of abnormal heart beat that is correctly classified. Specificity is defined as the percentage of normal beat that is correctly classified. Accuracy is defined as the percentage of the heart beat that is correctly classified.

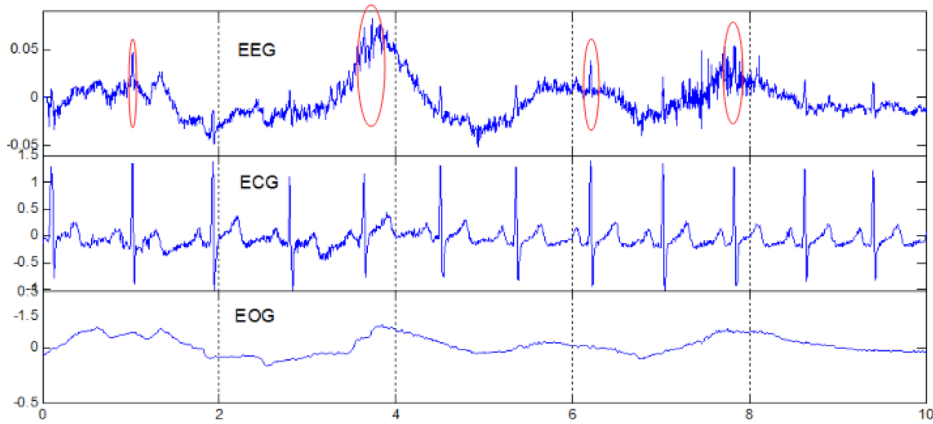


Figure 6 – The simulation on the propose methodology

In the figure 6, we show the simulation on the proposed methodology. First calculates the Gabor conversion coefficient that each heart pats, this kind of 155 point heart patted the sample to turn into the 1875 point Gabor transformation signal while because in the real part of Gabor conversion coefficient symmetrical distribution, the feature selection was limited in the first 955 coefficients searches. RR that chooses the coefficient and current heart shear after the special cylinder to ask that the time constitutes the characteristic vector as the input of general sorter together. Most close neighbor method is a powerful non-parameter sorter, does not need, no matter what serves the time-consuming training step to knock does not need to redesign the sorter in the character subset of each choice. The above results show that the Gabor transform can extract the features better, as but

the Gabor transform coefficients have information redundancy, which is not conducive to classification. Therefore, in the order to improve the classification accuracy, Gabor transform coefficients must be selected.

5. Conclusion and Summary

This paper proposes the novel ECG signal processing and the abnormal heart beat classification algorithm based on particle swarm optimization (PSO) model and the neural network. ECG is a reflection of the cyclical activity of the heart an important indicator in the clinical widely used. The current ECG detection equipment has not only limited to the ECG graphics records, and the ECG digital acquisition and automatic analysis, thereby improving the analysis speed and accuracy, reduce the work intensity of the doctor. Ectopic origin of general motility, frequency changes, conduction abnormalities or pacemakers is likely to cause arrhythmia. Arrhythmia classification is one of the important contents of ECG computer analysis. Under this basis, this paper proposes the novel perspective on the ECG signal processing and that the abnormal heart beat classification algorithm. The proposed method combines the PSO and neural network to optimize the wavelet. The simulation result proves the effectiveness of the method. In the future research, we will integrate more machine learning algorithm to enhance the robustness.

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Construction and Simulation on Stock Price Forecasting Model based on Fundamental Analysis and Technical Analysis

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Abstract: At present, the residential numerous researchers on the relationship between the Chinese stock business sector and large scale economy have carried on the exact examination. They utilize an assortment of strategies, a few conclusions. Study on this topic, most importantly, on the current exploration and examination on different perspectives. On this premise, the creator select sensible macroeconomic variables for shares index investigation and displaying. As the observational investigation, the creator in view of the granger causality test in econometrics and drive response function examination and fundamental investigation techniques to check this model. This recommends china's stock business sector is profoundly delicate to the nation's industrial production. Money supply, inflation, and exchange rates are different determinants of china's stock index yet to a lesser degree than industrial production. The study found that the macroeconomic variables involving industrial production, inflation, money supply, and exchange rate are cointegrated on the long keep running with stock business sector costs. These discoveries have suggestions for the strategy producers as in any adjustments in the macroeconomic approach ought to think about the effect of such changes on the stock business sector. This paper constructs the overall research on the model and conducts experimental analysis.

Keywords: Stock price; Macroeconomic; China; Cointegration; Modelling and Simulation; Fundamental Analysis; Technical Analysis

1. Introduction

Stock business sector assumes a critical part in the monetary advancement of the nations. It helps in exchanging the assets from surplus units to shortfall units. As the stock business sector performs positively, the economy is relied upon to develop. Moreover, both monetary and budgetary speculations contend that stock costs are influenced by the execution of fundamental macroeconomic variables. Understanding the elements that impact the conduct of stock markets have for some time been discussed by financial experts, strategy creators, and other invested individuals (Demirer, 2015; Adam, 2016). This is because of the centrality of stock business sector conduct to the whole economy

and financial advancement of regions (Drake, 2015). There are broad studies on the effect of macroeconomic variables on stock markets in created market with a developing assortment of writing on rising and creating nations.

This study investigates the relationship between stock business sector and full scale financial pointers with regards to China. China's stock business sector is viewed as the most dynamic and biggest stock business sector in Africa and among the biggest and most critical markets on the planet. As needs be, understanding the determinants of its conduct is vital for strategy creators, financial specialists, and different partners.

As China's stock business sector keeps on experiencing specialized changes, which likely expands the proficiency of the core business sector in this way expanding its response to macroeconomic occasions, there is a need to explore the effect of macroeconomic variables on stock costs in perspective of the on-going changes (Antoniou, 2015; Korhonen, 2016; Lino et al., 2016). The studies that inspect the issue with regards to China have been directed utilizing obsolete information and subsequently may not catch the effect of significant changes made in China. Additionally, concentrates on that have been embraced in China concentrated on one variable and its cointegration with stock costs, while this study will consider the various variables including inflation, money supply, exchange rate, and industrial production and its effect on China stock costs (Jegadeesh, 2015; Nguyen, 2015).

Our utilization of the time arrangement procedure will add thoroughness to the consequences of the study. In that capacity, this study expects to give new confirmation on the relationship between stock costs and monetary determinants. The outcomes would have suggestions for legitimate bodies and different partners.

2. Related Work and Literature Review

An extensive variety of the studies have been embraced to decide the monetary strengths that impact stock markets. Despite the fact that there are developing studies on rising and creating markets most have concentrated on created nations. Tailing this study, different studies discovered uncertain results on the relationship between stock costs and macroeconomic variables.

Analysts inspected the long run relationship between stock costs in Singapore and an arrangement of monetary variables including the exchange rate, money supply, inflation, and industrial production. They found that the stock business sector index shapes a cointegration association with changes in the short and long haul financing cost, industrial production, costs levels, exchange rate, and money supply (Raghavan, 2015; Sim, 2015). Different studies in created regions found a long run relationship between large scale financial variables and stock costs.

Thinks about in creating and developing markets have become quickly in the most recent couple of years. Scientist analyzed the relationship between stock costs and exchange rates in Mexico utilizing the Granger causality test. The analyst recorded that stock costs lead exchange rates in the short keep running with no long run relationship between these two variables (Stošić, 2015; González, 2015; Nardo, 2016). Correspondingly, the scientist examined the relationship between macroeconomic markers and stock costs

in Pakistan. Their outcomes inferred that stock costs cointegrated with industrial production. In any case, no causal relationship is reported with other macroeconomic variables. The specialist inspected the involved acquaintance between stock costs and inflation, exchange rate, industrial production, and money supply to find that there is for quite some time run causality between those determinants and stock costs in Turkey and the analyst examined the same issues and found a cointegration relationship among macroeconomic variables and stock costs.

To the extent China is concerned, analyst tested the impact of financial key or drivers of stock return in China, embracing cointegration and blunder amendment systems and using quarterly information all through the 1990 to 1995 period. The finding of the study uncovered that the stock business sector is impacted by financial development and different variables, for example, exchange rate and loan fee. Exchange rate has a positive association with stock costs and genuine GDP and is contrarily identified with financing cost. The vector autoregressive (VAR) procedure was utilized and the outcome reported that stock returns for the most part take after the industrial divisions.

Aside from the above two studies, scientist examined whether there is a relationship between stock return and macroeconomic variables utilizing Markov's exchanging model. The discoveries archived that stock return is affected by monetary variables. Taking after these studies, there was inadequate writing on this issue that particularly explores that utilized late information. Among the late investigates is in China utilizing the auxiliary bivariate vector autoregressive technique. They tested the long run relationship amongst inflation and stock costs. The outcomes showed that stock costs are invariant to lasting changes in inflation rate. The motivation responses uncover a positive genuine stock value response to a perpetual inflation stun over the long haul which infers that any deviations in short run genuine stock costs will be revised towards the long run esteem. Moreover, it has been found that there is cointegration relationship between China stock costs, different exchange rates.

The information utilized as a part of writing on China were exceptionally old information and along these lines, examining such an issue by utilizing late information could add new confirmation to the relationship between stock business sector and the macroeconomic variables. As the few studies on China utilized information before 2005, this study will fill the hole by looking at the effect of macroeconomic variables on stock returns utilizing late information and utilizing cointegration and the Vector Error Correction Model (VECM). Further, it is clear from the writing survey that the issue of causality between stock business sector execution and financial determinants has stayed uncertain both hypothetically or for all intents and purposes and therefore, the paper adds to writing on stock costs and its determinants by giving new confirmation to invested individuals, for example, the legislature and speculators.

3. The Propose Methodology

This revision examines the effect of certain financial variables portrayed in a past area on the stock business sector conduct of China utilizing month to month information for the period somewhere around 1995 and the year 2005. To accomplish this goal, the study utilizes time arrangement methods or vector Auto-relapse system. By embracing

such of the procedures, it is contended that the shortcoming of conventional relapse can be overcome. Utilizing time arrangement technique which incorporates granger cointegration, mistake revision model, and difference decay, scientists would be better ready to consider the issues confronted in the relapse. The principle issue of relapse focuses on the possibility that monetary variables are non-stationary and henceforth the consequences of t-test and f-test could be invalid. Specialists attempted to take care of such issues by separating the variables. Nonetheless, such a general methodology has another ramification on the information as it will expel the long run relationship or the hypothetical part. Aside from the over, the use of this strategy arrangements and record for the issues of endogeneity, as it can be managed in an appropriate way and thusly the variables are viewed as endogenous and the information will figure out if the variable is endogenous or exogenous. The vector autoregressive strategy involves a few stages including Element origin test, cointegration test, Error Correction Model, Impulse Response Function diligence profile. The significance of these tests is quickly depicted in the following areas.

1. **Vector error correction model.** Once the creator affirm that there is a long run relationship between the variables as demonstrated from the past stride, Vector Error Correction Model comes to assume another part in deciding the erogeneity of the variables under scrutiny. This strategy is another way to deal with explores the relationship among variables and decides the course of Granger causality in the short and long run. For instance, ECM joins the short and long run connections of the variables in one condition.
2. **Testing the cointegration and broadened operational displaying.** As per the analyst cointegration assumes a crucial part in deciding the nearness or nonattendance of Granger causality. This test is helpful for evaluating a long-run relationship between arrangements macroeconomic. On the off chance that two or more variables are observed to be non-stationary, the direct blend of these variables is destined to happen. Two variables are said to be cointegrated when they encounter long run relationship. Once the evaluated the cointegration vector is resolved, it is subjected to correct recognizable proof and over ID limitations in view of hypothetical desires and earlier data of the general business sector. It runs hypothetical relationship and guidelines out any spurious relationship.
3. **Variance decomposition.** This should be possible by dividing the basic difference of estimate blunder of a variable into extents owing to stun in that every variable in the framework including its own. The variable that clarifies its own stun more than others is viewed as a main variable and the variable that clarifies less of its own stun is viewed as an interim variable.
4. **Information, empirical results and discussion.** As specified already, goal of this study is to figure out if the monetary variables under scrutiny impact the conduct of China's securities exchange. The variables of the study incorporate the share trading system file of China (IC), cash supply (MS), expansion (IN), swapping scale (EX), and modern making (IM).
5. **Determining the request of the vector autoregressive.** The second step in time arrangement cointegration is that the vector autoregressive request ought to be chosen. There are diverse techniques for choice of the vector autoregressive or the quantity of interims to be utilized when the test of the

core cointegration is directed. The dependable guideline in this progression is to choose the greatest quality under every technique which gives the request of the interims.

4. Simulation and Experimental Discussion

Result of basic testing for the unit root: performing stationary/non-stationary test requires that the variables are changed to log for the level and afterward to take the distinction of log structure. We consider the following parameters.

CSI = log (index of China); L (cash supply) = log (money supply); LINFL = log (inflation); L (modern making) = log (industrial making); L (swapping scale) = log (exchange rate). At that point the creator needs to distinction as takes after basic distinction (CSI) = CSI - CSI(- 1); DL(money supply) = L(money supply) - L(money supply) (- 1); DINLF = LINLF - LINFL (- 1); DL (mechanical making) = L (modern making) - L(industrial making) (- 1); DLEX = L (swapping scale) - L (conversion standard) (- 1). The outline of the variables and the aftereffects of Augmented Dickey-Fuller are appeared in Table 1.

Taking into account Augmented Dickey-Fuller, for the level structure and contrast for appeared in Table 1, all variables are I (1), which proposes that the invalid theory of the variables are stationary is bolstered for all variables.

Determination the request of vector autoregressive: this progression decides the ideal request for the vector autoregressive. At this stage, it is vital to choose a sufficiently high request as in with certainty the ideal request won't surpass it. Thus, Intervals 6 was gone into the vector autoregressive request. Along these lines, the consequence of the test chooses vector autoregressive request of 2 has been chosen as the interims request for the vector autoregressive.

Cointegration is led taking after the determination of vector autoregressive. This figures out if there is cointegration among the variables. In light of confirmation from various markets, there is no less than one cointegration condition. Multivariate with vector autoregressive request 2 is utilized to acquire the outcomes in light of "eigenvalues" and the "follow" insights to decide the estimation of cr which is known as the cointegration relationship. In the event that cr = 0 is acknowledged, there is no cointegration among the variables. On the off chance that cr = 0 is rejected, there is cointegration among the variables.

Long run auxiliary condition displaying (LRSM): long run auxiliary condition displaying is an imperative expository stride as in the creator can contrast the hypothetical desire and the produced insights. As it were, Long run basic condition displaying permits assessing the long run model in light of hypothesis by forcing recognizing and over distinguishing the parameters. Since the principle reason for the article is to find out the impact of monetary variables on the China stock file, the writer force confinements on the CSI or China stock list.

The dismissal of the confinements implies that the variables entered the cointegration relationship altogether. To check the power of confinements, the scientists forced limitations for every variable independently. To abridge the consequences of those extra

confinements, and the related limitation is legitimate for expansion and mechanical making while the different limitation on cash supply is not substantial. The confinements on expansion and mechanical making are rejected and thusly, the two variables enter the cointegration relationship essentially. As to cash supply limitations, they can't be rejected with Chi-Square of 0.7 and along these lines the creator need to drop that variable. Notwithstanding, in view of the hypothetical underpinnings, the effect of cash supply on the share trading system conduct and exact proof reported by writing, the specialist likes to continue with vector 1 for the indication of the paper.

Vector Error Correction Model shows additional data on the relationship between variables. Cointegration does not tell the bearing of Granger causality as to which variable is endogenous and which is exogenous. Along these lines, Vector Error Correction Model is utilized to uncover which variable is needy and which is autonomous. Table 2 compresses the aftereffects of Vector Error Correction Model. Figuring out which variable is endogenous and which exogenous can be surmised from the table. Strategy producers and related gatherings are in a position to better distinguish the ranges justifying more noteworthy core interest. Table 2 demonstrates that CSI or securities exchange conduct is a reliant variable as indicated by T-proportion of more than 2, of course. Cash supply and modern making are autonomous variables. In conclusion, conversion standard and swelling are reliant variables.

Change deteriorations (VDCs): the consequences of the past stride can't clarify the relative endogeneity and endogeneity of the variables. Accordingly, the Variance disintegrations are intended to make determination on such a matter. There are two sorts of Variance deteriorations tests. The first is the orthogonalized conjecture mistake change disintegration and the second is summed up gauge blunder fluctuation deterioration. Table 3 demonstrates a rundown of the outcomes from orthogonalized estimate mistake fluctuation deterioration. The most driving variable is the Industrial generation which affirms the consequences of Vector Error Correction Model in which modern making is an exogenous variable clarifying around 87% of its own stuns. This is steady with the hypothesis and past observational confirmation from different nations. China as a mechanical nation is developing quickly in this field and this could be because of the progressions made in the political climate and in addition the nation's notoriety in the gold business. Along these lines, the suggestions are that the business sector responds to modern occasions delicately.

Impulse response function (IRF): the aftereffects of Variance decompositions are like the consequences of motivation response function. In any case, in the Impulse response function, the outcomes are delineated in graphical structure. The made determination from all graphical representation of the stun in any variable is that industrial production (LIP) is the main variable that does not respond to different stuns in variables. Be that as it may, when it is stunned, every single other variable respond emphatically and adversely showing its erogeneity. The response at stock costs to the stun on different variables fluctuates as indicated by the way of the variable.

For instance, CSI or China stock costs respond emphatically to stuns in money supply showing the positive relationship between both variables as demonstrated by hypothesis

which expresses that entrance liquidity will prompt expanding the interest at stock costs over the long haul. Inflation and stock costs demonstrated to have a negative relationship over the long haul. Generally speaking, all variables are cointegrated over the long haul and not in the short keep running as showed by Vector Error Correction Model and therefore, the stun of one variable differently affects the cointegration relationship as a portion of the variables respond delicately while others don't.

Determination profile: this test is intended to show to what extent the whole cointegration condition takes to come back to harmony when the framework is stunned. Figure 1 demonstrates the framework wide stun result and it is graphically demonstrated that it takes around two and half years or 30 periods in months to come back to balance.

Variable	Stationary/non Stationary variables	
	Variance form	Equal form
<i>Inflation</i>	Stationary	non Stationary
<i>Money Supply</i>	Stationary	non Stationary
<i>Industrial Marketing</i>	Stationary	non Stationary
<i>Exchange Rate</i>	Stationary	non Stationary

Table 1 – The stationary/non stationary variables

Variable	Inference
<i>Inflation</i>	Variable is endogenous
<i>Money Supply</i>	Variable is endogenous
<i>Industrial Marketing</i>	Variable is endogenous
<i>Exchange Rate</i>	Variable is endogenous

Table 2 – The consequences of vector error correction model

Variable	Inflation	Money supply	Industrial marketing	Exchange rate	Total
<i>Inflation</i>	90%	5.1%	9.9%	1%	100%
<i>Money Supply</i>	1.1%	97%	1%	9%	100%
<i>Industrial Marketing</i>	4.2%	9.7%	91%	1%	100%
<i>Exchange Rate</i>	1.4%	2%	1.6%	9.5%	100%

Table 3 – The summary of the results from orthogonalized forecast error variance decomposition

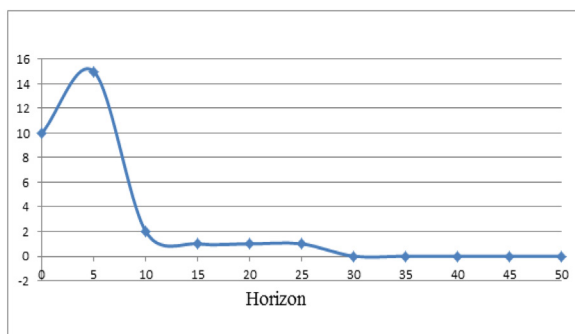


Figure 1 – The simulation on the proposed determination profile

5. Conclusion

This study utilizes a period arrangement system contained cointegration, blunder remedy displaying, and difference decay to achieve exact confirmation of the way of relations between stock costs and macroeconomic variables. The discoveries uncovered that the China market framed huge associations with every single macroeconomic variable incorporated into this study. Definitely, the China stock business sector is more delicate to industrial production than different variables in this manner highlighting its significance. The outcomes are reliable with past studies. Earlier studies have contended that the economy of a nation depends straightforwardly on the gathering of genuine resources, which thus adds to the capacity of firms to generate money streams and consequently influencing the cost of stocks. Money supply demonstrates it's huge in influencing the stock business sector, which can be connected the expanding in the liquidity and the henceforth accessibility of money to purchase securities, which pushes stock costs to ascend. As obvious from the concentrate, such a basic relationship is viewed as a long run relationship. The nearness of cointegration backings the rivals of effective business sector speculation in which they contend that the business sector mirrors the accessible data. This study would manage China strategy creators toward reassessing their approaches with respect to those macroeconomic variables and their impact on the stock business sector. The approach creators ought to think shrewdly when choosing to adjust or change their arrangements in regards to the macroeconomic variables. They ought to know that any basic adjustments in their approaches would have influence the stock business sector. At long last, it is advantageous to note that the study has a few restrictions because of the issues experienced in time arrangement, for example, the request of interims choice and its effect on different results. Different streets of exploration could be in building up a model to anticipate the above relationship utilizing non-direct strategies.

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Analysis and Modelling on the Green Building Integration System under Computer Simulation Background

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Abstract: This paper conducts theoretical research on the analysis and the modeling on green building integration system under computer simulation background. With the emphasis on building energy-saving emission reduction around the work, green building gradually from the beginning of scattered demonstration cases, to the film development and construction, large-scale promotion of the direction of development in many areas have been planned to build green buildings require all the buildings to achieve green building star standard. To meet with this challenge, low-carbon buildings are analyzed from seven primary aspects, such as outdoor environment planning, building body characteristics, energy management, material utilization, water resources utilization, low-carbon management, innovation and technology, covering grading index, rational transformation and the quantitative calculation and comprehensive comparison, a low-carbon building to give the comprehensive evaluation of the degree. By utilizing the Java and the computer system, we implement the system and in the future we will test the performance.

Keywords: Green Building; Analysis and Modeling; Computer Simulation; Background; Integration System; Computer Modeling

1. Introduction

Increasingly huge building energy consumption and damage to the environment is more and more cause the attention of the public, building the ecological energy saving has become the important task.

The low carbon economy based on the low energy, the low pollution and the low emission economic development model is the human society after the agricultural civilization and the industrial civilization once again historical breakthrough, thus promotes human society the new times of development trend low carbon economy green civilization (Aaltonen, 2013; Das, 2015). About ecologically-safe building and ecologically-safe building energy-efficient concept can be summarized as the listed categories.

1. **Ecological building energy saving.** The energy-efficient technological principle through the regeneration and the other measure reduction energy consumptions enhances the energy the efficiency, and makes full use of the

renewable natural resources (Chen, 2013). In the architectural design of the combination of different climate characteristics, according to the laws of the sun and the formation of wind laws, the use of solar energy and ventilation and other energy-saving measures to reduce the consumption, application materials, heat storage and insulation properties to improve the maintenance of the thermal insulation and thermal insulation with the use of solar heating in winter, summer cooling, through the shade facilities to prevent subordinate overheating, and ultimately improve comfort of the indoor environment.

2. **Eco-buildings.** The construction has the life organism as one that must form one with the ecology phase equilibrium circulation system. It will construct as ecological systems, organizes various state of matter factors in building inside and outside spaces through the design making the cyclic utilization of material energy constructing the ecosystem orderly, obtains one type highly effective, low consumption, to be little waste, few dirt and architecture environment of ecological equilibrium.

With the emphasis on building energy-saving emission reduction around the work, green building gradually from the beginning of scattered demonstration cases, to the film development and construction, large-scale promotion of the direction of development in many areas have been planned to build green buildings require all the buildings to achieve green building star standard (Eichholtz, 2013; Fuerst, 2014). The sustainable development request green city balances relations of urban and nature, person and environment in the macroscopic and basic microscopic level. New technology rapid development represented by news technology that subverts the traditional urban space function optimization layout concept thoroughly broke through the series sole chain link-type organizational connection the information, logistics and that supply to the distribution of demand because of news, and day by day recombines and network (Gigone, 2013; Lino

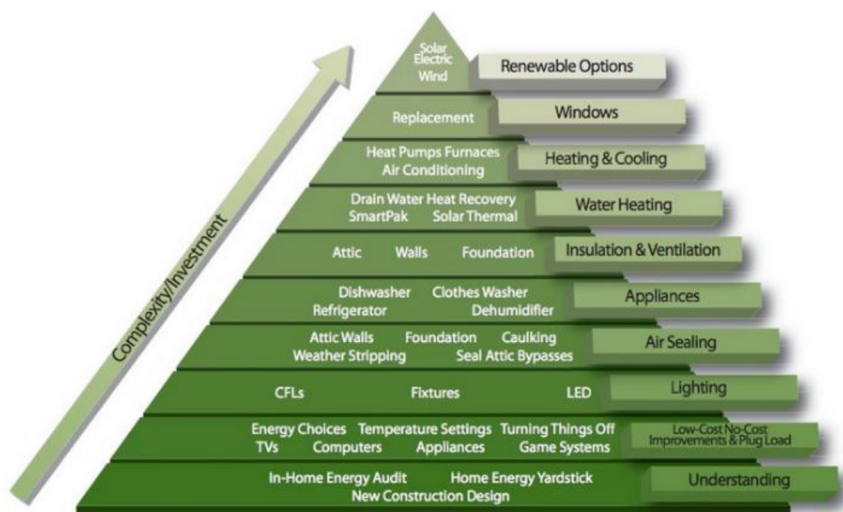


Figure 1 – The components of the modern green building

et al., 2016). The scale collective effect superiority of relatively sole physiographic region also gradually and spends the network to substitute by the scattered globalization and the personalized supply (Hess, 2012; Inkoom, 2016). From the perspective of ecosystems and green cities, green buildings have evolved from end users subject to urban functional arrangements to those with the ecological value, energy and the resource acquisition and processing capabilities, functional complex integration, spatial adaptation diversification, and sustainability and the recycling function to enhance the carrier (Wang, 2012). In the following figure one, we show the components of the modern green building.

In this literature, to utilize the advantage of computer system on the modern green building construction, we conduct research on the analysis and modelling on the green building integration system under the computer simulation background. The rest of the paper is organized as the follows. In the section 2, we summarize general characteristics of the green building. In the section 3, we analyze the intelligent based construction from the angles of the computer building integration, Java MIS and the technique management. In the section 4, we propose the construction assessment model and the modified flowchart. In the section 5, we summarize the whole paper and conclude the work.

2. The Review Analysis of the Green Building

Since the sustainable development view has established during more than 20 years, the domestic and the foreign green building implements the operation to maintain various aspects to achieve the remarkable achievement from the design, technical research and development and construction, the green building idea has struck root in the hearts of the people day after day, its construction quantity and quality have greatly improved (Lee, 2013; Hojem, 2014). Low-carbon building refers to the building materials and the equipment manufacturing, construction and building use throughout the life cycle to minimize greenhouse gas emissions, low-power, low pollution, low emissions, based on the user to provide livable the architectural pattern of space.



Figure 2 – The general architecture of the green building model

The future green building should be based on the practice of contemporary green building to further adopt the following strategies to expand the scale of practice, and integration of regional ecosystems to improve the building material energy cycle.

For the dismantling of design, renewable materials, recyclable components into the design and construction of buildings to make today's buildings to become the future of the construction of mineral resources (Pourzolfaghar, 2013; Moore, 2014). Rationalization of energy saving in ecological buildings can be then summarized as the following aspects.

1. Improve the legal system and the market mechanisms, and promote eco-building energy efficiency. Germany is in the world advanced level in the ecologically-safe building and energy efficient building, its complete law, laws and the policy, as well as the effective subsidization measure machine-made merit cannot extinguish (Ravindu, 2015). On ecology energy efficient building one, law that draws up has only and the law of energy-saving and corresponding laws rule, the renewable energy law, and started to implement the ecology tax reform in 1999, the goal was reduce energy consumption, encouraged the research and development of new energy technology.
2. Takes the ecology idea as the starting point, overall forms in one's mind. The architects display to command the function in the urban construction process, takes the ecology idea as the starting point, overall forms in one's mind, and the goal that focuses on realizing the ecologically-safe building. Comparison, the three design techniques are common ground is from the specific local ecological environment design, and the difference is reflected in the application of technology concepts and methods.
3. Analysis of regional climate characteristics, heritage of the local residential ecological technology. Climate has a significant impact on building comfort and energy consumption, so it is important to have a clear understanding of the local climate characteristics and to select local design strategies to maximize the potential benefits of using the regional climate and the local climate matches the purpose.

Green building is very complex system engineering, green building development has become the system, in developed countries has been vigorously promoted and become the construction industry development (Samer, 2013; Pereira, 2015). The construction of the evaluation system of green building in our country lacks practical experience, and it is in the initial stage. The related evaluation system draws the advanced experience from abroad. After the concept concrete application of green building, our country of one set of clear advanced green building evaluation system to sustainable development that constructs has the vital function, making our construction industry will worth the important topic of long-term discussion. In the later sub-sections, we will then discuss our proposed systematic countermeasures and solutions.

3. The Intelligent based Construction Methodology

3.1. The Computer and Architecture

The intelligent building uses method of integration, closely combines the intelligent computer technology, the communication, information technology and building, through to the automatic monitoring of equipment management to the information resource and to user the information service and the optimized combination with building with the investment of obtains is reasonable, adapts to information society

knowledge economy as need to develop, and has safe, highly effective, comfortable, convenient and flexible and other characteristics (Shaviv, 2014). Content that composes from the intelligent building, it has the following function and the corresponding subsystem generally. (1) Construction Equipment Management System (BMS): Monitor and optimize the operation of the electrical and mechanical equipment in the building, ensure comfortable and safe office environment in the building, and realize energy saving and intelligent management. Including construction equipment automation subsystem BAS, the fire automation subsystem FAS, and the security automation subsystem SAS three subsystems. (2) The Office Automation System OAS: for the building of the user to provide management information network, so as to achieve office electronic and automation, improve work efficiency, enhance the ability of the information processing. (3) Integrated wiring system GCS: It is the intelligent building infrastructure and is to connect buildings or buildings within telephone, television, core computer, office automation equipment, communication network equipment, a variety of measurement and the control equipment and information appliances and other equipment.

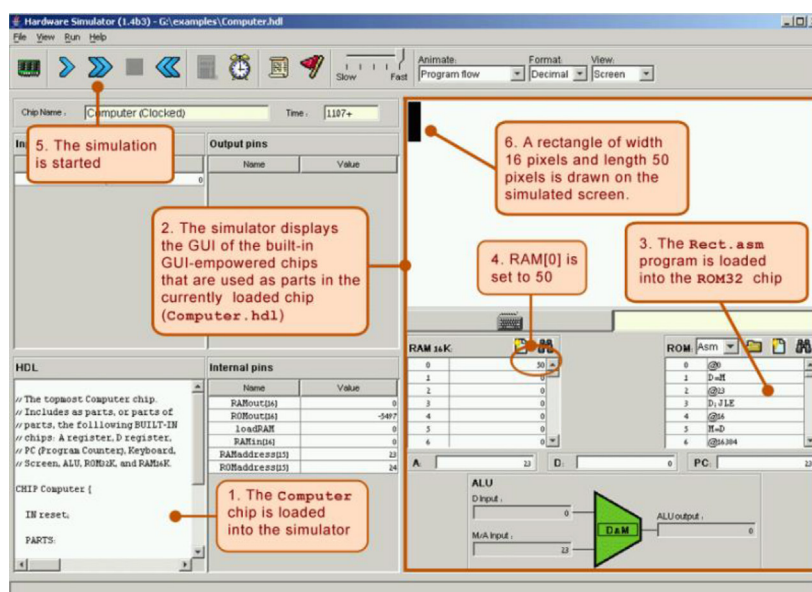


Figure 3 – The computer based systematic modelling platform

As demonstrated in the figure 3, the computer based systematic modelling platform is shown. Especially for the network based home, it has the following approaches.

1. XDSL interface technology. The XDSL technology is the RADSL, HSDL, VDSL, SDSL, IDSL and other interface technology of the general names. the XDSL technology can passes to the far-end user many form data, voices and video signal through the copper wire from the bureau end, can support the high-

speed Internet/Intranet visit, the online service, and the video on demand and television signal transmission and interactive entertainment.

2. CATV network access technology. This network is comprised of receiving unit, front part, the skeleton line transmission and assignment network. At present HFC synthesis interface technology is an important direction that the cable television network develops has to expand the potential space.
3. DDN special line access. The DDN special line access, save dialing Internet speed, but with the increase of volume of 16 big flexible channel bandwidth or adding new channels. Remember fee way as the monthly fee, the price does not poor that is suitable for large volume, strong real-time users.

3.2. The Java Management System Implementation

The network superintendent and was managed resources proxy to understand and control through the exchange management information is managed the resources. And, network superintendent to was managed the resources proxy to carry on the regular polling respectively that managed the inquiry and control command of the resources proxy monitor and response from network superintendent. When the managed the resources have certain events, acts to the superintendent issues the notice. This exchange of the information realizes through a network management protocol, the information stations in the separately, in the supervisory work stands with is managed the resources in management information base MIB which will be essential for the green architecture construction. Here, we focus on the technique of the NDWFlow. The system structure of the NDWFlow will follow the workflow management system reference model proposed by the MfMC. The system mainly includes the following three parts.

1. Applications and application data. During the execution of a system must also be a variety of applications to interact with the system external that is common to complete the task and the application and relevant data is an important extension of function of the whole system.
2. Software component. Software modules that make up the entire system, including process modeling tools, workflow engines, task list managers, user interfaces, etc.
3. System control data. The data that in the system implementation each component use has the process definition and enterprise organization/role model data, task table and workflow control data and correlation data.

SNMP Manager meets the control command that the Java applets sends, tries to transmit through the SNMPI office to Embedded SNMP Agent and should submit its return the sentence to the Java applet SNMP Trap Receiver monitors the alert notice that managed equipment resource sends, submits to Java applets, by Java applets to the superintendent reported in order to process promptly. In the figure 4 we show the sample code blocks and the structure can be organized as follows. (1) Task manager. Each activity in process model is regarded as by the duty or by user manual execution the duty of computer automatic execution, the task manager is responsible for the surveillance and maintenance to these duties. (2) Database. To implement the underlying data storage, including the process definition, workflow control data, workflow related data, enterprise organization model, the workflow management system and workflow management system. (3) Workflow

engine. The core component of the workflow management system is responsible for the process model interpretation operation, such as responsible for process of instantiation, the implementation of activities and activities, such as navigation. (4) Client side. The client side bases on the Web, facilitates the manager to manage the entire WFM the operation process and common user management and execution assigns.

```

1  public void addLogin(Component cc,int col,int r,int w,int h)
2  {
3      gbc.gridx=col;
4      gbc.gridy=r;
5      gbc.gridwidth=w;
6      gbc.gridheight=h;
7      gb.setConstraints(cc,gbc);
8      lgn.add(cc);
9  }
10 public void addCustomer(Component cc,int col,int r,int w,int h)
11 {
12     gbc.gridx=col;
13     gbc.gridy=r;
14     gbc.gridwidth=w;
15     gbc.gridheight=h;
16     gb.setConstraints(cc,gbc);
17     cst.add(cc);
18 }
19 public void addRegistration(Component cc,int col,int r,int w,int h)
20 {
21     gbc.gridx=col;
22     gbc.gridy=r;
23     gbc.gridwidth=w;
24     gbc.gridheight=h;
25     gb.setConstraints(cc,gbc);
26     regn.add(cc);
27 }

```

Figure 4 – The Java management system implementation core code

3.3. The Project Management Optimization and Modification

Project manager while doing well the quality control, progress control, cost control and the safety control project that must keep firmly in mind “coordinated”. The coordinated goal is to make every effort to obtain various aspects to assist, urging all parties to coordinate to realize the predetermined target of project. Coordination outside the system refers to the whole process of construction projects outside the relationship of coordination, which has a contractual relationship as the boundary is divided into the contractual relationship between the coordination and the non-contractual factors. According to our experience, the satisfactory project system can be collected as the following steps. (1) The project plan founds the stage, E-project management needs according to the area of knowledge and product mix that the project involves, defines the project macroscopic goal, the restrictive condition, the project method and project external relation, simultaneously carries on the project decomposing, divides the sub-item, the sub-item further decomposes into certain duties. (2) The exact course of the project cannot be foreseen, and in the process of dealing with a large number of interdependent relations, the need to track and control the various sub-projects. E-project management needs to obtain track and coordinate the overall progress of the project, resource use, node task execution and other status. In this process, using the generated project progress Gantt chart, resource application state diagram, the

task node network diagram that provide screening, grouping technology, comparing the production plan node information and manufacturing unit report information. (3) When the goal of the project has been completed, the project reaches its destination. Project termination is the final stage of the life cycle of the project, E- project management to provide expert online assessment and project acceptance, the project involved in the enterprise to submit acceptance documents, the release of the dynamic alliance resources of the project. (4) E-project management requires the establishment of the project management database, the management of shared data including human resources, equipment, materials, capital, product quality, project progress information and project-related documents, and the distribution of role-based authorization. Management system access to data information resources, query, update and use, and can then help the project to main enterprise resource balance, the dynamic scheduling and the basic distribution of distributed resources.

4. The Construction Assessment Model and Modified Flowchart

4.1. Construction Assessment Model

Between the people and outer environment have the complex two-way interaction relations, the ideal space environment design serves for the human that meets the behavior and the psychological need of person diversification, simultaneously the environment makes the definition to the behavior of person.

The architectural design is a complex work, although the designer had considered many demands of user, but in our country current architectural design, cannot satisfy a person of phenomenon to space operation requirements to sometimes occur. Creates this phenomenon is mainly because the existing architectural design pattern lacks the stand-alone link to consider the user behavior demand, therefore should improve the design pattern, from satisfying the angle of the user behavior demand creates the harmonious people's living environment. Design pattern of this two-way interaction to promoting the scientific style of architectural design method has the good guiding sense.

Appraisal of modern ecologically-safe building should be comprehensive including comprehensive on time and space. But the current assessment method many only pay attention to static state construction that existed carries on the comprehensive appraisal and the environmental quality evaluation to construction stage has not integrated the evaluation exercise, like this makes our evaluation exercises isolated is divided into the two parts, the two cannot unify effectively. The environmental quality of the building should be in its construction phase or development stage should be reflected in the assessment of existing buildings at least to improve the environmental quality of the project does not make much sense. Therefore, the evaluation of the ecological building should have two organic components: the construction process is mainly the construction stage of the environmental quality assessment and construction products with environmental quality evaluation.

As shown in the figure 5, we illustrate the general flowchart of the construction assessment model. The basic evaluation method is more and more in-depth study, and it is also the method used in most ecological building evaluation system at present. The evaluation of construction stage and the evaluation of the construction products are regarded as the

two organic components of the work. We firstly use the environmental pollution index to consider the first model form. The first step of the evaluation is to quantify the whole process of the building products and the pollution caused by the total factor or the harm to the public, and that the two quantitative methods are obviously different.

Because during the project construction, especially during the construction stage, The duration is generally longer, and the pollution and public health hazards are dynamical achieved by the individual operations. Therefore, the quantification of these hazards and public hazards should be able to continuously monitor the entire cycle of the project and to the specific operation as the basic unit. Therefore, in the formula one, we define the standard for general measurement.

$$pollution_index = \sum_{i=1}^n CPI_i \tag{1}$$

It is noteworthy, because this target is also close with the time as feeds back the computed result of this target to construction of the schedule plan in our project management, can reflect environmental quality in the construction stage each time clearly. For example draws up the histogram with the contamination index of basic

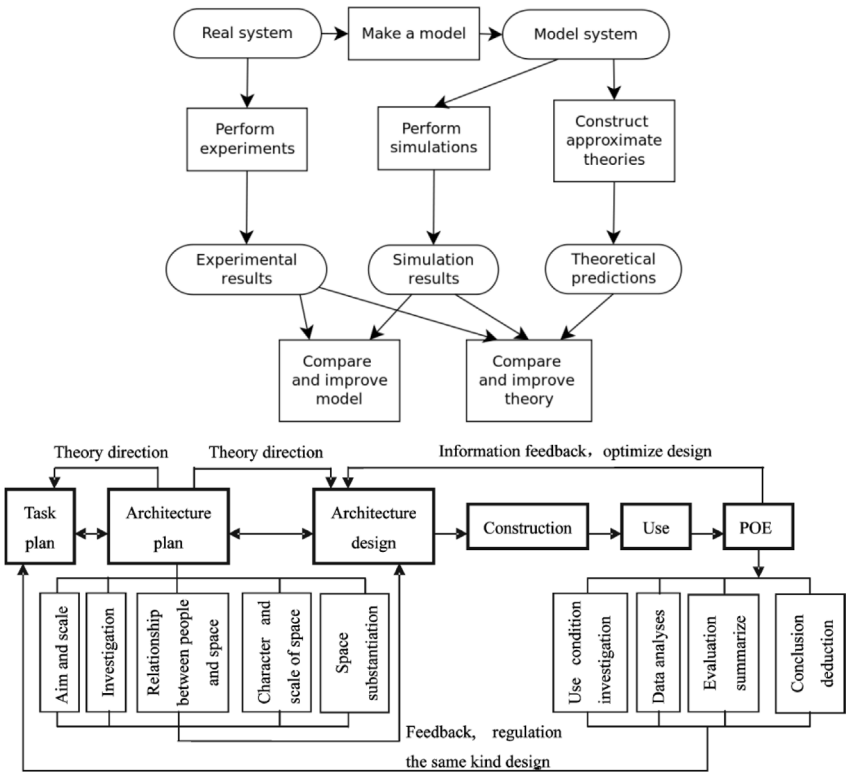


Figure 5 – The general flowchart of the construction assessment model

quantification, takes the time as the abscissa axis, can have certain relations with our construction schedule planning chart, this can be the environment as one virtual resource thus integrates our project management that carries on the reasonable resource distribution which can be reflected from figure 5. In addition, we will also consider the listed models. (1) Fuzzy judgment method. Due to the uncertainties in the environmental quality assessment of buildings, including the insufficiency and uncertainty of data and with the limitations of knowledge, and the randomness of environmental quality, environmental assessment needs to be expressed in vague language. The fuzzy mathematics is to use mathematical methods to deal with the actual uncertainty of the fuzzy problem. From the environmental point of view, water quality, atmosphere, the soil classification line is a fuzzy boundary, in the evaluation can be used to describe its membership. (2) Comparative study. The focus of the method is to design the comparison template, which needs to simplify the workflow with the power of the table. Of course, this template design work is quite complex, mainly related to the level of design of comparative indicators.

4.2. The Modified Flowchart for the Modern Construction

Construction business process reengineering is through the bidding, construction, procurement and other processes description, analysis, identify problems in order to improve the general quality of construction, reduce production costs, access to competitive advantage to design a new process for the implementation of the new process pilot and the continuous improvement. The flow system project and its implementation must depend upon the industrial engineering technology, and the operations research method, the management science and social humanities and modern high tech, and person related to enterprise business process, technology, organizational structure and enterprise culture and other aspects. The BPR is mainly the operation flow description and operation flow analysis and business process design, the operation flow implementation, these four parts according to linear do not carry on turn, among the three is very difficult to separate, usually needs repeatedly to carry on, we will add this property into our system.

5. Conclusion

This paper conducts the research on the analysis and the modelling on the green building integration system under computer simulation background. In this paper, low-carbon buildings are analyzed from seven primary aspects, such as outdoor environment planning, building body characteristics, energy management, material utilization, water resources utilization, low-carbon management, innovation and technology, covering grading index, rational transformation and the quantitative calculation and comprehensive comparison, a good low-carbon building to give a comprehensive evaluation of the degree, but we must see that building assessment system is a multi-disciplinary, multi-angle, quantitative complex system problems. Besides these, we integrate the Java based computer system to achieve the modern implementation of the system. In the future research, we will then apply proposed method into the further applications to achieve the further better result.

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Research on the Impact of Customer-to-Customer Interaction on Consumer Purchase Behavior under E-commerce Environment

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Abstract: With the development of electronic commerce, more and more consumers begin to choose online shopping. In the process of network consumption, most consumers will refer to other people's comments on the goods, so that the customer interaction will have an important influence to consumer buying behavior. In this paper, the author analyzes the impact of customer-to-customer interaction on consumer buying behavior under E-commerce environment. By using empirical analysis, the result shows that other customer's suggestions and help have a positive impact on customer purchase intention, the result is consistent with the habits of online consumers. On the basis of this, we put forward some relevant suggestions.

Keywords: E-commerce, Online shopping, Consumer buying behavior, Structural equation

1. Introduction

The rapid development of Internet technology makes more and more consumers begin to use online shopping mall, customers can through the network easily and quickly complete the purchase of goods, orders, and even customer service. However, the electronic commerce services as difficult to be completed directly through the network, known as the key factors affecting customer evaluation on the overall service level of the electronic commerce (Eisenberger, 2002; Sá et al., 2016). Online service platform mostly belongs to the self-help service system online, online customer service system is not provided; even the system of online customer service provided in a small amount, there still exist some problems in customer service is not timely, the number of online customer service staff is not enough, most cannot meet customer service requirements (Jepson, 2006; Farh, 2007). Therefore, many e-commerce customers do not want to choose online system services, or through the online service system failed to obtain a successful service, often due to the lack of or cannot be timely access to online customer service staff to help. Compared to the physical service environment and electronic commerce, enterprises in the new environment of network service staff to interact with the customer is often lacking, guide customers cannot fully accept the correct service, enhance customer confidence (Fornell, 1981; González, 2015). In service encounter another factor to the

blue managers tend to be ignored, that is the proper application of customer interaction the success rate, enhance customer service and trust in these service providers, in order to increase the customer for this type of service purchase intention.

Over the past more than 20 years, researchers in service management will be more and more attention to the occurrence of various types of relationships in the process of production, exchange and consumption. In recent years, in this kind of relation among them one kind of important relation, the relations between the customer and the customer started to cause the scholars to pay attention to and the research (Lisa,1994). Many research results show that customer interaction in service encounter are widely used as a service industry phenomenon, has an important influence on customer perceived value (Weiwei, 2014; Yujing, 2015), perceived risk and purchase intention of customer service, so the research on these issues has important significance for customer relationship management for service enterprises smoothly (Liang, 2005). However, the current customer interaction research results are mostly concentrated in some of the limited types of service industry, and sometimes even just confined to a service organization. The electronic commerce system of self-help service under the environment of customer interaction has the dual characteristics of virtual interactive customer interaction and customer self-service, showing the characteristics and the existing research results of customer interaction are different (Xiaoming, 2004). In addition to this kind of customer interaction through customer perceived risk and perceived value have an impact on the service purchase intention, and subjective relationship the objective factors of customer characteristics and the external environment and how to influence customer interaction and purchase intention between, are the current theoretical research and management practice achievement is lack of problems, and the development of e-commerce in China has a profound practical significance.

2. Customer interaction in an electronic service environment

2.1. Customer interaction

Nowadays, Web 2.0 and social media technology applications make more and more customers communicate with each other through the virtual community, this phenomenon is also getting more and more attention of enterprise managers and researchers. Under the traditional thinking, customer interaction is usually used to describe the interaction between customers in the process of service contact, which is more or less accidental and occurs in the service scene of the physical entity. Although the electronic interactive customer service environment (e-CCI) is defined as the earliest in the electronic service environment, service environment and real customer interaction counterpart, but considering the rapid development of the electronic world, the cognitive perspective of customer interaction electronic service environment with extensive application of virtual brand community and extension. Virtual brand community can be described as a large number of consumers because of its interest in a product or brand in the Internet virtual space aggregation its importance is due to the use of online tools of customer more and more customers to contact their partners have become more and more important. Therefore, even if the virtual brand community is not the most important electronic service under the environment of customer interaction platform, certainly is one of the important, so the use of social media, virtual brand community and the popularity

of interactive electronic customer service environment has become more convenient, promote the development of customer interaction services in new environment, research in considering the influence of social media, virtual brand community is very necessary.



Figure 1 – Electricity customer relationship

In the network economy age, the customers through the social media communication is not the fundamental purpose of interaction, the enterprise can use the customer interaction to improve the overall service quality, in order to meet the increasing demand of customer service. The interaction between users is the core of social media, and the electronic service environment from the perspective of the enterprise, this interaction has a close relationship with the customer interaction. The application of electronic technology service providers can successfully Web 2.0 and social media technology into the process of providing the service, even though purposefully guide the customer interaction occurs to establish a revolutionary business model. In this new

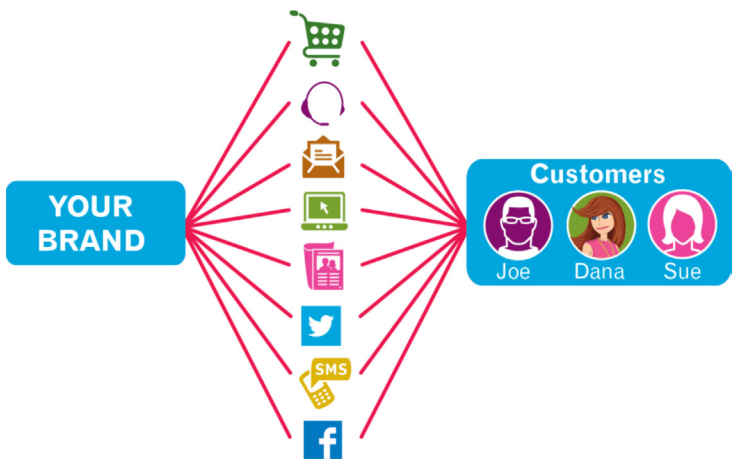


Figure 2 – Network virtual brand community

service environment, customer interaction is regarded as the key factor to create value, the quality of customer interaction is particularly critical

To sum up, the development and application of the Internet and e-commerce technology to make new forms of electronic service customer interaction phenomenon emerge in an endless stream, service environment presents new features; and the application of social media, network virtual brand community so that customers can interact more efficiently; e-commerce service enterprise needs correct understanding and analysis how to use and guide customers interactive electronic service environment in order to create the core price more, enhance customer satisfaction, customer service purchase will have a positive impact on promoting and guiding the relationship between electronic commerce and enterprise customer to the benign direction.

2.2. Perceived risk and perceived value

Perceived risk is an uncertainty, this uncertainty is the result from customer inscrutable each of its purchasing behavior and their desired result is consistent, if not consistent, may make the customer to produce pleasant mood, so that the original definition of perceived risk also involves psychology; however this concept was not on the perceived risk of specific content make a detailed explanation. Drucker believes that customers purchase and consumption is not the product but the value, this view has contributed to the concept of customer perceived value, but he did not give the customer perceived value of a complete, systematic concept. Customer perceived value is a kind of overall customer perception and evaluation of products in the purchase of products in the process, and this perception and evaluation is obtained by comparing customer revenue and cost obtained, can be seen above the view is based on the customer psychology to define customer perceived value. Many foreign scholars have pointed out that the source of customer perceived value or its important components is the driving factors of customer perceived value. In the early research of customer perceived value drivers, many scholars put forward the two factors of customer perceived value, quality and price. Among them, Impact of Market (PIMS Strategies Profit), the key point is that the quality of products, the relative price is the decisive factor of customer value. The domestic and foreign scholars in the course of study on the concept, perceived value driving factors, accumulated a wealth of research results, relatively mature, laid the foundation for the relationship between the effects of perceived value and other variables, such as the impact of customer perceived value on customer satisfaction, customer loyalty and other important results of marketing variables.

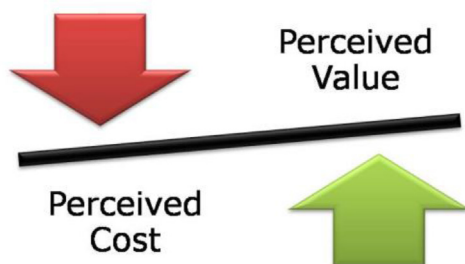


Figure 3 – Perceived value

2.3. Customer purchase intention

The basic reason that causes the customer to purchase the product or the service is the customer's demand for the product or service and the strong purchase desire. The intention is not only a necessary process behavior, but also make behavior occurred before the decision, the relevant information and cognitive it involved will affect a person to take a particular behavior intention and bring the corresponding results, namely the person of behavior will take some degree. However, in the actual case, the customer is difficult to completely the control of their own behavior, because of factors outside influence information master will affect the decision-making behavior, so the assumption of rational behavior theory is too idealistic, there are obvious limitations. In order to improve the objectivity of the model, it is needed to improve on the basis of the above theory, so that the model can improve the prediction level of decision-making behavior, and then the theory of planned behavior arises at the historic moment. First of all, the theory of planned behavior breaking the range of previous research on behavior intention definition, in addition to the behavior also increased the cognitive control required for action resources and opportunities; secondly, although the behavior in this model is a function of attitude and subjective intention is still the standard two parameters, but added on the basis of perception behavior control as an important attitude variables, it refers to the individual to successfully finish the difficulty of perception behavior.

The main point of the theory of planned behavior is that the individual has the resources and opportunities with the number of behavioral control size has the same trend, control variables of perceived behavior will affect the behavior intention first, then through the behavior intention influence behavior. According to the above research, the individual behavior is caused by the behavior intention, and the individual's attitude and perception will have a positive or negative effect on the behavior intention. So the study of the subjective factors that influence customer purchase intention is helpful to further understand the customer's purchase behavior; according to the classic theory, from two aspects of perceived value and perceived risk analysis of the customer's subjective attitude, perceived their willingness to purchase way.

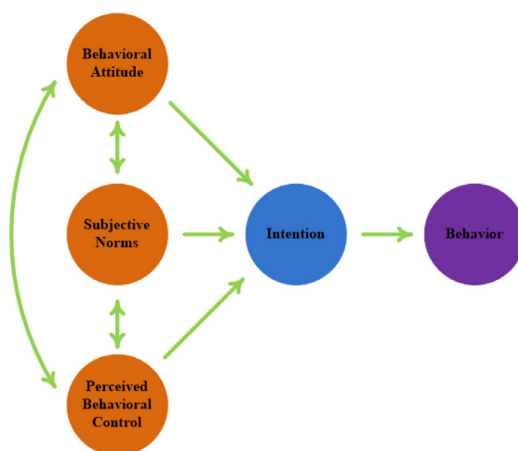


Figure 4 – Planned behavior theory

3. Research design

3.1. Variable setting

An important field of the study involves the research of customer interaction and impact of electronic service environment, service environment, thus determine the new dimensions of customer interaction and the specific measurement items is the foundation of the subsequent research, the key is to carry out the research. The research group arranged the research staff in the campus random column access, in the form of recording to record the results of the interview, the investigation of a total of 425 questionnaires. The results confirm the four dimensions of customer interaction in the e-commerce service environment, including suggestions, friendly attitude, negative information, inappropriate attitude. Related dimension variables and measurement items are as follows:

First order index	Second order index	Content
<i>Customer advice</i>	A1 experience introduction	Experience of providing previous web services
	A2 published insights	Recommendations for the service of the past
	A3 answer questions	Answer questions to other customers.
<i>Friendly attitude</i>	B1 active communication	Active communication with customers
	B2 common topic	Be able to find a common topic
	B3 patient help	Patiently answer the customer
<i>Negative information</i>	C1 complain	Complain about service
	C2 information is not true	Provide untrue information
	C3 information is not complete	Incomplete or defective information
<i>Inappropriate attitude</i>	D1 lack of etiquette	Reply to a lack of courtesy
	D2 no response	Long time no reply
	D3 perfunctory	The reply is too simple

Table 1 – The index system of customer interaction

An exploratory study based on critical incident method of customer interaction model service environment study, the customer interaction is divided into one containing four dimensions of research variables: advice and help, friendly attitude, negative information and inappropriate attitudes; at the same time will directly affect the electronic commerce customer service network to buy will the factors attributed to the perceived value and perceived risk, on the one hand, the four dimensions of customer interaction will affect the perceived risk and perceived customer value, but also will directly affect customer service purchase intention; in addition, the four dimensions of customer interaction can also have indirect effects through perceived risk and perceived value two intermediary variables the customer purchase intention, the structure of the model can more clearly reflect the process of logical thinking and behavior of the new customer service environment.

First order index	Second order index	Content
Perceived risk	E1 service risk	Do not understand the risk of service
	E2 information risk	Negative impact of information not true
	E3 economic risk	Loss due to no valid information
Perceived value	F1 quality perception	Product, good service effect
	F2 emotional value	I feel relaxed and happy.
	F3 social value	Win other people's approval
Purchase intention	C1 preference	I'm more willing to use it.
	C2 feasible	It is feasible to use service system.
	C3 possibilities	The possibility of using web services is large

Table 2 – Index system of purchase intention

3.2. Relevant hypothesis

Customer service purchase intention as a typical customer behavior intention, according to the domestic and foreign scholars point of view, it is located in the customer purchase behavior in the purchase decision stage, it is an important index to judge the purchase behavior of customer service, so the research on the impact of customer interactive e-commerce network service environment on the customer service purchase intention for the analysis of customer service model of purchasing behavior plays an important role. Although the customer interaction in this study occurred in the virtual network environment, the network service as the background, focus on customer interaction for other customers positive or negative influence is still very important, and the interactive behavior characteristics in the new customer service environment and the traditional physical service environment and there are obvious differences, and reference abundant research results of other scholars in the real service environment, according to the four dimensions of customer interaction proposed in this study, put forward the hypothesis of this study are as follows

H1a: There is a significant positive impact on customer service purchase intention between customers.

H1b: Customer friendly attitude has a significant positive impact on customer service purchase intention in the process of interaction.

H1c: Negative information delivered by customers has a significant negative impact on customer service purchase intention.

H1d: The inappropriate attitude in the process of customer interaction has a significant negative impact on customer service purchase intention.

More information or experience required by customers in the purchase, the possibility is because of the lack of information, experience and perceived risk is greater; in addition, if the purchase made poor decision caused a negative effect of follow-up will also increase the perceived risk. In the process of the actual purchase of products or services, more or less the need for information or experience as a reference and basis for decision-

making, do not need information or experience of the purchase is not exist. For network service of electronic business, service is provided to the network as the transmission medium, when the customer service personnel provided by the lack of information, the perceived risk may increase; and when other customers do not provide information or other customer information brings negative effect when the perceived risk will increase. The advice and help given by other customers in the process of customer interaction can be used as a favorable external information source to reduce the customer's perceived risk. The negative information is not conducive to the correct and effective external customer information collection, customer service provider is difficult to understand the real situation of reputation, the customer is difficult to obtain the opinion leader, the reference group for help, which will make the customer perceived risk strengthen. Inappropriate attitudes tend to strengthen the negative impact of negative information, and indirectly affect the customer's perceived risk. Therefore, based on the previous analysis, this study put forward the following assumptions:

H2a: Customer recommendations and help have a significant negative impact on perceived risk.

H2b: The friendly attitude of customers in the process of interaction has a significant negative impact on customer perceived risk

H2c: The negative information delivered by customers has a significant positive impact on customer perceived risk

H2d: The inappropriate attitude of customer interaction has a significant positive impact on customer perceived risk.

Previous research has pointed out that customers' purchase intention can be an important indicator to predict consumer behavior. Customer decision-making behavior in

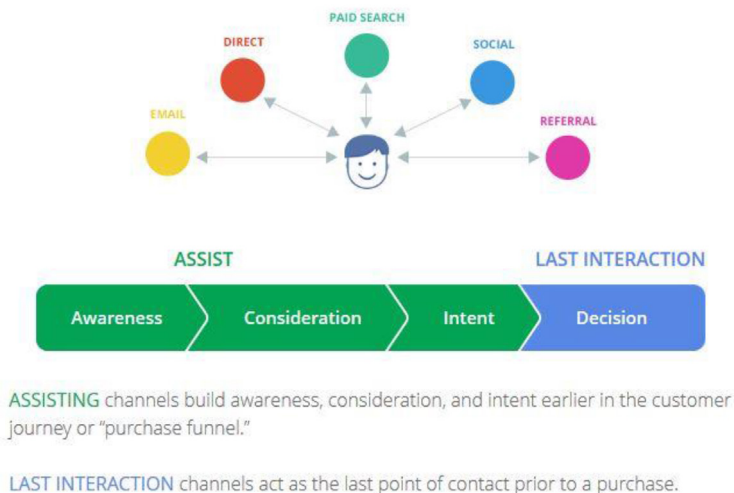


Figure 5 – Customer purchase intention process

e-commerce network service environment is driven by customer service purchase intention. Therefore, the study of e-commerce service customer service purchase decision-making behavior should also be based on the analysis of its service purchase intention, analysis of the key factors that affect the purchase intention of customer service under the new service environment. The customer perceived risk and perceived value influence customer purchase intention of research scholars, this study combined with the characteristics of e-commerce network service environment, that will be perceived risk and perceived value of electronic commerce network customer service and decision of their willingness to buy service. Based on the above analysis, the hypothesis proposed in this study is:

H3: Customer perceived risk has a significant negative impact on the purchase intention of service.

H4: Customer perceived value has a significant positive impact on the purchase intention of service.

4. Empirical analysis

4.1. Reliability Analysis

After collecting the questionnaires, sorting and statistical tools for data entry, using SPSS15.0, the initial measurement scale of three variables were analyzed, including reliability analysis and exploratory factor analysis, to measure the quality of items, the measurement items are deleted or modified into items to form the formal questionnaire. Calculate the perceived risk, perceived value and purchase intention of the three variables measure corresponding CITC coefficients and Cronbach's α coefficients, and to analyze the concept of measurement scale internal consistency reliability, the analysis results are shown in table 3.

variable	item	CITC	Cronbach's Alpha if Item Deleted	Cronbach's Alpha
Perceived risk	E1	0.721	0.815	0.894
	E2	0.804	0.743	
	E3	0.846	0.903	
Perceived value	F1	0.715	0.821	0.826
	F2	0.759	0.856	
	F3	0.784	0.813	
Purchase intention	G1	0.826	0.897	0.885
	G2	0.831	0.846	
	G3	0.816	0.824	

Table 3 – The reliability analysis

The contents of the display, perceived risk, perceived value and purchase intention of each item CITC value exceeded the specified threshold value of 0.50; at the same

time the variables corresponding to the Cronbach a coefficient were 0.894, 0.826 and 0.885, are much higher than the lowest standard of 0.70, and delete the scale in any one measurement items will make the item corresponding to variable Cronbach decreased a value, the initial scale of all items can be retained.

4.2. Structural equation

Analysis of structural equation model using AMoS7.0 software and the results are shown in Table 4, test value to the fitness of the ideal; explain the research hypothesis of the whole conceptual model better fit, that there was no significant difference between the covariance matrix of the covariance matrix of model assumptions and empirical investigation questionnaire obtained. The calculation results fit index of the other, the other major absolute fit index including GFI=0.916, RMSEM, =0.037, RMR=0.125, meet the basic requirements of the indicators; then examine the relative fit index, the main results are NFI=0.904, NNFI=0.928, CFI =0.926. By analyzing the calculation results of all kinds of indexes, it can be seen that the fitting degree of the conceptual model established in this stage is better.

hypothesis	Path coefficient	T value	P value
H1a→purchase intention	0.682	3.45	0.001
H1b→purchase intention	0.415	3.72	0.000
H1c→purchase intention	-0.573	4.98	0.014
H1d→purchase intention	-0.673	3.12	0.002
H2a→ Perceived risk	-0.749	4.02	0.000
H2b→ Perceived risk	-0.661	3.51	0.028
H2c→ Perceived risk	0.387	3.47	0.005
H2d→ Perceived risk	0.015	3.78	0.000
H3→purchase intention	-0.518	4.26	0.000
H4→purchase intention	0.796	3.55	0.000

Table 4 – Path test and hypothesis test results

If the customer service purchase intention to purchase decision-making behavior depends on customer service, and customer service related to the master degree determines its willingness to purchase services in size, so the customer will collect information as much as possible in the early stages of decision making, including internal information and external information. However, due to the internal information of their own customers are often very short, they are more familiar with the people, through commercial sources of information, public information sources, and even other customers are not familiar with to get more information. The conclusion of empirical research shows that suggest other customers of e-commerce network service environment and help to customer service have a significant positive impact on purchase intention, this is because the lack of experience of the new customer service function, using techniques, solutions

of common problems and so on, because this wants to rely on the Internet for useful information, and on the other this type of service is more familiar with the customer can often play the role of information providers; although customers are not familiar with the network characteristics of openness and equality has been to provide customers with a convenient channel and search through the network information acquisition unknown information behavior has become a prominent feature of China users of the new era, and more the empirical analysis result is consistent with the online consumer habits.

5. Conclusion

The research in the first stage, first discusses the effect of the four dimensions of customer interaction on customer perceived risk and perceived value of the e-commerce network service environment, also analyzed directly influence the different dimensions of customer interaction on the customer service purchase intention. Because the interaction including positive interactions lead to positive results and negative effects caused by the negative interaction, so in the analysis to distinguish the different types of interaction and produce positive or negative effects; the empirical results show that customer interaction dimensions for all positive interaction and negative correlation with perceived risk perceived value positively while the negative interaction behavior; customer interaction dimensions have negative correlation with perceived value and perceived risk is related with the part. From the empirical analysis conclusion, friendly attitude in customer interaction will directly influence customer service purchase intention, the main reason is that the network customer's social and psychological needs is an important driving factor in their network communication, and indirect impact on customer service purchase intention.

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Analysis on Interaction Design Pattern of Public Facilities based on Natural Language Processing Technology and Data Visualization

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Abstract: Theoretical integration of design and computer science has been developing for a long period, how to find out the application layer integration is becoming the challenge. This paper conducts the analysis on the interaction design pattern of public facilities based on the natural language processing (NLP) technology and the data visualization. Data visualization is the visual representation of data in the form of visual expression of this data is a form of a summary of the related extracted information. Because the graphs help to understand the data studied intuitively, many statisticians have presented graph representation method of the multivariate data, including the contour diagram, the radar chart, the harmonic graph, the scatter diagram. This paper integrates the SOM to propose the new visualization paradigm. The result proves the effectiveness of the mode and it can visualize the public facilities with the satisfactory performance.

Keywords: Interaction Design (ID); Public Facilities; Natural Language Processing; Data Visualization; Systematic Review

1. Introduction

The emergence of public facilities can be traced back to ancient time ancestors, the public places of heaven. Ancient Greek and Roman city drainage system, ancient Olympic arena is the initial form of urban public environment facilities, limited to the generalization of municipal facilities (Francisco, 2012; Alkhatib, 2016). Later, with the development of the city, the public facilities became more popular, and the form gradually diversified. From the initial pursuit of the simple form of development to the pursuit of urban space environment, urban life rich art form and different cities according to the different regional cultural development of the different public facilities products (Friederici, 2015; Iqbal, 2016). When we understand the public utility, besides understanding facility function, what is more important is the explanation public utility itself contains the cultural implication and ethnic customs that has the basic reflection and impression.

Meanwhile, in carries on the appearance modeling process also to consider that for the environmental facility the traditional culture and environment these factors of

various countries, national and the regions to respect the environment the culture, culture intention that pays great attention to design (Guizzo, 2014; Cambria, 2014). At present, what the public labeling system uses is the traditional image form, although the meaning simple and brief, it appears the quite monotonous interest. How to use the interaction design to break through the limitation of traditional image marking, the richness of enhancement marking content and interesting is this article research goal.

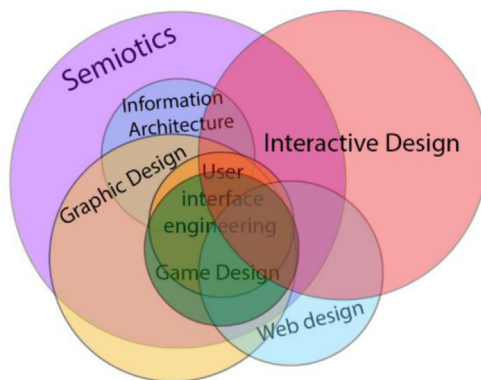


Figure 1 – The state-of-the-art design pattern illustration

Under this historical background, in this paper, we propose the novel interaction design pattern of public facilities based on natural language processing technology and data visualization (Athavankar, 2014). The rest of the paper is organized as follows. In the section 2, we review and analyze the principles of the natural language processing features. In the section 3, we introduce the data visualization methods and especially, we propose the novel organizing mapping paradigm. In the section 4, we analyze the interactive design model and apply it on the public facilities design. In the section 5, we conclude the work with summarizations.

2. The Natural Language Processing Paradigm

Early, the NLP main centralized in morphology and syntax analysis, based on rule, based on the statistics, the syntax analysis technology that as well as the rule and statistics combine widely is utilized in the various domains. Currently quite mature syntax analysis model has the phrase structure grammar and glossary of functional grammar, the interdependence grammar central language actuation. At present, semantic analysis, such as the word sense disambiguation, the semantic reasoning and semantic induction come to the onstage gradually that becomes the current hot spot and highlight (Khwaja, 2013; Llorach, 2015). The semantic analysis involves word, phrase, minor sentence, the sentence group, paragraph, chapter and other analyses of different level.

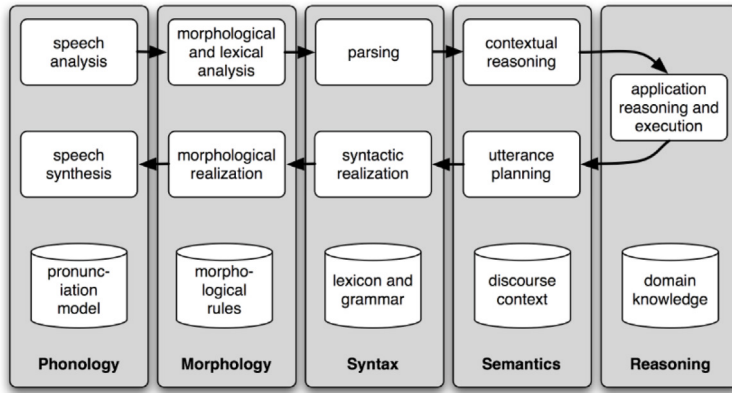


Figure 2 – The general processing architecture of the NLP

The figure 2 illustrates the general processing architecture of the NLP. By analyzing the literature review, we can summarize the NLP features as follows.

1. Syntax semantic rules-based a rationalist approach was questioned, along with the corpus rising of construction and corpus linguistics, processing of large-scale real text becomes the main strategic target of NLP.
2. In natural language processing, more and more methods of the automatic machine learning are used acquire basic language knowledge. Traditional linguistics is basically through linguists summed up the phenomenon of language summarized manual method to obtain knowledge of language, due to limited memory, any linguist, even essential linguistic authority of the authority, it is impossible to remember and deal with vast sea of smoke of all the language data (Saxena, 2013; Oki, 2016). Therefore, the use of traditional manual methods to obtain language knowledge, as if to look at the leopard, to control the sea, this method of access to language knowledge is not only inefficient, but with the great subjectivity and property.
3. In the NLP more and more uses the statistical mathematics method to analyze the language data. The method of use the manual observation and introspection, impossible to gain the precise reliable linguistry from the voluminous corpus obviously must use statistical mathematical method (Sippo, 2013). The linguistic model is the mathematical model of the description natural language inherent laws, constructs the linguistic model is the NLP core. The linguistic model can be then divided into the traditional rule linguistic model and the statistics-based the linguistic model.

In the natural language processing application scenarios, the feature selection and extraction is the essential task. Because the opportunity with presently is random event with the accident that presently follows is matches in the extraction process the biggest noise. Therefore, goal of matching extraction is words and expressions two tuples of extraction unidirectional tendency and bidirectional tendency, the cradle handles jointly

with that presently two tuples (Freixo, 2014; Tiwari, 2015). The choice is suitable for portraying the matching tendentious statistical method and is helpful to explaining that the mechanism of matching constitution improves the accuracy of matching extraction. Feature selection algorithms are many, the simplest and most common of which is the Cutoff method. Because in computational linguistics, low frequency features are usually discarded this kind of noise characteristics can not only greatly reduce the number of features in the feature space, but also can avoid the influence of noise characteristics on the ability of model prediction, so in NLP, Cutoff and the other feature selection methods often use a combination of methods.

The mutual information method was also used in feature selection, it through the computation asserted that predicate and mutual information between conclusion verdicts judges the connection degree between both. Mutual information is a measure of common information between the random variables as widely used to measure the degree of binary association. The mutual information of two random variables is shown as the follows.

$$I(x;y) = H(x) + H(y) - H(x,y) \quad (1)$$

Although roughly speaking, basic mutual information can measure the degree of dependence between variables. However, through the analysis, it is found that the mutual information does not completely confirm the correlation of the random variables, because it has two characteristics. (1) Mutual information will be the size of the total amount of information, as the size of the random variable dependent on only measurement basis. However, “independent” is different from “incompatible”, independent random variables may still co-exist. (2) Tendentious measuring is different from semantic similarity computation, but should be asymmetrical, such as matches two tuples sparsely is unidirectional tendency. Therefore, symmetrical characteristics of mutual information are not suitable portraying tendentiousness.

Besides the mutual information, we also define the features of circulation screening method and χ^2 as the formula 2 and 3, respectively.

$$\Delta L(S,f) = L(p_{S \cup f}) - L(p_S) \quad (2)$$

$$\chi^2 = \frac{N(o_{11}o_{22} - o_{12}o_{21})^2}{(o_{11} + o_{12})(o_{11} + o_{21})(o_{12} + o_{22})(o_{21} + o_{22})} \quad (3)$$

The feature with the highest gain is selected to join the active set S. Because each time to add features to the activity set to be re-model training, and model training itself is extremely time-consuming, so this method is difficult to use in the practical applications. Therefore, for the formula 2, the optimal model is equation 4.

$$p_{S \cup f} \quad (4)$$

In order to pick up the feature selection speed, the training of new model can use the approximate method. Process of model training is an optimization of the multi-dimensional variable, usually needs to use conjugate gradient method and other algorithm circulation iterative solutions, shown in figure three.

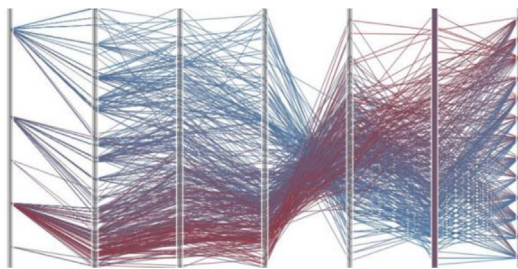


Figure 3 – The NLP feature projection demonstration for global optimization

3. The Proposed Data Visualization Methods

3.1. The Data Visualization (DV) Review

Data visualization originated in the 1950s, with the rapid increase in the computer computing power, people established a growing scale, increasing the complexity of the numerical model, creating a large variety of the large-scale numerical data sets, which need advanced computer graphics techniques and methods to process and visualize these large data sets. Data visualization is the visual representation of data in the form of visual expression of this data is a form of a summary of the extracted information. Because the graphs help to understand the data studied intuitively, many statisticians have presented graph representation method of the multivariate data, including the contour diagram, the radar chart, the harmonic graph, the scatter diagram, the constellation diagram, etc. In the following figure 4, we show the modern visualization methodologies.

Through abundant graphics performance, visualization technology can accurately express original data, mining results and mining process, allowing the users to understand problem in depth and select more appropriate data mining algorithms to achieve the purpose of in-depth analysis of the data. Especially for spatial data, visualization is important for revealing structural characteristics interrelationship and evolution of the spatial entities. The data visualization mainly includes the visualizations in the data, models and process aspects, the data visualization mainly has the histogram and scatter diagram, and pie and the concrete method of model visualization is related with algorithm that data mining uses, but the visualization uses the DFD to describe the discovery process of knowledge. We then summarize the popular methodologies as the follows.

1. Pixel guidance technology. Pixel-oriented technology is the basic meaning of each data value is mapped to a colored pixel and the data values in the accordance with its properties displayed in a separate window.
2. Geometric mapping technology. Geometric mapping technology is to find “interesting mapping” cube. Types of the geometric mapping technology

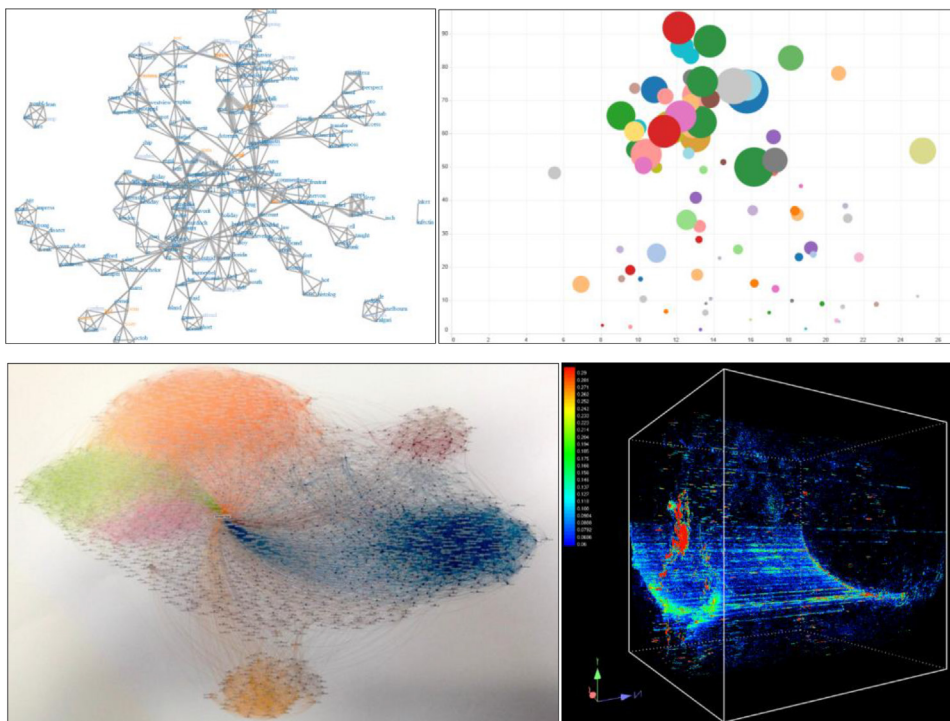


Figure 4 – The illustration of the modern visualization methodologies

including the main component analysis, factor analysis, multidimensional measurement of statistical detection technology, most of them can be summed up to the “mapping affairs” this term. If all travel systems such as “mapping affairs” the purpose of the system is to automatically discover “interesting” mapping or at least to help users to find them.

3. Hierarchical and the graph based techniques. The basic implication of the graphics-based technology is the efficient use of a dedicated page layout algorithm, query language, and abstraction techniques to display a image.
4. Icon-based technology. A bar chart is one of standard display technologies that allows visualization of large amounts of data and is therefore better suited for data mining. As the name suggests, icons are a type of bar graphs and, on the other hand. The number is mapped to a dimension that can be displayed and the remaining dimensions are mapped to branch lengths of the angles or the general bar graphs.

3.2. The SOM based Data Visualization Paradigm

This section has “topological defect according to partial Euclidean space and SOM algorithm of manifold” the reason of issue, from a linearity or the approximate linear local data set that expands the training data acquisition according to the neighborhood

structure of data gradually, carries on the evolution to train to the network that can avoid the local extremum and victory “topological defect” issue and finally studies and visualization data intrinsic lower-dimensional non-linear manifold structure. In the SOM algorithm, the neurons represented by the data points are fixed on the low-dimensional regular grid. Finally, the neurons can be topologically ordered on the low-dimensional regular grids by basic neighborhood learning. Or, dimensional topological relations between the data points on a regular grid, so that the SOM algorithm becomes a clustering and visualization tool. The objective function for the SOM can be summarized as formula 5.

$$c(x) = \arg \min_i \|w_i - x\| \quad (5)$$

The $c(x)$ represents the target neuron, neurons located near the low-dimensional regular grid is trained according to the following rules we can get formula 6.

$$w_i(t+1) = w_i(t) + \alpha(t) \cdot h_{c(x)_i}(t) \cdot (x - w_i(t)) \quad (6)$$

The output two-dimensional feature map keeps the topology of the input data, i.e. two adjacent feature vectors in the input space to the output space in both the same neighborhood, so SOM is suitable for the visualization research. But as I said before the SOM method is an unsupervised learning algorithm, different types of data easy to overlap in low the visualization of the space, cannot provide the classification boundary information that is not conducive to the observation of different types of data. In order to visual classification boundary to provide more information about the classification results, we must first obtain the classification boundary, and then realize the visualization of the classification boundaries. Therefore, there is need to adopt the classification algorithm of the supervised learning. The definition on the lower-dimensional conventional grid usually uses the following Gauss form.

$$h_{c(x)_i}(t) = \exp \left(-\frac{\|c(x) - i\|^2}{2\sigma(t)^2} \right) \quad (7)$$

Because the SOM algorithm adopts the neighborhood learning method, neurons located in the low-dimensional regular grid will be trained in the same direction, and the weight vector of the adjacent neurons will be similar. As the result, and similar to the data points of the winning neuron its low-dimensional position is also adjacent, which is SOM algorithm to maintain the characteristics of topology. In order to ensure that the training data set to a certain extent correctly according to its neighborhood structure expansion, and reduce the sensitivity of algorithm to noise, outliers and neighborhood size, extended DSOM algorithm in training data set using a core simple rule, namely, new data points should be extended with the existing training data set in a data points

are close neighbors of data points. And the objective function can be then transferred into the formula 8.

$$c_{revised} = \arg \max_i \frac{|D_{New}^{(i)}|}{|NoB(i)|} \quad (8)$$

According to the local Euclidean space, the value should not be too large, if it is too difficult to ensure that the extended training data set is still linear or approximate linear, it gradually degraded into SOM algorithm. According to partial Euclidean space and analysis situs of self-organizing mapping maintains the characteristics, T is not suitable is too big, if it greatly is too easy to make the network bias data intrinsic non-linear manifold, fall into the local extremum, gradually degenerated the SOM algorithm of manifold. The figure 5 visualizes the steps.

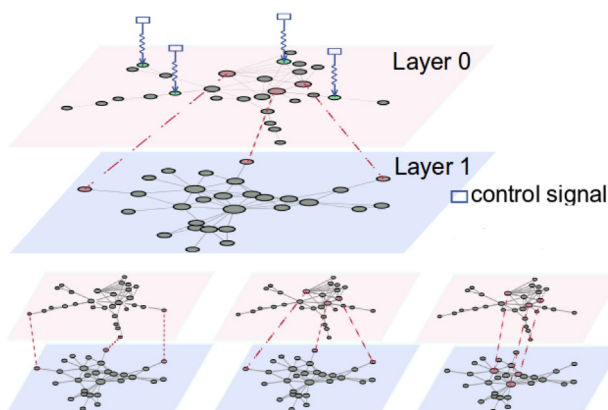


Figure 5 – The proposed SOM based data visualization illustration

4. The Interaction Design Pattern of Public Facilities

4.1. Interaction Design Principles

In the interaction design, establishment of metaphor interactive model is relates the key of user image model and designer image model is through finding in two models product altogether has the characteristics, and that reveals with the design language the characteristics, communicates with the user, thus enables the user to understand and grasp product structure, function, usage-style and information of rapidly. There are several ways to achieve interaction between systems, commonly used in the following aspects.

1. The establishment of general SOCKET data exchange package, that is, the establishment of two systems to transmit data packets between the ends of the data packet received in accordance with the general established rules to complete the interaction.

2. Web services to achieve the way the interaction between the server systems for the client to send requests to the server-side interaction. The advantage of this approach is high real-time interactive efficiency.
3. Shared database or the share database, that is, multiple systems share the database, or multiple systems between database synchronization update.

Users of new, unfamiliar, abstract, complex knowledge of things, often from the known, the specific experience began. Metaphors are used to apply the cognitive experience of everyday life or past experiences to the interaction with the product. Through cognitive experience, the metaphor of cognition has been formed, and the experience and analysis of the interactive product have drawn the ontology and metaphor. Associating past experiences with the interactive experiences to better understand and manipulate interactions through the same or similar metaphors. In the later sub-section, we will discuss the proposed novel paradigm.

4.2. The Novel Interaction Design Pattern of the Public Facilities

Public labeling system authoritative and high serviceability, regardless of state, to which age level and to which cultural level, it is posted maximum degree general labeling system. In these logo designs to follow the basic premise, the interactive content design is both a design of this difficult.

Different from the traditional representation, interactive identity is characterized by need to take into account the information communication and entertainment. In other words, in terms of basic information communication, it can convey multiple-information while not limited to a message. Analysis of the meaning of these signs, how to express the information at the same time with the traditional representation of the entertainment is not. It is this design in the core interaction design of the top priority, while at the same time we should focus on the listed issues.

1. Ensure that the identity of the meaning of the same, appropriate to join the entertainment nature. In the design of the script, as close as possible to identify the most basic meaning, do not do too complex changes.
2. Logo in the interactive animation, we must then ensure that the simulation accuracy, that is to say, and the dynamic must be the same and this is equivalent to the life into the logo, to give signs of vitality.
3. In the production process, it will become a 3D animation rendering plane effect, while the use of the motion capture device, motion capture data that combined with the manual debugging later, this can really reproduce the realistic character of vitality.

Interactive design requires user-centered design and conception of basic interactive products. At the same time, the interaction design can convey the information processing into three major levels: instinct, behavior and reflection. The level of the interaction design with some aesthetic appearance, mainly to the exterior design, interface design; behavior level is added to the functional design, usability design, the user in the interactive process of practical fun and efficiency.

In information processing process of core interaction design, this design follows the interaction design in principle has carried on the development design according to

the characteristics and user of marking demand. Eventually not only has achieved the usability goal of marking, and enhances the aesthetic sense as well as marking of general visual form marking presented asks the interactive quality with the user. Realized satisfyingly, pleasant, interesting, fascinating, useful and inspirational, the rich aesthetic sense, to stimulate the creativity, to have the sense of achievement, to obtain the emotion satisfaction and other user experience goals on. In the following figure we show the principles of interaction design pattern of the public facilities.

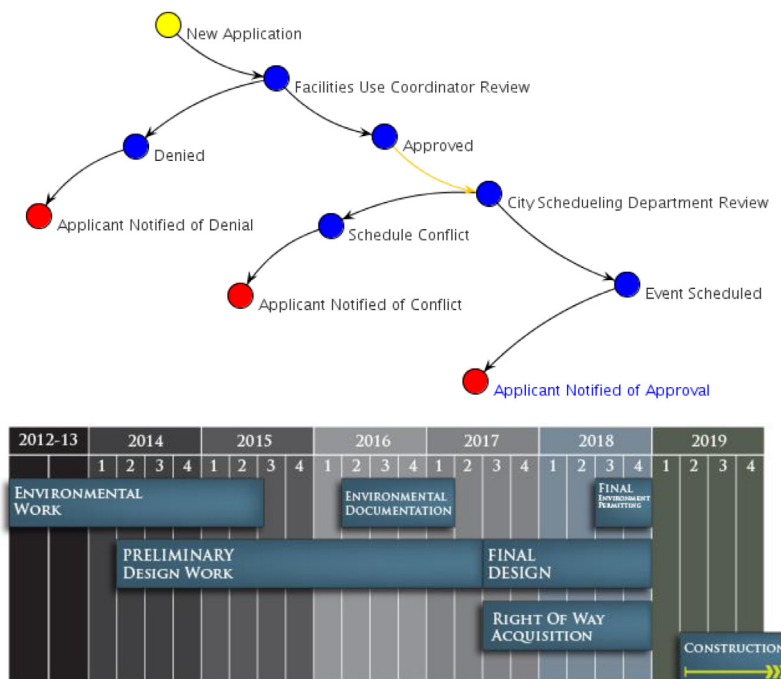


Figure 6 – The interaction design pattern of the public facilities

5. Conclusion

This paper conducts the analysis on interaction design pattern of public facilities based on natural language processing technology and data visualization. The self-organizing mapping is competitive learning-based single-layer neural network model, it while to the data carries on the vector quantization can also realize to the non-linear dimensionality reduction mapping of data, this mapping has the fine characteristics that the analysis situs maintains, thus causes this algorithm is not only often used to carry on the cluster to the mass data, but can also be used to carry on the study and visualization to the high dimensional data intrinsic lower-dimensional non-linear manifold structure. This paper applies the SOM into filed of the interaction design pattern of public facilities. The result reflects effectiveness of the method. In the future, more research will be deployed.

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Teaching Mode of Higher Vocational English under Web-based Environment

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Abstract: Along with the rapid and irreversible development of computer science and technology, the combination with modern education is becoming the trend. In this paper, we propose the novel teaching mode of higher English under web-based environment. Online learning is with the Internet and the Web technology and the rise of a modern means of education, is through the computer network, database and multimedia technology to produce a new form of the modern teaching. The development of the modern science and technology, promote the rapid development of modern education technology, at the same time, the modernization of education and puts forward the higher request to the further development of network technology. The magnanimous, multiplicity and the dynamic randomness and content of non-constitutive property and the ultra-link of page cause the low efficiency of information retrieval that is unable to provide very good personalized intelligent service for the network user. Under this basis, we implement the system with Java and the MVC is adopted to enhance the robustness.

Keywords: Higher English, Web-based Environment, Programming Language, Teaching Mode, Methodology and Literature

1. Introduction

The 21st century is the new era characterized by knowledge economy. In order to grasp the initiative of sustained and rapid development in the coming century, all countries in the world are actively building a modern education system compatible with the social and economic development of the 21st century (Baker, 2012; Chang, 2013; Abreu et al., 2015). But now the rapid development of information technology especially computer network technology, to realize this type educational quality, network and socialization, lifelong melted, individuality to change into the brand-new education of characteristics to provide the solid foundation that directly promoted the rapid development and widespread utilization in school edition of contemporary educational technology and promoted the transformation of educational pattern (Deodhar, 2014; Earls, 2014). With the development of information industry and the gradual development of the mature computer-aided teaching as a modern science and technology to implement infiltration and impact of education is an important symbol. Researching the problem, cultivating the ability, increasing the important way of knowledge become the inevitable choice

of the means of the school quality education (Jolliffe, 2012; Costa, 2013). The foreign language teaching is an education for the all-around development constituent, as we enter the English teaching each link can definitely say, the ELT is helpful to the student open field of the vision, expands the aspect of knowledge and deepens the understanding the world as profits from and the absorption foreign country outstanding culture essence enhances the cultural element. The figure one illustrates the principles.

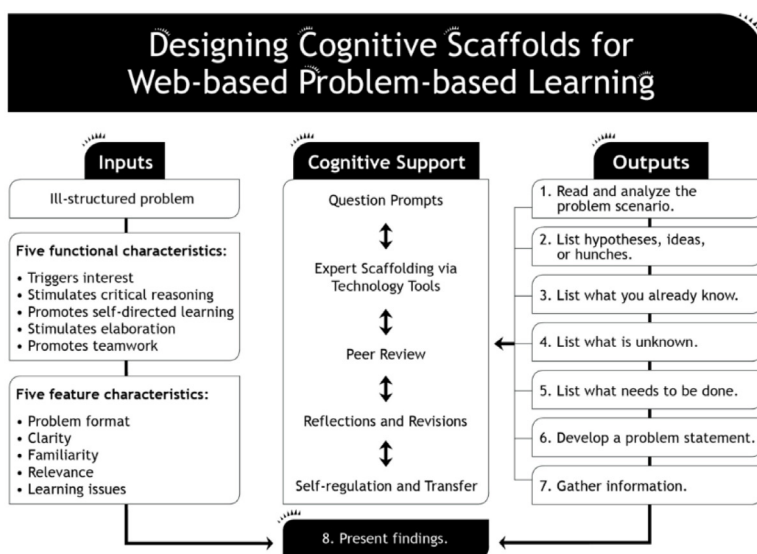


Figure 1 – The principles of the CAI based teaching

Under this basis, the combination of the English teaching and modern technology is the timely trend, as one of the reflections online education is the proper example. Along with computer network technology unceasing mature as well as the rapid development of Internet, the learning approach of people is also having important transformation (Kelders, 2012; Marsh, 2013). Taught with past teacher for focus educational model compared with, the autonomic learning emphasized the study pattern focusing on student (Murray, 2013). To integrate the modern techniques into the teaching, this paper proposes a novel teaching mode of the higher English under Web-based environment. In the later sections, we will provide the detailed discussions on the methodology.

2. Literature review and analysis on the English education

Our country university college English curriculum teaching reform like a raging fire is developing, but must train the student English comprehensive utilization ability that trains them to obtain information in the internationalization and information society and deals with the issue the ability, we need to conduct the comprehensive study to the construction of the applied undergraduate education English quality developmental education system to grasp the ELT development direction. Based on the literature review, we should consider modifying the listed items.

1. Students at the entrance of the English level varies, the learning interest is generally not high. The students of the college come from different areas, English foundation are different, the level is irregular (Matsuura, 2014).
2. The teaching method awaits improvements. Some colleges and universities still remain in the English teaching of the five steps “teaching method”, the results of teaching and learning is limited to textbooks or grammar items on the repeated exercises that cannot expand the students thinking.
3. At present the effects of various national university bilingual educations do not hate satisfyingly, its basic reason has not been solved from university transition issue of the basic English to bilingual education.
4. The cultivation of English quality for the undergraduates of applied type is based on the training objectives and the requirements of their cultivation. Through the training of English teachers and the cultivation of students’ English learning, they can form the students’ English ability to meet the needs of the future society (Naidoo, 2015). With the development of the education teaching methods, the implementation of quality education teaching activities, just from the conceptual emphasis on the formation of the quality of students, that is, the teaching of mouth or training objectives.

The contingent of teachers of high-quality is the key of ELT reform is the school trains high-quality personnel’s guarantee. Accomplishes two batches of theories rapidly deep and has explorations and innovation energetic middle aged backbone teacher, comprehensively enhances the overall level and competitive strength of the tutorial contingent which is in the applied undergraduate education English quality developmental education system an important aspect (Raes, 2012; Smit, 2012). College Basic English, ESP and bilingual teaching in the College English teaching is a whole. Basic English is a necessary condition for ESP teaching, ESP teaching is the extension or expansion of the Basic English teaching, and it is also a transitional course from Basic English courses to bilingual courses (Siadaty, 2012). The two are indispensable in the education system and the close links to develop English quality applied talents, all three services in the applied undergraduate English quality to develop the main goal of education. In the following figure, we show English learner distribution around world, accordingly.

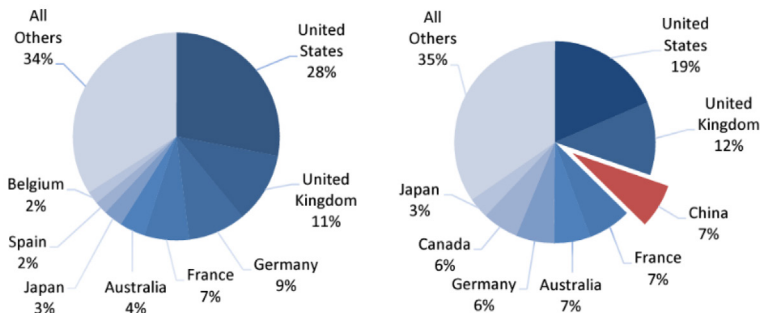


Figure 2 – The English learner distribution around the world

3. The Virtual Reality and Backend System Development

3.1. The virtual reality (VR) for education

VR is the term by United States VPL founder Lanier in the early 1980s proposed, it refers to the comprehensive use of computer graphics systems and a variety of the display and control interface devices, generated on computer, Interactive, three-dimensional environment in which the general computer-generated, interactive, three-dimensional environment is referred to as a virtual environment. Externally, VR obtained widespread using in education community. The application is not only restricted in developed country, the application in developing country VR aspect constantly is also increasing that can be organized as follows.

1. Britain when use virtual learning environment has conducted the research to teacher lecturer's idea and thinks that the virtual learning environment is helpful to producing the learning environment centered on student as well as the way of teaching centered on student (Xue, 2013).
2. Malaysia, a private university through a questionnaire survey, pointed out: those who use computer anxiety or lack of preparation students in virtual learning environment easy to encounter difficulties. Therefore, is necessary to establish the positive attitude towards the virtual learning environment. Students' ages, experiences and learning levels affect both the usefulness of the virtual learning environment and the student's use of the computer.
3. Holland University has established a virtual library system, the teachers and students use the system in particular, such as exposure to real library, any quick and easy access to all kinds of information and books.

The education must redesign and the organization regarding these basic learning capabilities, but ability cultivation of VR in these aspects can play the positive role. (1) VR can be easily simulated to achieve a variety of practical or even imaginary experimental scenes, so as to cultivate practical ability, scientific research ability, and cultivate the students' creativity and imagination. (2) VR can be for the student provides all kinds of the simplicity to the complex learning environment, helping training the student to adapt to the various circumstances the abilities, sharpens its cooperation ability and survival capability. (3) VR technology is easy to achieve with the network, is conducive to students to actively collect knowledge and access to knowledge, training and ability to work and the cooperation.

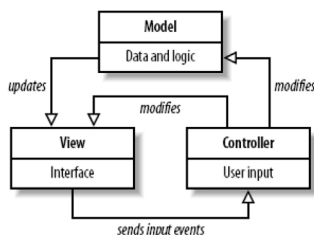


Figure 3 – The interaction procedures of the virtual reality system

The virtual reality technology depends on high speed operation and transmission of the computer. High speed computing and transmission can solve the problem of complex and realistic environment structure and massive data processing in the virtual reality environment, so as to solve the problem of mental disorder caused by the lag of computing and transmission. The basic properties of the virtual body are fused with the geometric, physical and biological behavior. Then a good sense of reality cannot be separated from the simulation behavior of the virtual body. Virtual reality technology is mainly reflected in the sense of vision and hearing, the “multi - perception interaction” is becoming a hot spot.

3.2.Backend system development

From static HTML pages in the 1990s to complex and lacking custom CGIs, then to the rise of Window NT, IDC, IDA, IDQ, VBScript-based ASP and Java technologies, Servlets, JSPs, PHP and Cold Fusion Server technology. It is particularly important to find a scripting language that is both safe and effective to meet the needs of work in a variety of Web development languages. As for the backend system concern, we can use the following techniques which hold satisfactory performance.

JSP. JSP is sponsored by the SUN companies, many companies involved in the establishment of the dynamic Web programming technology standards. It has the logical detaching and the convenient management of formidable performance and monitor and is easy to expand the ability, it can expand a network server by the most economical expenses, maintenance and support that provides independent platform for the enterprise field, any manufacturer can realize JSP in own system.

PHP. PHP is inserting in HTML and the multipurpose script language that was explained by server. As completely free public free software, it changed the free software specification to be high, code memory difficulty and use inconvenient and other characteristics. It can be used to manage the dynamic content, the support database and processing the conversation track, to send and receive Cookies, even constructs the entire site.

ASP. ASP is one set of server end ISM script language environment it allows the exploiter to connect the script language with the expandable software component installment. It has the formidable module, this is its merit, but only supports the operation in the operating system of Windows series, and all scripts must in the service end through the explanation execution, in addition it take CPU resources quite many characteristics, causes some large and middle scale website efficiency low and the large-scale multiuser website interactive abilities is bad, its weak type variable definition cut the difficulty and efficiency of study, the Web development market prospect is not very good. The table one shows the comparison result.

Language	JSP	PHP	ASP
<i>Operating System</i>	All	All	Windows
<i>Component Reusability</i>	Yes	No	Windows
<i>Application Support</i>	Yes	No	Yes
<i>Cluster Support</i>	Yes	No	Yes
<i>Stability</i>	Good	Perfect	Good

Table 1 – The comparison of the different programming languages

Scripting language has accelerated the development of software to a great extent. It has become one of the objects that people have been concerned about for a long time. For a language, it has its advantages and disadvantages, we must carefully choose the language used in accordance with the specific application. In the figure 4 we show the individual coding styles and features.

```

1 < form action = " / cgi-bin/ gday. pl" method = " GET" >
2 < input type = " text" name = " yourname" size = 30 >
3 < input type = " submit" value = " Click Me! " >
4 < / form>
5 < form action = " gday. cfm" method = " GET" >
6 < input type = " text" name = " yourname" size = 30 >
7 < input type = " submit" value = " Click Me! " >
8 < / form>
9 // Starting from this line the header item integrated.
10 #! / usr / local/ bin/ perl
11 #The line above tells the Unix shell where to find the Perl interpreter.
12 #On an NT box, you can leave this line out, but your Web server will have
13 #to know which program to run when processing requests for files with the
14 #extension. pl
15 $ input_string = $ENV{ 'QUERY_STRING' } ;
16 ( $ field_name, $ yourname) = split( / = / , $ input_string) ;
17 #Because we've used GET as the method, the HTTP request that is passed to
18 the server( if for example, I enter " Krish" into the text box) will read:
19 #GET/ cgi-bin/gday. pl? yourname = Krish HTTP/1. 0. The two lines above
20 # are used to separate the field name and the entry into different string variables.
21 print

```

Figure 4 – The individual coding styles and features for backend system development

4. Online English education system and the optimization

4.1. The MVC design pattern

The MVC pattern widely had been utilized in the general development of network information system as a flexible software design pattern. Meanwhile, because the network is an open style construction, with the resources of network connections fully has not been protected, the user can obtain all kinds of resources information that oneself need through the network anytime and anywhere. MVC refers to an input of the application, processes and outputs the flow separate according, Model, View and Controller way, such applies is divided into 3 level 11 model levels, the view levels and key-course which can be illustrated as follows, respectively.

1. The control can understand that to receive to request from user, matches in the model and view together, jointly completes user's request. The function of the division key-course is also very obvious, it is distribution, it told us clearly what model chose, what view chose, what user request can complete.
2. View represents the user interface for interaction with the user, usually with JSP to achieve. For Web applications can be summarized as an HTML interface, but that the XHTML, XML and Applet. With the complexity and scale of the application. The processing of the interface is also challenging, an application may have many different views. MVC design pattern for the view of the processing is limited to view the data collection and processing, and the user's request, not included in the view of the business processes.

3. To develop the model is the business process/status of the processing and business rules. Usually can use JavaBean or EID. The process of business process layer is the other black box operation, model view to accept the request of the data, and return the final results. MVC has not provided the model the design method, but only told should organize and management these models, to be advantageous restructuring of model and improved the repeatability can make analogy with the OOP, MVC has defined a top class, told its subclass that only to make these, but had no way to limit us to make these and this development staff to programming is important.

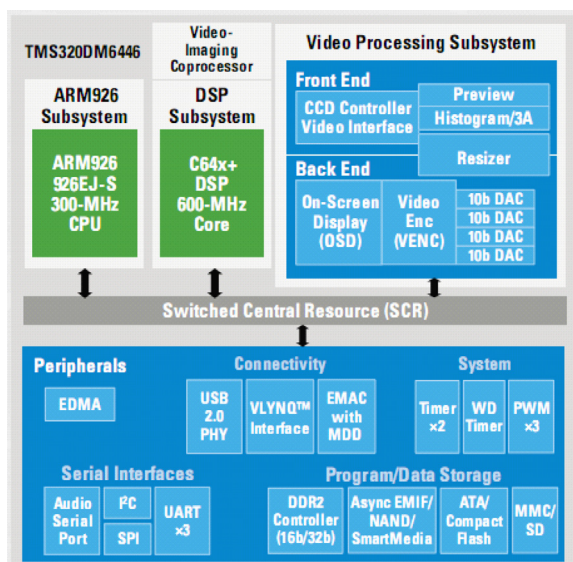


Figure 5 – The hardware-aware architecture of the MVC design pattern

As shown in the figure 5, the hardware-aware architecture of MVC design pattern is illustrated. ASP.NETMVC is official Microsoft MVC mode to write ASP.NETWeb application framework that is the second ASP. NETWebForm after another kind of developments and the ASP.NET developers have another option. ASP.NETMVC completely changed the Web developers using the Microsoft platform, the ability of the new framework design pays more attention to pure architecture, the use of the design patterns and test, controllability of all the code reduction to developers, therefore, the MVC model is widely used in large scalable Web project development. To understand it better, we summarize the relationships as follows.

1. The frame usually in these class examples between one group of abstract classes and has reciprocities indicated. The frame has stipulated the gross structure of similar application system. It has defined kind and the primary responsibility of the object, how kind and the object cooperates, as well as overall control flow and the record domain public decision making.

2. Framework is a recurring to field a group of large-grained abstraction to solve related issues, and used as a semi-finished products in the application, thus has great reuse granularity.
3. Framework is a common part of the field of application software extraction and encapsulation, by providing the unified and stable operation of the interface, so that the design and implementation of the details of the user transparent. The frame provides the function and revision that can directly use for the user expands the new function the way. The abstract father class and heavy load pre-definition clasp method in of white box frame through inheriting frame realizes general extendibility. The black box frame user combination and proxy method, and provide the module insertion frame the mechanism to realize extendibility through component interface.

For the further modification that will be adopted by the further system, union of Flex and MVC is a trend. Flex and MVC can be a good combination, Flex uses a development-based development model, all the code in the program can be defined as the formation. The use of components will be separated from the interface, but also distributed to each function set, and the realization of the code package. In addition Flex data binding function for the interface to provide a convenient data sharing. MVC mode dependent data binding in Flex and when data binding is used, Flex automatically copies an object's data, which is used by another object to provide a data source object called the data source object. When the data object changes, the target of the data will be automatically updated, and do not need to write code to force the update. Using the data binding to reduce the process, to improve the efficiency of development plays a key role.

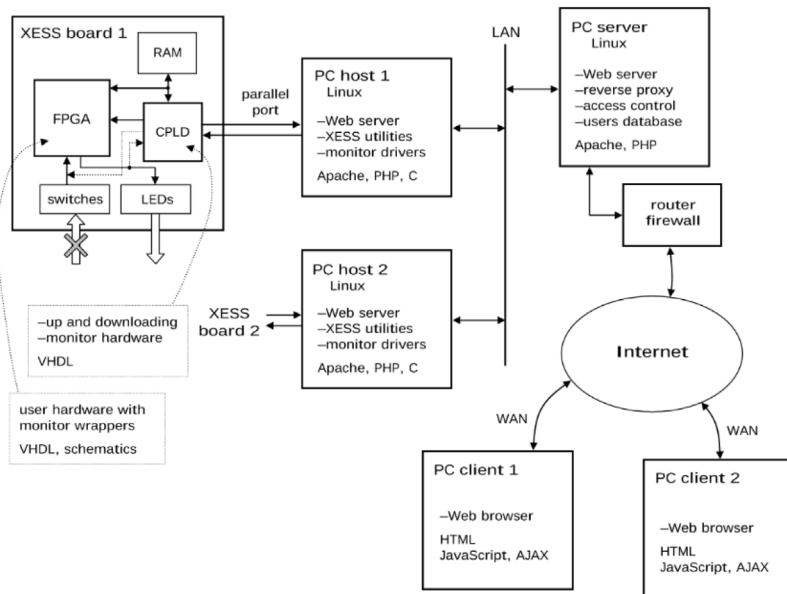


Figure 6 – The systematic architecture of the online platform

4.2. Online English education system design and implementation

We propose a web service-based framework of education system integration based on Web services architecture and technology composition, as well as the analysis of the existing integration model, combined with the specific characteristics of Web services technology. By introducing XML technology, XML technology and global data model can be combined with general heterogeneous data sources integrated middleware system can be better adapted to the open development environment. Web services for loosely coupled, reusable, component-oriented requirements are understood as the best heterogeneous platform data technology model.

As shown in the figure 6, the systematic architecture of the online platform is well demonstrated. The Web service as a basic application, it provides one to be able through Web to carry on the transfer to the outside API, the client side can call this application with the method of programming through Web, it for carries on client side server end communication through Web, as well as application integration, code and data the entrusting with heavy responsibility and other situations. For the efficiency, we use the XML to implement from listed aspects.

1. Processing of XML. Because the general XML documents in fact is a text document, therefore needs one be able to distinguish in XML document information text document Microreader-xml parser is used to explain that the XML documents and withdraw content.
2. XML Schema. The XML schema is a comprehensive validity constraint mechanism that aims to define and describe a type of XML document that uses markup constraints and describes meaning, usage, and relationship of each component, including data types, elements and contents, entities, and their contents and so on, so that the XML processor to better test validity.

Most of the existing systems do not achieve cross platform and open the real meaning of the cross platform Web application system, some of the so-called, which usually refers to the communication between CORBA and DCOM or RMI technology and distributed software architecture based on component, the client and server is a tightly coupled is also in the same framework to be able to achieve barrier free interconnection. But to achieve interoperability between the two architectures is not so simple. For example, the original development in Windows DCOM under the framework of the examination system, if changed into CORBA service architecture of OMG, and then a service agent component object and client application must make snap change.

As shown in the figure 7, sample code block for the designed system is illustrated. We adopt the characteristics of the semantic network. An online learning system based on the semantic Web must be a system that can be managed and used in a proper way and need to abstract a semantic level of interoperability. XML is a content-oriented markup language the core is in a standardized way to build data structure, and by the user to flexibly define the different applications in the use of tag combinations. But XML does not have the semantic description ability, but RDF proposed a simple model to represent any kind of data.

This model is composed of nodes and nodes with labeled arcs, nodes are used to represent resources on the Web, and arcs are used to represent the properties of these resources, so

```

1 public class AAdel extends HttpServlet
2 {
3     String str1;
4     public void service(HttpServletRequest req,HttpServletResponse res) throws ServletException,IOException
5     {
6         res.setContentType("text/html");
7         ServletOutputStream out=res.getOutputStream();
8         try
9         {
10             Class.forName("sun.jdbc.odbc.JdbcOdbcDriver");
11             Connection c=DriverManager.getConnection("jdbc:odbc:online");
12             Statement st=c.createStatement();
13             ResultSet rs=st.executeQuery("select adminid from madmininfo");
14             out.println("<body bgcolor=lightyellow text=blue background=paper_bg.gif>");
15             out.println("<br><br>");
16             out.println("<font size=5px>");
17             out.println("Choose the ADMIN-ID");
18             out.println("<form><select name=user size=1>");
19             while(rs.next())
20             {
21                 String str=rs.getString(1);
22                 out.println("<option>"+str+"</option>");
23             }
24             out.println("</select></form>");
25             out.println("<a href=http://peers:8080/servlet/AAD1Next..</a> <a href=http://peers:8080/");
26             out.println("</body>");
27             rs.close();
28             st.close();
29             c.close();
30         }
31     }
32 }

```

Figure 7 – The sample code block for the designed system

that the data model can easily describe resources and their relationships. The metadata level organizes the resources using XML/XML Schema and RDF/RDF schema, provides a unified frame for online learning system for many metadata standards. It among the various relational types through defined notions, establishes among between the relation between resources, resources and attribute, the attribute, eventually realizes the system the resources semantization. Certainly, this level must provide the visit connection for the upper formation similarly provides the unification to formation the resources of semantic-based.

5. Conclusion

This paper proposes the novel teaching mode of higher English under web-based environment. The Internet is the important source of people knowledge acquisition, and becomes the network information main interactive platform. However, along with its rapid development and widespread application, its flaw also gradually exposes. The magnanimous, multiplicity and the dynamic randomness and content of non-constitutive property and the ultra-link of page cause the low efficiency of information retrieval that is unable to provide very good personalized intelligent service for the network user. And the semantic web is to have been proposed to solve these difficulties, it is network as quantity information resources definition intact, given the formal semantics, grammar and thus easier to understand by a machine which is advantageous for the man-machine coordinated work. Under this trend, this paper designs the corresponding online education system. The system is implemented with the Java and related script languages. In the future research, we will apply the system in our school to test the effectiveness.

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Research on the Application of Multimedia Computer Interactive Teaching in Higher Vocational Colleges Education

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Abstract: With the rapid development of information technology, Multimedia teaching has become a major feature of modern education. In this paper, the author analyses the application of multimedia computer interactive teaching in higher vocational college's education. The characteristics of multimedia teaching are rich in resources, large amount of information, vivid image and strong interactivity. In multimedia network teaching, the teaching of organization and coordination is a comprehensive process. With large screen projection instead of the blackboard, with graphics, audio and video instead of the past teaching methods, with the courseware to complete the demonstration, visit and experiment, therefore to form a new lecture mode. Survey shows that multimedia teaching can fully mobilize students' learning initiative and enthusiasm, improve students' learning efficiency, and improve teaching quality and teaching efficiency.

Keywords: Information technology, Multimedia computer, Interactive teaching, Vocational colleges

1. Introduction

In today's rapid development of information technology, multimedia technology has matured, multimedia teaching has become a major feature of modern education, multimedia teaching represents a development direction of modern education. Multimedia teaching refers to the application of multimedia technology, through a variety of media teaching information collection, transmission, processing and sharing to achieve the goal of teaching and learning new teaching model (Borrego, 2007; Diefes, 2013). In the teaching activities, the use of computer and technology in the teaching process of information, to achieve the purpose of teaching, to complete the teaching task (Finelli, 2008; Gilbuena, 2015). These are transmitted information may be the actual information learners must absorb, learn from computer flow, or feedback on the learning process, or information about the learners is the use of the model, or between learners and teachers of information exchange. Multimedia teaching is characterized by: rich resources, large amount of information, vivid, interactive and strong (Halim, 2014). The advantages of multimedia teaching are rich and vivid teaching resources, friendly man-machine

interface, can fully mobilize students' learning initiative and enthusiasm, improve the students' classroom learning efficiency, improve the quality and efficiency of teaching.

After mid-1990s, the information technology, which is the core of the multimedia technology, has been widely used in the field of education in our country. The theory, method, technology and application of educational technology have been changed deeply (Lonner, 2013; Gonçalves et al., 2015). Over the past 20 years, multimedia teaching has developed rapidly in our country, scholars have carried out a multi-faceted research on multimedia teaching, and the research results have emerged in an endless stream (Moore, 2015; Pereira, 2015). Many of these results are the case study of multimedia teaching, but there is a lack of macro level research, especially the lack of investigation and Research on practical ability (Roselli, 2006). So that, we present computer multimedia teaching in Higher Vocational Colleges conducted a large-scale survey from the macro perspective, the study aims to have a clear understanding of China's current higher vocational colleges computer multimedia teaching status, and find problems and find solutions to the problems, in order to facilitate the healthy development of computer the multimedia teaching in Higher Vocational Colleges in our country in the future.

2. Computer multimedia technology

2.1. Computer multimedia

The multimedia teaching system is a kind of new teaching system, it combines voice, image, video and text media as a whole, can produce a lively and vivid effect, help to improve the students' learning interest and memory; at the same time, make full use of multimedia performance, participation, attention and controlled the characteristics of



Figure 1 – The computer multimedia

strong, not only to teach knowledge, developing intelligence and training ability and can achieve individualized and individualized teaching objective, function of multimedia teaching system in quality education is very obvious. The multimedia system is the use of graphic menus, icons, etc. multi window appearance image of the graphical interface as the man-machine interface, combining the interactive function of the audio-visual features of TV and computer together, create a new interactive graphic music, rich and colorful human machine. It can effectively stimulate students' learning interest.

The organization structure of the teaching information has the form of linear structure, branch structure and net structure. Traditional teaching materials, video materials and the organization structure of the recording materials are linear and orderly. However, people's memory is the network structure; this linear structure in the objective also limits the freedom of human association thinking play. As a result of multimedia are generally used to manage the teaching of hypertext information. Hypertext method is a new type of information management technology, which is to collect, store and browse the discrete information in order to establish and express the relationship between the information technologies. It takes the node as the unit, in the node and the node through the link between them, forming a network of information structure, is suitable for the characteristics of human association thinking, is conducive to the cultivation of students' innovative thinking. In the traditional classroom, a teacher is faced with dozens of students in the class; it is very difficult to achieve the goal of this kind of individualized teaching. The application of multimedia teaching system, the teacher should use CAI courseware development system. Design corresponding courseware. The courseware cognitive process, can be designed to automatically or semi automatically identify each student's cognitive speed or intelligence levels, and guide students to enter the appropriate counseling process, to guide students to learn. Such as students with independent thinking, can be used to find the structure of cognitive process, not independent thinking of students, can be used to explain the teaching method design program, and so on. In the process of teaching, students in the student machine by the counseling process to guide learning. Students to use the teaching system and

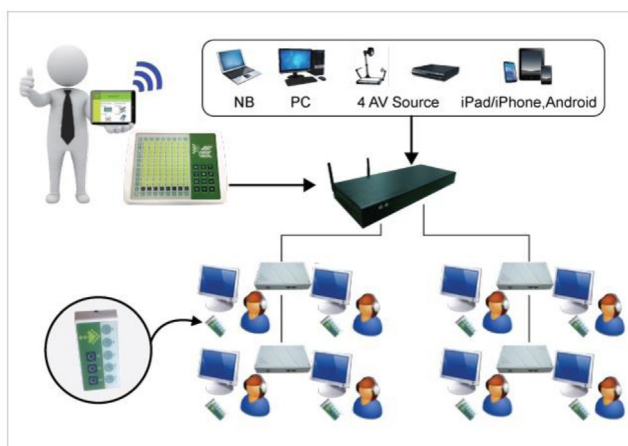


Figure 2 – Multimedia classroom

learning content to the cognitive object problems in teaching system provides a solution processing method fully reflects the degree of perfection, depends on the teachers' teaching experience in the design of courseware. Students can use the multimedia teaching system "electronic hand" function, to ask the teacher. Teachers can use the multimedia teaching system of the "screen and audio and video broadcast" function, the teacher's computer screen, image, VCD. Voice, music and other signals broadcast to a certain group or all the students, to answer questions, counseling or explanation.

2.2. Interactive whiteboard

From the blackboard writing to the whiteboard, from the whiteboard to the electronic whiteboard, from the whiteboard to the interactive whiteboard, through continuous reform and innovation, the interactive whiteboard has become the most powerful tool of information technology education. Interactive electronic whiteboard by the induction whiteboard, electronic pen and other hardware and whiteboard software, etc. It combines computer technology, microelectronics technology and electronic communication technology, has the function of traditional blackboard, whiteboard, projection screen, electronic copy board etc., is a kind of teaching equipment with human-computer interaction function. Teachers or students can use electronic pen or finger to operate directly on the electronic whiteboard, such as writing, notes or drawing etc. Any content on an electronic whiteboard can be stored in a computer to be reused. Whiteboard software is software platform matched with interactive electronic whiteboard, which not only support between man and computer, projector, whiteboard, exchange of information, but also can be equipped with the subject material library and library resources making tools become a powerful, compatible with a variety of software intelligent operating platform, teachers can freely call on the electronic whiteboard all kinds of material or application software for teaching. Interactive whiteboard can be widely used in teaching and training, distance learning, conference presentations, and other fields.



Figure 3 – Interactive electronic whiteboard

Many researchers believe that the application of interactive whiteboard in teaching can enhance students' learning interest and motivation, improve their participation in

learning activities. As an image and color teaching platform, the interactive electronic whiteboard has a good visual effect, which can effectively enhance the students' cognition and understanding of the teaching content. With the help of the interactive whiteboard graphics manipulation, recording and teaching activities teaching demonstration and interactive functions, by allowing students to practice in the interactive electronic whiteboard, and with innovative and flexible teaching strategies can effectively enhance students' understanding of teaching content. The results show that the good visual interactive whiteboard function and multimedia integration function of multi pattern characteristics, can meet different students of different learning styles and educational needs of the demand, so as to enhance the students' understanding of narrative.

3. Multimedia teaching in Higher Vocational Colleges

3.1. Characteristics of teaching in Higher Vocational Colleges

The training objectives of the higher occupation education is to cultivate the necessary theoretical foundation and strong technical development capability, able to learn and use of high-tech knowledge, solve practical technical problems of the production operation and management, and technology and production operators to communicate properly, high-level applied talents of science and technology knowledge and guidance operation. To this end, higher vocational education must be organized and implemented to the needs of professional post. As an important part of the educational system, vocational colleges must carry out the party's educational policy in all aspects as well as other levels of education, and cultivate talents with moral, intellectual and physical development. But in the talent training objectives of the specific specifications and standards, different nature, different types, different levels of the school is different. Higher vocational colleges are the first line of production, construction, management, and service to train advanced technology applied talents. This requires the basic way to achieve educational goals; teaching must have a clear direction, that is, to the employment of students as the guide, in order to develop highly skilled personnel as the goal.

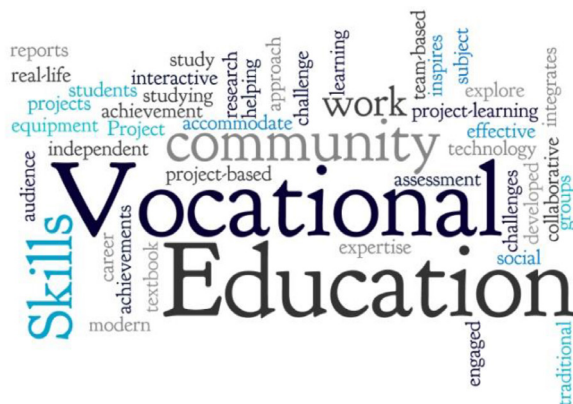


Figure 4 – Vocational education

Because the essential requirements of the teaching goal orientation and teaching enough, requirements of higher vocational teaching content must be practical, targeted, must according to the choice of teaching content of employment needs to be targeted, the proper handling of the recent employment “necessity” and “the future development of relations between the transfer available”, the scientific construction of curriculum structure in strong, can cultivate the practical talents of higher. The higher occupation education training students in teaching requirements should not pursue systematic and complete theory, theoretical knowledge can only grasp the professional necessary professional skills, emphasize the practicability, pertinence and learn the basic knowledge of the applicability of the theory in practice. Focus on practical application. In short, the training of talent is not undergraduate compression, nor simple operation, but high level of application. Specifically to consider the following points: one is the design of teaching objectives teaching content must be aimed at cultivating high skilled talents, to achieve “necessity”; the two is according to the employment diversity, flexibility and pertinence of teaching and learning in different positions require skills; three is to pay attention to the curriculum of modular, the organic combination of basic knowledge module, general skills module, specific skills module three; four is to do as much as possible the teaching content and students personality to adapt to the flexible combination of courses.

3.2. Multimedia teaching model in Higher Vocational Education

The teaching mode is the stable structure of the teaching activity process which is carried out under the guidance of a certain educational thought, teaching theory and learning theory. The renewal of teaching means to make people understand and understand the teaching activities, and provide technical support for carrying out the education theory and teaching theory. The multimedia technology provides the ideal conditions for the realization of constructivist learning environment; on the other hand, the theory and teaching theory of constructivism, to realize multimedia teaching student-centered teaching model provides a theoretical basis for. The teaching process is the process of teaching the students to learn the teaching materials using various teaching conditions. The general part of the teaching work should include preparing lessons, teaching, homework arrangement and correcting, extracurricular guidance and teaching effect evaluation. However, the use of different teaching methods will have a certain impact on all aspects of teaching, teachers and students to cause a lot of changes in teaching behavior. The traditional blackboard, chalk, textbooks and multimedia graphics, audio - visual way is clearly not the same. The application of multimedia technology in the teaching process of higher vocational education can be reflected in the process of teaching:

- **Teachers prepare lessons:** Preparation of multimedia distance teaching is the design, copy, editing, processing network and multimedia resource center resources, the formation of electronic courseware and multimedia courseware, stored in the cyber source center through computer, for the class or student self-study call. In this mode, the teacher’s main focus is on the design of the teaching strategy, and put in the rules of learning to adapt to the students
- **Teacher lectures:** In multimedia network teaching, the teacher organization and coordination teaching is a process of teaching, discussion, guidance,

induction, analysis, demonstration, observation, experiment, practice and so on. Large screen projection instead of chalk and blackboard, with graphics, audio and video instead of the mouth that hand painting to convey information, with the courseware in the completion of the demonstration, visit and experiment and other teaching links, the formation of a new lecture mode

- **Homework correcting and out of Class Counseling:** In multimedia teaching, students' homework is not to write or describe on paper, but through the Internet. Extracurricular counseling can be carried out anytime, do not have to set the time and place, a great place for students to learn.
- **Evaluation of teaching effect:** Students on the main evaluation teaching of Higher Vocational Education in the past the examination results. Multimedia network of higher vocational education, completely break the examination mode, with the computer as a tool to replace the paper roll test, with a separate examination instead of a group of exam, exam instead of people with exam, exam marking, edge computer statistical analysis results instead of artificial scoring, statistical analysis of test results, the students know the results instead of on the spot know the results after.
- **Autonomous learning:** The multimedia teaching in higher vocational colleges, the only channel self-study mode breaks through reading or reading notes to obtain knowledge, they according to their own needs, at the right time, right place, right under the condition of repeated use of VOD, watch a variety of resources, including teachers teaching reference materials such as rich resources.

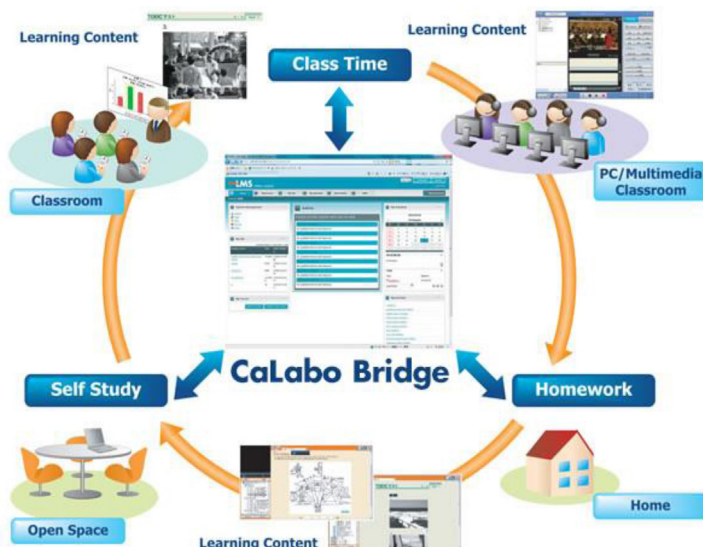


Figure 5 – The multimedia teaching mode

4. The development strategy of multimedia teaching in Higher Vocational Colleges

4.1. Strengthen the construction of multimedia teaching hardware

The hardware construction is a basic construction of the multimedia teaching; teaching should be based on the existing equipment conditions and the actual need of carrying out multimedia teaching to increase investment, rational allocation of resources, to provide a good hardware environment for teachers to carry out multimedia teaching. At present, teachers should be teaching with multimedia computer, it must be in the multimedia room or multimedia audio-visual room, and for the majority of higher vocational colleges, this place is very few, even if there is, is also used in the teaching of computer subject, but seldom used in other subjects. In a number of economic strength, the parties to the education of the input is very adequate higher vocational colleges, has the entire classroom layout into a multimedia network classroom. In this class, it is very convenient and efficient. For example: the basic computer course in operating knowledge, for teachers, students can see very clearly, in the ordinary classroom teaching effect and the first theory, in the practice room than it is a world of difference. To do this, the biggest difficulty is still insufficient education funds, it is impossible to the entire classroom all the equipment up. But we cannot affect the teaching effect of the premise, the configuration of the multimedia classroom to make some changes to reduce investment.

4.2. Daily management and maintenance strategy

Due to the differences in construction objectives and requirements, most of the equipment configuration and standard of multimedia classrooms have been built in most vocational colleges. Therefore, according to the requirements of different courses and the number of students to arrange the appropriate specifications of the multimedia classroom, make full use of multimedia classroom resources. According to the resources of the multimedia classroom, and the nature of the subject, the course content to arrange the multimedia classroom. The utilization rate of the multimedia classroom is very high, the user is constantly changing, the level of the operating equipment is not the same. Therefore, there will be various types of failures in daily use, if not timely treatment will have a direct impact on teaching. On the one hand, it is to strengthen the maintenance of equipment in multimedia classroom, improve the level of technical service, establish classroom monitoring system and the rapid response mechanism of the multimedia classroom. On the other hand, to do a good job on the regular inspection and maintenance of equipment, can extend the service life of the equipment and prevent the occurrence of failure. Third, in order to reduce the adverse effects of dust on a variety of instruments in the multimedia classroom, it is best to ask the multimedia classroom must use the whiteboard, to eliminate the dust on the equipment. Fourth, to improve the use of multimedia classroom registration system, fill in the record and fault recording equipment, through the timely understanding of various problems in the use of multimedia classroom equipment, in order to carry out scientific management and maintenance.

4.3. Pay attention to the leading role of Teachers

Multimedia teaching system is a kind of modern teaching tool. Multimedia teaching provides a better environment for the exchange of teachers and students. In the multimedia

teaching process, the teacher's leading role in any other teaching methods and tools cannot be replaced, the leading role of teachers is based on differences in learning basis, learning psychological factors, intelligence and non-intelligence factors, the design and arrangement of teaching, so that different levels of students to participate in the learning process. This undoubtedly puts forward higher requirements for the quality of teachers. Multimedia courseware capacity, and more to stimulate the students a variety of senses, if the content is too much, too fast, the students will be subjected to increased knowledge of fatigue, lack of concentration, poor results. Teachers should be based on the actual situation of the classroom and students' ability to accept, arrange appropriate explanations, questions, inspire and review, and leave the time for students to think about the problem.

Constructivism, student-centered teaching concept based on can give full play to the initiative of students, mobilize the reserves in the brain of the great learning potential, multimedia teaching mode reasonable teaching design can not only make the students complete the teaching tasks within the prescribed period, to achieve the purpose of teaching, also can make the teaching towards personalized learning, active learning direction, cultivating students' autonomous learning ability. In the specific application of multimedia technology, it should be considered how to play a role in the students' autonomous learning, stimulate their enthusiasm, and publicize their personality.

5. Conclusions

The use of multimedia network teaching, no doubt to provide students with a full range of multi-channel, the most direct hearing, visual perception, is the inevitable trend of educational development. The focus of multimedia network teaching in higher vocational colleges is to apply the theory to practice, focusing on the ability of the students to translate the theoretical knowledge into practical ability and the accuracy of the actual operation. In short, with the rapid development of science and technology, more and more media will be integrated into the classroom teaching. As long as we can put the students, teachers, the relationship between the multimedia auxiliary status, deal with multimedia in the classroom teaching, the proper use of multimedia, will make classroom teaching more exciting, it will make classroom teaching achieve pleasant and large capacity.

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Research on Interactive Creation of Japanese Animation Film Music under the Background of Computer Multimedia Technology

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Abstract: The development of computer multimedia technology, especially the development of musical instrument digital interface, which has brought a revolution in the field of music. In this paper, the author analyzes the interactive creation of Japanese animation film music under the background of computer multimedia technology. Multimedia music system brings great convenience to music creation, from the creation perspective, the composing is no longer stay in piano, when the musical ideas generated, it can be directly made into the sound and stored in the sequencer. At the same time, the author analyzes the style of Japanese animation film music creation, and summarizes the art function of film music.

Keywords: Computer multimedia, Sequencer software, Interactive creation, Animation music

1. Introduction

The rise of MIDI technology brings a revolution in the field of music. All kinds of electronic musical instruments and equipment with MIDI interface are springing up and emerging. In the country, performing arts and music recording companies use MIDI equipment and technology for music performances and music production, the music industry has a greater impact (Finelli, 2008; Bao, 2011). Some colleges and universities have established the electronic piano classroom or the electric piano classroom, applies in the music teaching (Du, 2013). With the rapid development of computer technology, the combination of computer and music is increasingly close, with the use of computer electronic synthesizer and other musical devices came into being (Gilbuena, 2015). Computer music software is a great variety, everything, and more and more perfect and powerful function. MIDI equipment, computer and music software combination, constitute a more powerful than the MIDI system function of the computer music system (Tang, 2011; Yang, 2014). Since then, the computer music in radio and television, music recording, music performances, and other fields are widely used, has played an important role (Halim, 2014). Also get attention and applied widely in the field of music education in computer music, music colleges and normal music department began to

use computer music system for teaching, creation and research, some colleges have computer music lessons or minor.

With the rapid development of society, the new culture industry of animation film develops rapidly, and animation film music has become an important part of audio-visual elements (Long, 2013). There are a lot of measure in an animated film successful, one of the people most concern is the film's soundtrack, high-quality soundtrack can put the whole movie characters more vivid details. Animated film music is a part of the film music, animation film music in music art is a very novel form, it has its own characteristics and aesthetic value (Roselli, 2006). In the field of animation film music, the most representative is a famous Japanese musician Hisaishi, as one of the most prolific composers of modern Asia, the most influential at present, his animated film music formed a unique style of music, and the development of a more comprehensive type of music, has become a symbol of world music Hall in.

2. Multimedia music teaching system

Multimedia music teaching system is the combination of multimedia computer and computer music system. The system combines the multimedia information processing function of the multimedia computer with the music equipment and music software, and displays the contents of the music teaching in an intuitive, specific and visual way. Application of multimedia music teaching system for teaching, management and other activities, can significantly improve the quality of teaching and work efficiency. Multimedia music teaching system equipment can be divided into the following types: Computer: multimedia computer (including the sound card, TV card, Modem, etc.). Projection equipment: projector, video display platform. Video equipment: video recorder. Audio equipment: audio cassette, power amplifier, speaker. Music equipment: electronic synthesizer.



Figure 1 – Multimedia music

1. **Multimedia computer:** multimedia computer can handle the text, graphics, images, sound, animation and movies and other media information, you can convert the information into digital signals and edit and modify.

2. **Projector (or large screen color TV):** the computer screen on the contents of a clear, large screen display, so that more people can see at the same time display a variety of text and image information on the computer screen.
3. **Big screen:** hanging on the wall of the classroom, used to accept and display projector projection of the image signal.
4. **Video display:** you can send books, pictures, pictures and real image information directly to the projector or large screen color TV shows; you can highlight and enlarge the local image according to the needs.
5. **TV receiving card:** TV receiving card to watch television program, can be directly displayed on the big screen or tv. The image effect and sound quality are better than that of the common TV set.
6. **Sound card:** sound card is computer audio signal processing accessories, it can carry out the music creation and performance by computer with M IDI interface and the corresponding software can make electronic music instruments.
7. **Speaker:** accept the signal transmitted by the power amplifier, the signal is reduced to sound playback.
8. **Electronic synthesizer:** electronic synthesizer with a built-in computer interface can be directly connected to the computer, which combines music and audio playing keyboard as a whole, through the keyboard to play music directly to the computer input information, which can provide high quality audio, multi tone and multi voice polyphony.

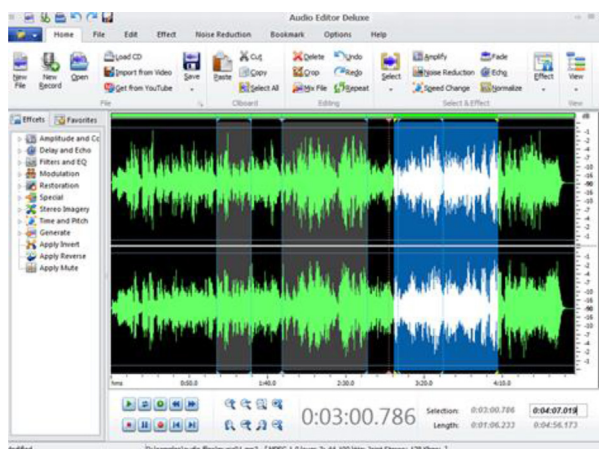


Figure 2 – Synthesizer

Sequencer software is the most commonly used music software, it can play all kinds of music data recorded into the computer, and then edit, delete, modify, shift splicing, generation of these data, then the data replay sequencer software similar and multi-track digital recorder. The most famous sequencer software is Cakewalk, using Cakewalk sequencer software for music production, digital recording (hard disk recording and audio editing). Can use it to assist the teaching of composition theory, assisted music creation, etc. The tone editing software is divided into the tone database, the synthetic

software and the sampling waveform editing software. Timbre synthesis software is to turn the synthesizer or sound timbre synthesis parameters on the computer to make software, data processing and graphical way to adjust the parameters of instrument, the synthesis of new timbre. Sampling waveform editing software is an electronic instrument with RAM waveform sampler or the use of the software, it is mainly through the waveform data MIDI line input sampler, and then edit it, new timbre synthesis



Figure 3 – Sequencer software

Multimedia music system brings great convenience to music creation and music composition. In the past, the auxiliary instrument is mainly piano music creation, both vocal and instrumental works, or solo and ensemble music, was first played on the piano, audio-visual effects. To the piano as the auxiliary instrument is convenient, but it is hard for them to play music, such as complex texture and figuration, the piano is also difficult to do. In addition, the work of the requirements of the tone can only rely on auditory imagination to add. It is difficult for an ordinary music worker to turn the composer's creation from the music into the actual sound, and also need to organize a series of complex work, such as band, rehearsal, and sound recording. With the computer music system, not only can solve the above contradictions, but also has more superiority.

First of all, from the music imagination, the synthesizer provides a variety of musical instruments in a variety of different styles of timbre, rhythm, drums, music, which can stimulate inspiration, arouse the function of imagination, can even provide creative material. From the creation of the control means, the composing is no longer stay in piano and music, but the musical ideas generated by one, can be directly into the sound, and stored in the sequencer, if necessary at any time, change notes, additions and deletions speed, strength and so on, can choose to listen to any one voice or overall effect. The use of real-time recording, can make the recording of the performance of real, delicate, vivid.

The use of step recording method, you can separate the pieces of difficult to play, step by step entry, even if the keyboard is not proficient can also be music creation. From the creation process, it set the creation, performance, command, recording in one, reducing the intermediate links; music creation process is the production of music, recording process.



Figure 4 – Music creation process

3. Japanese animation film music style characteristics

3.1. Animation Film Music

For the animated film and music plays in the animated film in a considerable role, because the animation film has its characteristics on relatively small, and the animated film mainly consisting of sound and music background to the development of the story, pictures and music together, and at the same time show in front of the audience is the main feature of modern film and television works. The music show in the form of requirements are different, sometimes need to be intense, sometimes sad and so on, these are the needs of music creation themselves feel so as to correspond to the movie screen with music, and thus enhance the overall level of animated films. In the conception of film music, is the need for in-depth understanding of the story and the characters and the movie authors want to express the content of the music, and together, achieve unity of visual and auditory, making animated films show a more perfect, such as the combination of Hayao Miyazaki's works is a typical the pictures and music perfect works

First of all, the film and television works of music and our daily concerts and concert music is not the same, the latter's stylized performance is very strong. Our daily movies of the figures and their movements, facial expressions, speaking from life than life, have a certain exaggeration; secondly, the film and television works of music not only music, but varied, such as music as TV, the original black and white TV, and now is the color TV, for the music, but also by the silent music to music and change, in the beginning is silent, only the evaluation of the film and the audience laughter echoed in the shadow of the audience. With the development of science and technology, film and television works also entered the sound era, the role of dialogue and story language in the movie

soundtrack for the film is more and more big, compared to the traditional single music, modern music makes the film more artistic charm, abler to buckle moving heartstrings. Only the goal of music producers and film makers are consistent, to create a good animation film music and film and television works. Movie music creation need without damaging effect on the original film director, starting from the movie required auditory effects through the music needed for the film to penetrate and heighten the atmosphere and emotion. Thus, we should not deviate from the principles of music art, on the basis of the overall art of the film, music and movie content mutual coordination, mutual integration. This is not only conducive to the completion of the creation of animation film music, but also conducive to the sublimation of the story of the film, which is a key factor in the development of animated films.

3.2. Animation movie music creation

The famous Japanese animation director Hayao Miyazaki film a general description of the story happened in the distant and mysterious ancient world, or more science fiction future era, so Hisaishi music generally has the characteristics of simple and clear tone, empty and vague, which give the audience a mood distant scene the audience, as if in a mysterious dream personally on the scene in the same space, gives us endless thinking space. According to the characteristics of the style of music, we can see that Hisaishi's music style is the last century in the early 90s. The New age style N, actually is also a kind of brings a quiet, comfortable, leisure interest in music. This style of music to create a tranquil and harmonious atmosphere can relieve the pressure of the heart in life, to a certain time and space for a short meditation, to forget the sorrow, reach a soul detached and relaxed. Along with the development of society, the promotion of human spiritual civilization, animation film has become an indispensable part of today's popular culture and entertainment, for the audience, its status is also indispensable. To a certain extent, the animation film and other films are more similar, is the story of the show and give the audience a physical and psychological baptism and feelings, which also has a certain degree of educational significance.

In the creation of music, the melody is very simple, is to die, and other techniques to carry out into the cyclotron as the main body, emphasizing the development of rhyme and rhythm, make people for the main melody of music is more easy to remember, and can carry out simple humming. In the music of Mr. Hisaishi's works, it is also a strong. He is generally through the positioning of the body, according to the main affective factors determine the performance of music or themes of the times, and then through different ways or different style to render or performance of this theme, through the use of different instruments and with the music in a variety of forms change a lot, but it is not out of order, random change, there are more or less contact in music. Another feature of the music is music written at the beginning of the story when clever corresponding animation movie plot and the protagonist's character, so as to promote the film, to better meet the needs of the audience and television works now, so this is very important because love is not so much the field of music one of Mr. Hisaishi's music creation. The current film and television works to attract more viewers in a very short period of time, it is needed to make the film and the film soundtrack to the audience's heart, touch the hearts of the audience.

3.3. Theme creation technique

In music creation, theme Enthone independent, complete and expressive, and did not deviate from the theme of the film and television works, through a unique form of music, music theme is “”. In young age, Hisaishi and the famous Japanese music educator Mr. Suzuki Jinchi made about studying violin, after its creation method and the film music composer Philip Glass as well as the influence of modern minimalistic music master Steve Ickey et al. By Hisaishi for the creation of animation film music, the theme of music has the following 3 characteristics:

1. Melody bright characteristics

The above examples selected from chinchillas, the melody is simple and clear, distinct rhythm, the whole song is full of playful, and accompanied by a strong Japanese country folk wind, at the same time, without losing rigorous, this music version more, such as symphonic edition, electronic version, printing edition and so on. Symphonic Power, gives a sense of the sacred and the suite to be exceptionally heavy feeling, piano and Cello together, to give people the feeling that time crossing. Although, it makes people gradually forget that once call countless people heart the story, but also give people a shock, childish, but particularly sacred. In the sound of music, we will feel the smell of soil from the countryside, can feel the breath of trees, and hear the wind singing.



Figure 5 – Totoro music

2. Progressive to the main melody line

“Princess Mononoke” of this work can be said to be Hayao Miyazaki and Hisaishi two masters make painstaking efforts masterpiece, reached their peak, “Princess Mononoke” clear long style, but also laid a more Hisaishi’s position. From this melody is not difficult to see that he is progressive to the main line for the theme song. “Progressive” is the relationship between the tenor and the sound of music is not greater than 4 degrees, the main description of the soft music form, through the upregulation of the expression of the emotion scale to rise. The film took place in the eastern world a long time ago, Hisaishi through the music of the material to show a strong sense of the Japanese national flavor.

Hayao Miyazaki's film works in general is about social discontent, but in the stories of the hard work have changed the destiny, eventually to the successful end, this film is based on the very high music score requirements. So in Hisaishi's music, it is not difficult to find that his music is generally in sorrow and with hope, has a very strong emotional color.

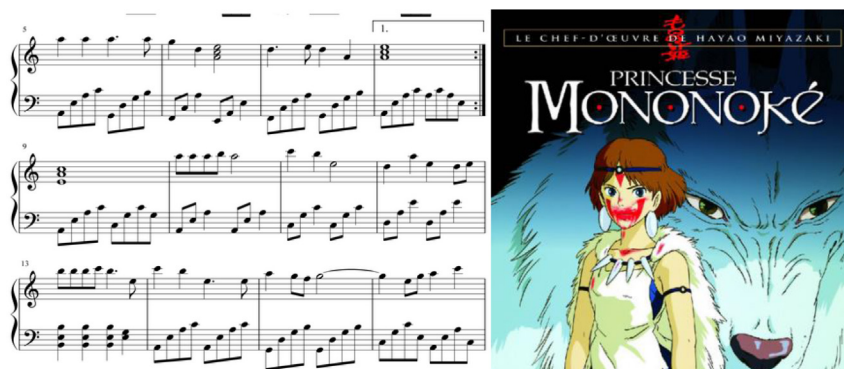


Figure 6 – Ghost princess

3. Popular “segmentation rhythm” is the main element of its rhythm

Hayao Miyazaki's “sky city” is full of new elements in the film, Hayao Miyazaki painting work perfect to show the story background, myth and science fiction feeling, even a little taste of the industrial revolution in europe. The basic idea of this music in the music began to beat on the set, the treble voice syncopated melody, after several times after the uplink appeared under four degrees, the expression of gentle but slightly sad mood, and the rhythm of segmentation and give a person a kind of steadfast feeling. The music is not difficult for us to find the theme of this song is very concise, but without losing the music to express the content, still expressed important ideas in film and television works, only with sadness, while the rich emotional expression of faith. Influenced by



Figure 7 – Sky City Music

many music masters, their music has streamlined and distinctive style, and are used to show the way and nationality story, the creation of the way they played a very important influence in the late Hisaishi music creation ideas.

4. The artistic function of movie music

4.1. Promote the development of the plot

Although the music has its own unique artistic nature, but for film music, with the characteristics of the film plot development is the main principle to follow, he fusion story based on its own artistic expression on the characteristics of artistic conception. When the film music in the early stage of creation, to fully understand the plot of the movie, to show the way, and to show the film artistic conception to locate the direction of music creation, music and movie to integration, beautiful music and the story of the film's aesthetic, the best realm. This is the direction of the pursuit of all films. The movie shows the story progress the main method is to set the connected story, and in the film with proper music will also promote the plot effect of expression, through the story of the picture and background music to let the audience know the degree of film production costs more profound. With a simple and simple rhythm, it is the main way for the film score to highlight the character's character. For example, in the film "spirited away" in music creation, it is through the image of music for different characters in the film depicts different character image, the development of the story of the ups and downs, and not to put undue pressure on the whole process of Chihiro Mountain Film in suppression.

At present, the display in front of our film and television works, there are music and music. Animated film is a special kind of art, so the requirements of the soundtrack are also very high. Because the film works as an art, it is from life than life, and not in fact true portrayal, but somewhat unreal, it needs to increase the color for the music, the more natural development of movies. For example, by Hisaishi for the animated film soundtrack, the overall effect of the film added a lot of features.

4.2. Create a solid atmosphere

Music can enhance the expression of the film picture. Although on the surface, the picture and music of the film are independent of each other, but they can cooperate with each other. Music can improve the performance of the screen on the screen effect, so that the audience's perception is more profound. This type of music is lyrical or delicate beautiful music can be closely linked to the heart of the audience, the audience and the distance closer to the film and television works. Hayao Miyazaki's a very representative work is "Totoro", this work is a magic realism animated film. The story is in under the accidental opportunity, two little girls know the forest in the "immortals" Totoro, the mother of two daughters in poor health and long-term hospitalization, father's work is very busy, so the girl love transferred to the chinchilla's body, they grew up together. The story of a rich fairy tale shows the complexity and variety of life through the child's perspective. Hisaishi used percussion music in the soundtrack of the film,

and wrote a humorous piece of music. My fat body repeatedly show and spoof parody expressions and because the body is overweight and difficult image positioning of the naive immortals. Hisaishi's soundtrack to the film and television to improve the picture, so that the animation more vitality.

4.3. Express emotion

Animation film music is the soul of the film and television works, to a certain extent, the animated film itself for the plot of the story and characters of the interpretation of the expression has certain limitations, and the music can be a perfect interpretation of the image of the characters, character and environment story happened thus, music for film and television works, is essential. The main music animation film is the theme music, the audience can heart for music perception to image of the characters have a deep understanding, and through music can also put the film characters to express the emotion expression more vivid and delicate, create visual and auditory aesthetic mood in one film, to impress the audience. Animation film has a very unique form of expression, to a certain extent, the general will be in an unexpected scene to show the world in front of the world. So sometimes, film and television works to the audience show some of the things that the audience does not understand and recognition, and music is not the case, the music can enhance the understanding of the audience for the film and television works acceptance, thus, music for film and television works to say is very important. Show all the characters in the animated film is unreal and unreal, so the character image is not vivid, of course, is not possible to express emotions in place, however, the music was added, it can be a good solution to the problem of animated film.

5. Conclusions

In recent years, the Chinese animation industry has gradually become a pillar industry in the cultural industry in the context of vigorously promoting the cultural industry in China. People are becoming more and more agree with the art form of animation film. Animation film music has gradually become an important part of audio-visual elements with the development of the animation film. There are a lot of measure in an animated film successful, one of the people most concern is the film's soundtrack, high-quality soundtrack can put the whole movie characters more vivid details. Quality music is the soul of the animated film, can touch people's hearts. The overall production for the animated film, the background music for the appropriate collocation in the right plot, the film could be pushed to a peak, and touched the audience's vision and mind, let the film's memories. Therefore, inspired by the study of Japanese animation film music, these theories can promote the development of animation film production in the future.

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Research on the Regional Difference and Spatial Effect of Green Innovation Efficiency of Industrial Enterprises in China

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Abstract: Compared with the traditional innovation efficiency measured by the DEA model without considering the non-expected output, this study uses the SBM model to measure the green innovation efficiency of Chinese industrial enterprises without considering the non-expected output, and analyzes the regional differences of the green innovation efficiency of industrial enterprises in the regions. In addition, the spatial econometric models are used to evaluate the spatial effects of the green innovation efficiency. The results show the traditional innovation efficiencies without considering the undesirable output are higher than the efficiencies considering the undesirable output, but the innovation efficiencies have a large room for improvement in both cases (with and without considering the non-expected output). The efficiency gap among provinces is larger, which presents the rule of diminishing from eastern, central to western, and uses cluster analysis to divide the provinces into three groups according to the efficiency level. There is a spatial effect on the green innovation efficiency of Chinese industrial enterprises.

Keywords: Industrial enterprises, green innovation efficiency, cluster analysis, spatial effect

1. Introduction

With the development of reform, China has acquired a significant growth in economy and society. However, the development approach of high input, low output and high pollution is a serious constraint on the China's social sustainability. In addition, the world has been paying more attention on global warming and carbon emission problem. China is facing the shortage of domestic resource and serious environmental pollution. Therefore, China must take into account the impact of environmental pollutions in the rapid development.

The construction of an innovative country has become the inevitable choice for China to the road of healthy and sustainable development. At present, as more attention to ecological environment problems given by the world, scholars started to study the green innovation efficiency of various industries. The industry is gradually becoming the significant force in promoting the development of China's economy and society.

With the tide of green economy comes, objectively calculating the green innovation efficiency of China's provincial industrial enterprises has a vast importance to realizing the sustainable economic development.

The green innovation efficiency, as the important part of green innovation, is mainly studied by Data Envelopment Analysis (DEA). The DEA method was initially raised by Charnes et al. (1978), who used mathematical programming model to evaluate the object and to assess the relative efficiency of a decision-making unit (DMU) containing multiple-input and multiple-output. The DEA method promotes the development of production function theory and efficiency theory.

Scholars have used the DEA efficiency evaluation model to achieve a lot of related research results. Han (2012) used DEA method and Tobit regression method to estimate the green innovation efficiency and its influencing factors. Feng (2013) analyzed the industries enterprises of 30 provincial regions and 8 economic zones by using the DEA-SBM method. Zhang (2015) used SE-DEA Model and Malmquist index model to analyze and compared 30 provinces' green innovation efficiency in China. In addition, other methods are used by some scholars to evaluate the green innovation efficiency. Hua (2011) used the factor method to study the green innovation efficiency of Northeast in China. On the one hand, the relaxation of input-output and the undesirable output were rarely considered in previous researches. On the other hand, the traditional DEA model assumes that all outputs are desirable outputs, and ignores that some outputs have characteristics of reducing output to improve efficiency, which are called undesirable outputs.

The above researches on innovation activities rarely consider environmental factors in exploring innovation efficiency. The researches on regional differences of green innovation efficiency of industrial enterprises are obviously insufficient. Moreover, this ignores the inter-regional correlation and spatial effects. Therefore, this study will expand the previous studies through different ways. First, it selects data from 2009 to 2013. 30 provinces, municipalities and autonomous regions of China are studies in this study. Based on the latest development of traditional efficiency and productivity analysis theory, this study calculates the green innovation efficiencies of industrial enterprises of China's 30 provinces, municipalities and autonomous regions by using the SBM model considering relaxation of input-output problem to reflect the concept of sustainable development from the perspective of green innovation, and compare with the traditional innovation efficiencies calculated by the DEA model without considering the undesirable output. Second, it is of great theoretical and practical significance to analyze the differences and causes of the green innovation efficiency of industrial enterprises in the regions, so this study uses the cluster analysis to classify the green innovation efficiencies of 30 provinces, municipalities and autonomous regions in China. Third, as China's innovation-driven development policy deeps, the spatial mobility of regional innovation elements is enhanced. The importance of spatial effect is gradually significant. Therefore, the spatial effect of green innovation efficiency of Chinese provincial industrial enterprises is measured from the perspective of green GDP. This research uses the spatial econometric models to evaluate the spatial effect of the green innovation efficiency of Chinese provincial industrial enterprises. It will be beneficial to improve the green innovation efficiencies of China's regional industrial enterprises and promote regional ecological civilization construction.

2. DEA model, SBM model and spatial econometric models

2.1. DEA model

This study uses CCR model to measure the traditional innovation efficiencies of China's industrial enterprises. The CCR model uses linear programming to estimate the production frontier of the decision making units and evaluate the relative efficiency of each decision making unit. It's assumed that there are n decision making units (DMU). Each DMU has m input variables, n output variables. For a particular decision making unit, the efficiency evaluation formula can be expressed as:

$$\begin{cases} \max \frac{u^T Y^0}{v^T X^0} \\ \frac{u^T Y_j}{v^T X_j} \leq 1, j = 1, 2, \dots, 31. \\ u \geq 0, r = 1, 2, \dots, s. \\ v \geq 0, i = 1, 2, \dots, m. \end{cases} \quad (1)$$

By using the Charnes-Cooper transform, the fractional programming form of the CCR model can be transformed into an equal order linear programming. Therefore, Eq. 1 can be transformed into:

$$\begin{cases} \max \mu^T Y_0 \\ v^T X_j - \mu^T Y_j \geq 0, j = 1, 2, \dots, n. \\ \omega^T X_0 = 1 \\ \omega \geq 0, \mu \geq 0 \end{cases} \quad (2)$$

The dual problem of linear programming of Eq. 2 is expressed as:

$$\begin{cases} \max \theta \\ \sum_{j=1}^n X_j \lambda_j + S^- = \theta X_0 \\ \sum_{j=1}^n Y_j - S^+ = Y_0 \\ S^+, S^-, \lambda_j \geq 0; j = 1, 2, \dots, n. \end{cases} \quad (3)$$

According to Eq. 3, θ ($0 \leq \theta \leq 1$) is the technological efficiency of the decision making unit "t". When $\theta = 1$ and $S^+ = S^- = 0$, the DMU is considered to be effective.

2.2. SBM model

The traditional DEA method uses the ideas of linear segmentation and radial theory in efficiency theory, which can cause the input-output relaxation problem. Tone et al. (2002) put forward the Slacks Based Measure (SBM) model containing the undesirable outputs, which can consider the input-output relaxation problem that the traditional DEA model ignores, and also solve the efficiency evaluation problem containing undesirable output. The SBM model, as a non-radial and non-angle evaluation method, can reflect the nature of efficiency evaluation compared with other models (Chang et al., 2013).

It's assumed that there are n decision making units (DMU). Each DMU has three vectors, including X (input), Y^g (expected output) and Y^b (non-expected output), which can be expressed as (Feng, 2013):

$$\begin{aligned} X &= [x_1, \dots, x_n] \in R^{m \times chn} \\ Y^g &= [y_{1X>0}^g, \dots, y_n^g] \in R^{s1 \times chn} \\ Y^b &= [y_1^b, \dots, y_n^b] \in R^{s2 \times chn} \end{aligned} \quad (4)$$

The traditional SBM model considering the undesirable outputs is as follows:

$$\begin{aligned} \rho^* &= \min \frac{1 - \frac{1}{m} \sum_{i=1}^m \frac{s_i^-}{x_{i0}}}{1 + \frac{1}{s_1 + s_2} \left[\sum_{r=1}^{s_1} \frac{s_r^g}{y_{r0}} + \sum_{r=1}^{s_2} \frac{s_r^b}{y_{r0}} \right]} \\ s.t. \quad x_0 &= X\lambda + s^- \\ y_0^g &= Y^g\lambda - s^g \\ y_0 &= Y^b\lambda + s^b \\ s^- &\geq 0, s^g \geq 0, s^b \geq 0, \lambda \geq 0 \end{aligned} \quad (5)$$

2.3. Spatial econometric models

Spatial econometric theory holds that the Spatial Lag Model (SLM) and Spatial Error Model (SEM) are often used to examine the spatial effects expressed by spatial correlation (He and Wang, 2008). SEM represents the spatial spillover effect by means of stochastic perturbation term, and measures the impact of error factors of adjacent areas' related dependent variables on local areas. SLM mainly studies whether there is spatial spillover effect of each variable in a certain region. The spatial effect comes from the spatial lag variables. The spatial lag model is expressed as:

$$Y = \rho W y + X \beta + \varepsilon \quad (6)$$

In Eq. (6), Y is the vector of the explanatory variables. X is the matrix of the explanatory variables. W is spatial weight matrix. ρ is spatial regression coefficient. β indicates the impact of X on Y . ε is random disturbance term.

The spatial error model is expressed as:

$$\begin{aligned} Y &= X \beta + \varepsilon \\ \varepsilon &= \lambda W \varepsilon + \mu \end{aligned} \quad (7)$$

In Eq. (7), Y is the vector of the explanatory variables. X is the matrix of the explanatory variables. W is spatial weight matrix. ρ is spatial regression coefficient. β indicates the impact of X on Y . ε is random disturbance term.

3. Index selection and data description

China's 30 provinces, municipalities and autonomous regions are collected as the object excluding Tibet. In addition, because of the time lag between innovation input and innovation output, the time lag between input and output is set as 1 (Chen, 2013). Based on the connotation of green innovation, this study selected two input factors including labor and financial resources. Therefore, the amount of research specialist staff and research funds are used to measure the labor and financial resources of innovation activities. On the other hand, there are expected output and non-expected output in the production process. In terms of desirable output index, the number of patent applications of industrial enterprises can reflect the true level of innovation to a great extent. So this study selects the number of patent applications of industrial enterprises to measure the desirable output. In terms of undesirable output index, the amount of carbon dioxide emissions, waste water emissions, and solid waste emissions can represent the environmental benefits brought by innovation activities of industrial enterprises in China.

4. The empirical results and discussions

4.1. The overall average green innovation efficiency analysis in the two cases

According to Table 1, 2 and Figure 1, in the two cases (with and without non-expected output), the overall average efficiency of innovation activities of Chinese provincial industrial enterprises presents a steady upward trend. The traditional innovation' average efficiency of Chinese provincial industrial enterprises, calculated by the DEA method, increases from 0.564 in 2009-0.694 in 2013. The average efficiency of green innovation activities of Chinese provincial industrial enterprises considering non-expected output increases from 0.504 in 2009-0.622 in 2013, which are calculated by the SBM method. In addition, from the overall point of view, the traditional innovation efficiency without considering the undesirable output is higher than the green innovation

efficiency containing the undesirable output, but the innovation efficiencies in both cases need to be improved. This means that environment pollution has an impact on the innovation efficiency. Therefore, the SBM model considering undesirable output contributes to increase the accuracy and authenticity in evaluating efficiency.

DMU	2009	2010	2011	2012	2013	Annual average
<i>Beijing</i>	0.922	0.917	0.958	0.989	0.992	0.956
<i>Tianjin</i>	0.887	0.910	0.908	0.939	0.951	0.919
<i>Hebei</i>	0.722	0.773	0.784	0.789	0.803	0.774
<i>Shanxi</i>	0.559	0.572	0.589	0.615	0.657	0.598
<i>Inner Mongolia</i>	0.296	0.324	0.453	0.470	0.516	0.412
<i>Liaoning</i>	0.676	0.725	0.748	0.772	0.802	0.745
<i>Jilin</i>	0.925	0.911	0.920	0.917	0.926	0.920
<i>Heilongjiang</i>	0.770	0.789	0.812	0.847	0.875	0.819
<i>Shanghai</i>	0.926	0.948	0.953	0.959	0.963	0.950
<i>Jiangsu</i>	0.916	0.927	0.948	0.939	0.925	0.931
<i>Zhejiang</i>	0.865	0.943	0.953	0.962	0.949	0.934
<i>Anhui</i>	0.560	0.638	0.672	0.669	0.756	0.659
<i>Fujian</i>	0.633	0.662	0.712	0.733	0.775	0.703
<i>Jiangxi</i>	0.399	0.427	0.536	0.569	0.673	0.521
<i>Shandong</i>	0.652	0.712	0.754	0.825	0.871	0.763
<i>Henan</i>	0.463	0.553	0.559	0.580	0.588	0.549
<i>Hubei</i>	0.582	0.626	0.657	0.684	0.695	0.649
<i>Hunan</i>	0.426	0.439	0.525	0.626	0.659	0.535
<i>Guangdong</i>	0.668	0.747	0.801	0.823	0.876	0.783
<i>Guangxi</i>	0.367	0.412	0.436	0.453	0.476	0.429
<i>Hainan</i>	0.676	0.690	0.724	0.721	0.737	0.715
<i>Chongqing</i>	0.544	0.578	0.602	0.615	0.648	0.597
<i>Sichuan</i>	0.527	0.552	0.617	0.602	0.655	0.591
<i>Guizhou</i>	0.194	0.262	0.384	0.398	0.484	0.344
<i>Yunnan</i>	0.387	0.435	0.421	0.463	0.478	0.437
<i>Shanxi</i>	0.274	0.307	0.353	0.427	0.479	0.368
<i>Gansu</i>	0.325	0.412	0.417	0.445	0.468	0.413
<i>Qinghai</i>	0.326	0.376	0.391	0.411	0.436	0.388
<i>Ningxia</i>	0.256	0.271	0.304	0.338	0.359	0.306
<i>Xinjiang</i>	0.194	0.211	0.297	0.290	0.358	0.270
<i>National Average</i>	0.564	0.599	0.640	0.662	0.694	0.632

Table 1 – The traditional innovation efficiency without considering the undesirable output based on the DEA model

DMU	2009	2010	2011	2012	2013	Annual average
<i>Beijing</i>	0.901	0.902	0.924	0.937	0.956	0.924
<i>Tianjin</i>	0.802	0.853	0.872	0.896	0.902	0.865
<i>Hebei</i>	0.511	0.541	0.567	0.559	0.613	0.558
<i>Shanxi</i>	0.423	0.456	0.489	0.472	0.525	0.473
<i>Inner Mongolia</i>	0.265	0.325	0.423	0.467	0.481	0.392
<i>Liaoning</i>	0.515	0.554	0.587	0.612	0.618	0.577
<i>Jilin</i>	0.753	0.813	0.819	0.837	0.863	0.817
<i>Heilongjiang</i>	0.609	0.622	0.647	0.625	0.660	0.633
<i>Shanghai</i>	0.884	0.925	0.927	0.935	0.947	0.924
<i>Jiangsu</i>	0.843	0.876	0.889	0.917	0.946	0.894
<i>Zhejiang</i>	0.833	0.886	0.890	0.932	0.948	0.898
<i>Anhui</i>	0.474	0.534	0.554	0.567	0.579	0.542
<i>Fujian</i>	0.587	0.603	0.612	0.670	0.669	0.628
<i>Jiangxi</i>	0.394	0.421	0.436	0.439	0.458	0.430
<i>Shandong</i>	0.513	0.559	0.590	0.622	0.698	0.596
<i>Henan</i>	0.448	0.507	0.526	0.534	0.539	0.511
<i>Hubei</i>	0.521	0.515	0.586	0.639	0.646	0.581
<i>Hunan</i>	0.338	0.362	0.417	0.522	0.590	0.446
<i>Guangdong</i>	0.722	0.727	0.817	0.922	0.904	0.818
<i>Guangxi</i>	0.316	0.369	0.421	0.447	0.483	0.407
<i>Hainan</i>	0.625	0.684	0.721	0.712	0.704	0.691
<i>Chongqing</i>	0.503	0.525	0.534	0.552	0.575	0.538
<i>Sichuan</i>	0.525	0.529	0.547	0.552	0.598	0.550
<i>Guizhou</i>	0.234	0.279	0.315	0.342	0.352	0.304
<i>Yunnan</i>	0.354	0.403	0.423	0.415	0.428	0.405
<i>Shanxi</i>	0.236	0.280	0.312	0.365	0.412	0.321
<i>Gansu</i>	0.287	0.336	0.387	0.425	0.442	0.375
<i>Qinghai</i>	0.264	0.336	0.398	0.425	0.437	0.372
<i>Ningxia</i>	0.254	0.309	0.332	0.385	0.420	0.340
<i>Xinjiang</i>	0.198	0.187	0.220	0.254	0.272	0.226
<i>National Average</i>	0.504	0.536	0.573	0.599	0.622	0.568

Table 2 – The green innovation efficiency considering the undesirable output based on the SBM model

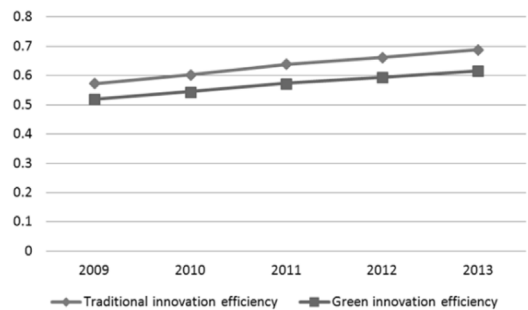


Figure 1 – The change tendency of the traditional innovation efficiency based on the DEA model and SBM model

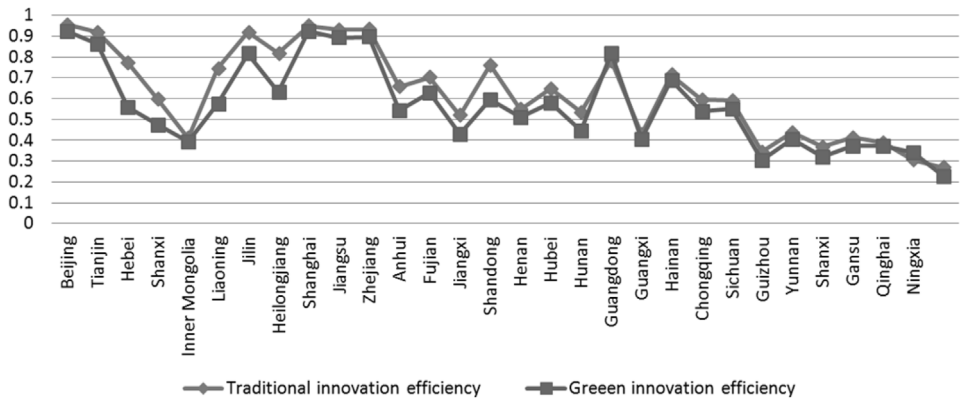


Figure 2 – The change tendency of green innovation efficiencies of China's industrial enterprises based on the SBM model

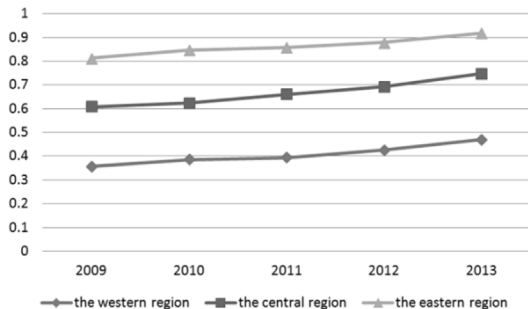


Figure 3 – The change tendency of green innovation efficiencies of industrial enterprises of the three regions in China based on the SBM model

4.2. The variation analysis of green innovation efficiency

Table 1 shows that the average traditional innovation efficiencies of China's provincial industrial enterprises without considering the undesirable outputs in Beijing, Tianjin, Jilin, Heilongjiang, Shanghai, Jiangsu, and Zhejiang are higher than 0.800 during the sample period. Table 2 demonstrates that from 2009 to 2013 the average green innovation efficiencies of Chinese industrial enterprises considering the undesirable outputs in Beijing, Tianjin, Jilin, Shanghai, Jiangsu, Zhejiang, and Guangdong also exceed 0.800. Fig. 3 demonstrates that the above provinces (municipalities and autonomous regions) with high green innovation efficiency in both cases are mostly in the eastern coastal areas. The average green innovation efficiency in Guizhou, Shanxi, Qinghai, Ningxia and Xinjiang are all lower than 0.400 in two cases, which are almost in the western remote areas.

Figure 2 compares the provincial green innovation efficiencies in the two cases. The majority of China's provincial traditional innovation efficiencies containing non-expected output are lower than the green innovation efficiencies without considering the non-expected output. However, the average green innovation efficiencies of China's industrial enterprises considering the undesirable outputs in Guangdong and Ningxia are higher than the traditional innovation efficiencies without considering the non-expected outputs.

4.3. Analysis on regional difference of green innovation efficiencies

In the average innovation efficiencies of industrial enterprises of 30 provinces, municipalities and autonomous regions in China from 2009 to 2013, the highest efficiency is 0.924, while the lowest efficiency is 0.226, and the variance is 0.093. It indicates that provincial green innovation efficiencies have a certain gap. In order to further analyze the regional differences and causes of green innovation efficiencies in different provinces, this study systematically classifies provincial green innovation efficiencies by SPSS 22, and divides them into the first, second and third groups according to the level of efficiencies. The results can be seen in Table 3.

Category	Provinces
<i>The first group</i>	Beijing; Tianjin; Jilin; Shanghai; Zhejiang; Jiangsu; Guangdong
<i>The second group</i>	Hebei; Liaoning; Heilongjiang; Anhui; Fujian; Shandong; Henan; Hubei; Hainan; Chongqing; Sichuan
<i>The third group</i>	Shanxi; Inner Mongolia; Jiangxi; Hunan; Guangxi; Guizhou; Yunnan; Shanxi; Gansu; Qinghai; Ningxia; Xinjiang

Table 3 – Cluster analysis of green innovation efficiencies of provincial industrial enterprises

According to Table 3, the average efficiency of green innovation in the first group is 0.904, the second group is 0.613, and the third group is 0.354. The first group is mainly the provinces in the eastern coastal regions including Beijing, Tianjin and Shanghai et al., which have higher efficiencies and better economic development. The second and third groups are mainly the provinces in the central and western regions. The low efficiency of these areas is mainly due to the less green innovation output and serious environmental pollution.

4.4. The spatial effect of green innovation efficiency

This study used spatial econometric models to measure the spatial effect of the green innovation efficiency of China’s industrial enterprises. According to the regression analysis results in Table 3, the spatial autoregressive coefficient passes the significance test of 1%, which shows that the green innovation efficiencies of Chinese provincial industrial enterprises have spatial effect. The spatial regression coefficient is 0.245, while the spatial error coefficient is -0.133. It reflects that the degree of spatial spillover of green innovation efficiency by the adjacent area is strong than the error impact of green innovation efficiency by the adjacent area. According to the comparison of the two spatial econometric models, the spatial lag model and spatial error model result in great similarity.

Explanatory variable	Original variable		Lagged variable	
	Regression coefficient	t-value	Regression coefficient	t-value
<i>R&D intensity (X1)</i>	0.49 ^{2**}	5.384	0.522 ^{***}	5.123
<i>Industry structure (X2)</i>	0.035 ^{**}	2.246	0.078 ^{**}	2.045
<i>Government support (x3)</i>	-0.273 ^{**}	-3.372	-0.446 ^{**}	-4.264
<i>Laborer’s quality (X4)</i>	0.137 ^{***}	4.911	0.298 ^{***}	4.683
ρ	0.245 ^{***}	4.121	-0.133 ^{***}	-4.143
R^2	0.865		0.887	
<i>Likelihood Ratio</i>	212.231		235.642	

Table 4 – The regression analysis of spatial econometric models

According to Table 4, R&D intensity, industrial structure, government support, and laborer’s quality have a significant effect on the green innovation efficiency. Meanwhile, the R^2 of original and lagged variables are more than 0.85 and the likelihood ratio is more than 200, which indicates that the regression analysis of spatial econometric models are better.

5. Conclusions and policy implications

Based on the SBM model containing the relaxation of input-output, this study calculates the green innovation efficiencies of industrial enterprises of 30 Chinese provinces (municipalities, autonomous regions) from 2009 to 2013, and compares with the traditional innovation efficiencies measured by the DEA model without considering the non-expected outputs. The results indicate that the overall green innovation efficiency containing the non-expected outputs declines significantly compared with the traditional innovation efficiency without considering the undesirable outputs. This suggests that the environmental factors should be considered in the efficiency evaluation and the SBM model promotes the accuracy and authenticity of the green

innovation efficiency evaluation. The research results show the green innovation efficiencies of the majority of provinces in China maintain an upward trend from 2009 to 2013.

This study analyzes the differences and causes of the green innovation efficiency of industrial enterprises in the regions by the cluster analysis, and divides 30 provinces, municipalities and autonomous regions into three groups according to the efficiency level. The first group is mainly the provinces in the eastern coastal region, the second and third group are mainly the provinces in the central and western regions.

The regression analysis of spatial econometric models shows there is spatial spillover effect in the provincial green innovation efficiencies of China's industrial enterprises. R&D intensity, industrial structure, and laborer's quality have a positive role in promoting the green innovation efficiency, while government support has negative effects.

According to the above conclusions, this study presents some suggestions to promote the green innovation efficiency of Chinese industrial enterprises:

1. Innovation-driven development strategy should be fully carried out. The momentum of the long-term development of the world economy comes from innovation, so Chinese industrial enterprises must adhere to the innovation-driven development strategy, which should also focus on domestic and foreign advanced technologies and independent innovation. In the green innovation activities, we should consider resource, economy and environment at the same time, and it's necessary to reduce non-renewable energy investment and focus on the quality of innovation output and environmental pollution.
2. The spatial effect of green innovation should be fully used. While exerting their own advantages in technology and location and improving green innovation efficiencies, eastern regions should actively promote the central and western regions to the direction of low input, high output, and low pollution. The central and western regions need to rely on their advantages in production, industrial structure adjustment, and policy support, and actively make use of the spatial spillover effect of green innovation efficiency, furthermore, they should actively cooperate with the eastern regions in terms of technologies, management, and personnel training et al., and strive to develop local industries. In addition, all provinces should consider the analysis on the influencing factors of green innovation efficiency of industrial enterprises so as to create a favorable environment for enhancing the green innovation efficiency in industrial enterprises according to their actual situations.
3. Industrial enterprises should play a central role in the green innovation system. Industrial enterprises should introduce advanced equipments and excellent personnel, and learn advanced management methods from home and abroad. It promotes the utilization efficiency and configuration capability of innovation resources. In addition, enterprises should strengthen further cooperation with universities, research institutes, and governments to create a green innovation system including governments, enterprises, universities, and research institutes.

Acknowledgments

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Research on the Influence of Rural Labor Force Transfer on Financial Economy based on Time Series Model

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Abstract: Time series model is a commonly used model to study economic indicators, which is generally used in curve fitting and parameter estimation. In this paper, the author analyzes the influence of rural labor force transfer on financial economy based on time series empirical analysis. Due to the existence of China's dual economic structure, the rural surplus labor force gradually shifted to the city. By analyzing the reasons and ways of the rural labor force transfer, the author research on the economic effect and social effect of rural labor force transfer. Based the empirical analysis, the result shows that economic growth has a great effect on the transfer of rural labor force, and the transfer of rural labor force is an important factor to promote the industrial economy growth.

Keywords: Rural labor, Time series model, Economic effect, Granger test

1. Introduction

With the rapid development of the world economy, as an important factor in economic development, rational allocation of labor resources has become to promote economic rapid, coordinated and sustainable development of the inherent requirements and key measure target (Fatima, 2013; Anming, 2014). Lewis in the dual economic theory pointed out that the existence of a large number of rural surplus labors is the basic characteristics of the traditional agricultural sector in developing countries; industrialization is the essence through the developed city industrial sector relatively high wages, the surplus labor force behind the agricultural sector to attract City Industrial employment (Jabbour, 2014). Through the transfer of rural labor force, the overall level of social productivity has been improved, and the dual economic has gradually transformed into single economic structure. Lewis pointed out that the existence of a large number of rural surplus labors is the basic characteristics of the traditional agricultural sector in developing countries; industrialization is the essence through the developed city industrial sector relatively high wages, the surplus labor force behind the agricultural sector to attract City Industrial employment (Liu, 2015; Michelsen, 2006). Through the transfer of rural labor force, the overall level of social productivity has been improved, and the dual economy has gradually transformed into single economic structure.

Not only can adjust the agricultural structure, increase the income of farmers, rural economic prosperity of rural labor transfer, and can speed up the national economic reform and the process of urbanization and industrialization, promote the benign circulation of the national economy and social development (Vachon, 2006; Shou, 2015). The orderly transfer of rural surplus labor force is a common problem that must be solved in the development of the society. It is a common phenomenon in the process of the transformation from agricultural society to industrial society (Yazdanpanah, 2015).

2. Related theoretical research

2.1. Reason of rural labor force transfer

China's large population base, the growth rate is fast, more and less people, coupled with the impact of policy and historical background, so that China's rural areas have a large number of surplus labor. The transfer of rural surplus labor force has both internal and external causes, and is the result of the combined effects of internal and external factors. Refers to the internal factors in rural areas and agriculture, the main performance is continue to reduce agricultural labor productivity and per capita arable land area, the number of idle rural labor force, increasing the number of rural surplus labor; agricultural comparative benefits decline, affecting farmers farming enthusiasm; the rural industrial structure is not reasonable, the process of city serious lag of rural surplus labor transfer lack of attraction. External factors are mainly as follows: gradually expanding region between urban and rural economic development level and income level, a strong attraction to the rural surplus labor force; the rapid development of non-agricultural labor demand increases, and the transfer of rural surplus labor force external pull. In addition, the reform and opening up to create a relaxed environment, the change in the concept of farmers, but also to make the transfer of labor force.

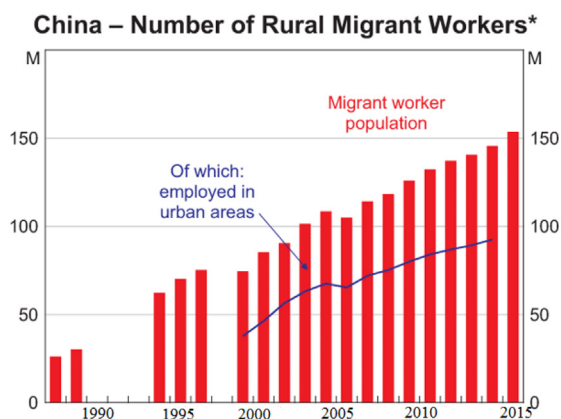


Figure 1 – Transfer of rural labor force

Scholars have made a lot of research on the influence factors of rural labor force transfer. The factors analyzed in this research are summarized as follows:

- **Institutional factors:** Most of the researchers point out that there are still many institutional factors which are not conducive to the transfer and flow of rural labor force in the current social and economic environment. Rural labor transfer process is divided into two stages: the first stage is the process of rural labor to move out of rural areas; the second stage is the transfer of the process of settling in the city. The influence of the traditional development strategy and the two process of the household registration system on the transfer of rural labor force were investigated. The research conclusion is: the traditional development strategy as well as the household registration system limits the potential transfer behavior, the ongoing reform of the easing of control of labor transfer, because Chinese reform is far from complete, the system obstacles to the free flow of labor force still exists.
- **Economic factors:** Almost all the researchers agree that the income gap between different regions, especially between urban and rural areas and the income gap between different industries is the most critical factor affecting the transfer of rural labor force. The expected income into a specific regional economic income gap, he believes that the economic imbalance of regional development is one of the important factors to promote the transfer of rural labor force, the impact of regional economic development on rural labor transfer is divided into factors of economic development and economic structural factors. With lower farm income of farmers are most likely to make the transfer decision, the relative income gap is an important factor to influence the decision-making of rural labor force transfer. In accordance with the Todaro theory of expected income, the more impoverished area should have stronger motivation to transfer, thus transferring more labor.

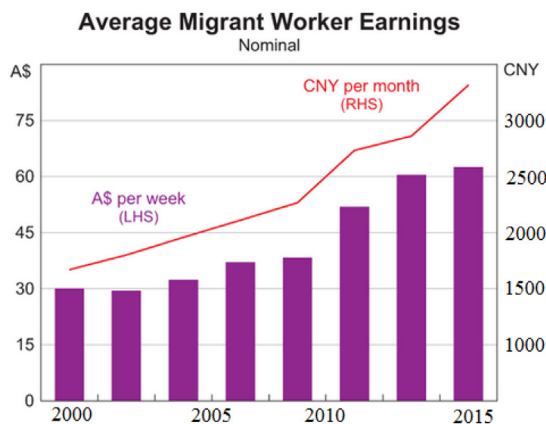


Figure 2 – Migrant worker income growth trend

- **Educational factors:** In the current study, the researchers have a different understanding of the effect of education on the transfer of labor force. It is very necessary to improve the quality of the labor force itself, such as strengthening

the training and improving the education level of the labor force. At the same time, education not only determines whether the rural labor force can obtain the non-farm employment opportunities, but also determines the stability of the rural labor force non-farm employment. Formal education for the labor transfer only very little effect, but the education for individuals from agriculture to non-agriculture has a significant positive effect; much higher levels of education of rural residents more love to engage in local non-agricultural work, rather than transfer to the field work.

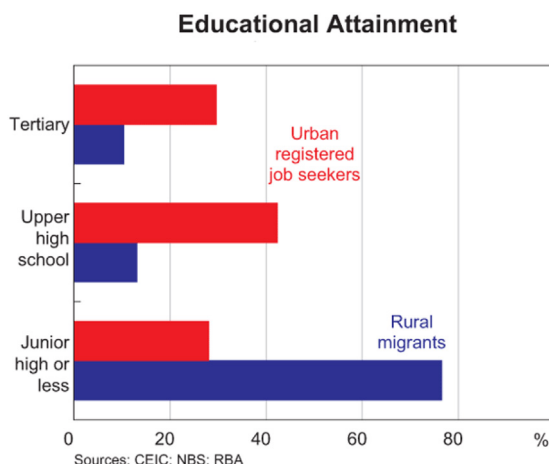


Figure 3 – Education level of migrant workers and urban workers

2.2. Transfer of rural labor force

The transfer of rural labor force in our country mainly has three kinds of patterns: in situ transfer, remote transfer and composite transfer.

1. ***In situ transfer:*** Local transfer is the transfer of surplus labor in rural areas, there are 3 main ways: the transfer of rural areas. That is to accelerate the pace of urbanization, the construction of small towns, so that the transfer of surplus labor to small towns.. That is, the transfer of non - agricultural industries in rural areas, mainly to the township enterprises. Expand the capacity to absorb agricultural interior. That is, by adjusting the internal industrial structure of agriculture, promoting the overall development of agricultural economy, taking the road of agricultural industrialization and increasing the employment opportunities within the agricultural industry.
2. ***Transfer in different places:*** Under this model, scholars generally believe that the local government should take positive measures for the export of labor services, should be based on local, facing the country, to the world “as

the goal, to solve the problem of rural surplus labor. In the development of industrialization and city, city and industrial agglomeration and development of the two industry, the demand for labor, rural surplus labor into the city, consistent with the general rules of industrialization and city development; agricultural surplus labor into non-agricultural industries, is the development of a market economy in the benefit mechanism and demand mechanism of double results and it helps to promote the formation and development of a unified labor market, is conducive to promoting the deepening of the household registration system, employment system, social security system reform; agricultural surplus labor transfer in different city, so that employees can get greater benefits, learn the skills, broaden their horizons, improve personal qualities.

3. **Compound transfer mode:** The model holds that absolute emphasis on a certain pattern is one-sided, must adopt diversified ways of transferring rural surplus labor in agriculture as the foundation of internal transfer, transfer of township enterprises as the starting point, small towns large and medium-sized city as the goal, and transfer of foreign labor output in combination, to supplement the transfer and transfer separate transfer and industry transfer simultaneously. To break the pattern of dual structure in urban and rural areas, speeding up the urbanization; accelerate the establishment of a unified urban and rural labor market; vigorously develop the private economy, provide a lot of jobs for the rural labor force; improving employment training, promoting farmers' employment flow.

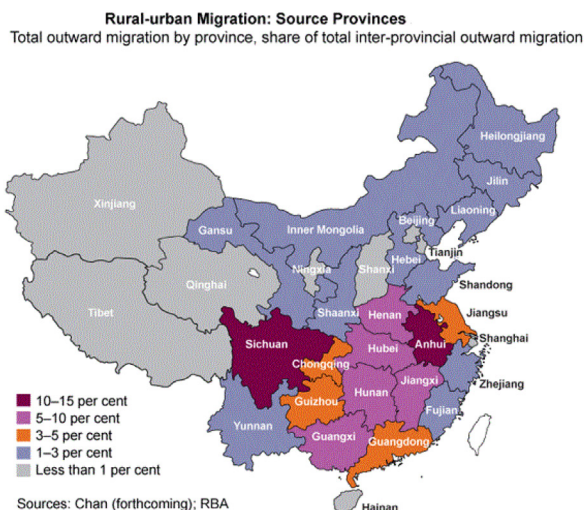


Figure 4 – Province analysis of rural labor force (Transfer out)

Rural-urban Migration: Destination Provinces
Total inward migration by province, share of total inter-provincial inward migration

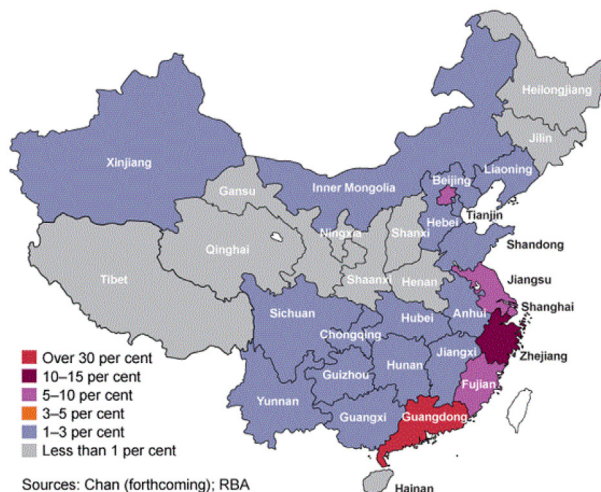


Figure 5 – Province analysis of rural labor force (Transfer in)

3. Analysis on the effect of rural labor force transfer

3.1. Social effects

The transfer of rural surplus labor is a process, which involves in, out, transfer, transfer of the intermediate zone and many other areas will have an impact on all these aspects of the transfer of rural surplus labor force. At present, the academic circles mainly analyze the positive and negative effects of the immigration and emigration.

The influence of the destinations: positive impact, provide the labor force for the city, especially in the dirty, heavy, and insurance industries and types of cheap labor, become the indispensable conditions for the development of these industries and trades; made an important contribution to the development of the third industry city; is conducive to the construction of the city. The negative effect of intensified city infrastructure; bring serious social security problems to the city; the impact of city management system, has brought the industry and commerce, taxation, employment and family planning and other aspects of the problem; disrupted national traffic order.

Influence on area where migrant workers shift out: positive impact, alleviate the contradiction between people and land in rural areas, is conducive to realize scale management of agriculture, improving agricultural productivity; improve the quality of farmers, cultivating a number of talents for the rural areas, promote the concept of change in rural areas, these people back to rural areas, also triggered change the structure of local leaders in rural areas; the market is conducive to economic development in rural areas, the activation of factor of production, communication and the relationship

between urban and rural areas. The negative effects, due to the large number of outflow of rural labor, the abandoned land and neglects agricultural phenomenon, especially the outflow of a large number of young women, accelerate the agricultural labor force and the trend of aging, the overall quality of agricultural labor force decline; due to the transfer of many young and strong, the higher educated people, with higher skill level in China's rural areas, talent loss, influence of rural grass-roots organization development; rural labor migrant workers income is used for consumption, especially conspicuous consumption, rather than for production investment, leading to social deterioration, also caused the increase between the rural community and within the community, between the rich and poor gap; to bring the impact of marriage and family stability in the rural areas; bring great impact on the rural old-age problem.

3.2. Economic effect

The effect of rural labor migration on rural economy is mainly reflected in the impact on Farmers' income and agricultural output. The transfer of rural labor force has a direct and important contribution to the growth of farmers' income. This is a fact that is universally acknowledged. Rural labor migration has a positive impact on improving rural income and restraining the internal income gap between urban and rural areas and rural areas. Rural labor force transfer to agricultural production is relatively complex, the transfer of rural labor force in the performance of some of the trends or characteristics led to the development of agriculture and rural areas of some fear. These concerns include: most of the transfer of rural labor force is the higher level of education of male labor, may cause serious loss of rural human capital, reduce agricultural labor productivity; labor employment is usually accompanied by a part of the agricultural labor force together with the accumulation of flows to non-agriculture departments or other areas, it is possible to further reduce caused by agricultural investment in the family income; labor transfer no longer rely on agriculture, but the farmers don't give up the land under the condition of

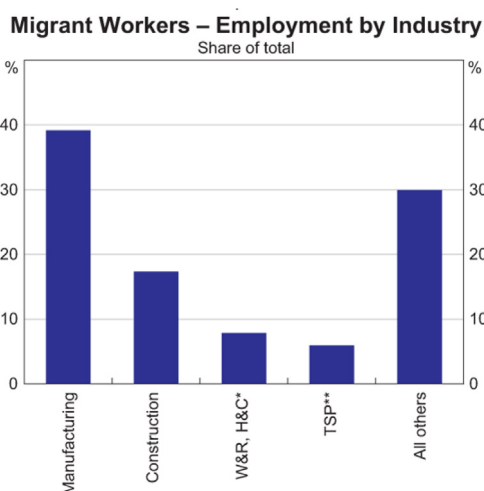


Figure 6 – Rural labor force is engaged in the industry

labor transfer may also lead to inefficient utilization of agricultural resources. But some studies have shown that until now, the transfer of rural labor has not adversely affected the development of agriculture. Study on Agricultural Research Center showed that the migrant rural labor employment does not necessarily lead to the increase or decline in agricultural production, and is more evident in the household, go out in the agricultural production there is a substitution of labor capital.

4. Empirical analysis

4.1. Variable design

According to the framework of neoclassical economics, labor and capital investment increase will stimulate economic growth and promote economic growth, increase investment; increase investment will lead to an increase in demand for labor, investment multiplier effect which is called elements and the interaction mechanism of the principle of acceleration. Is it true that China's economic growth and employment and transfer of labor force? The relationship between rural labor transfer and economic growth, the domestic research mainly focuses on the labor transfer function and the influence of economic growth, and the majority of scholars believe that the transfer of labor force has a strong pull effect on economic growth. The influence of the industrial economic growth and the adjustment of economic structure on the transfer of rural surplus labor force has been a hot issue in the domestic academic circles. Most researchers believe that the adjustment of industrial structure is an important reason for the transfer of rural surplus labor force, and that the industrial growth has an important impact on the transfer of rural surplus labor force in china. Based on China's 1990-2015 time series data, using time series model, analyzes the overall economic growth in China and the industry growth effect on the transfer of rural surplus labor and role, and made a further test of the co integration relationship and Grainger causality test. Model 1 tests the role and impact of the overall economic growth of the number of rural labor transfer, the number of rural labor transfer as the explanatory variables, the total amount of GDP as an explanatory variable. The model 2 to test the industry growth effect and influence on the number of rural labor transfer, the quantity as the explanatory variables of rural labor transfer, the agricultural GDP, industrial GDP, construction industry and the third industry GDP as explanatory variables.

4.2. Result analysis

From the measurement results, the model 1 and model 2 F-measure are large, the model of on-line relationship is significant in the overall adjustment; R^2 were as high as 0.8245 and 0.9647, indicating the fitting degree of the two models of the data is very good; because the data is time series data, can be identified by inverse variance of the basic there. The explanatory power of the model 1 shows that the coefficients of the explanatory variables $\ln GDP$ are significant at the 5% level of significance. $\ln GDP$ each increase of 1%, $\ln L$ increased by 0.145%. This shows that China's overall economic growth in rural labor force transfer has a greater role in promoting. Model 1, using Stata software to analyze the data to get the regression results are as follows:

$$\ln L = 3.671 + 0.1452 \ln GDP + 0.5683 AR(1) \quad (1)$$

Model 2, using Stata software to analyze the data to get the regression results are as follows:

$$\begin{aligned} \ln L = & 2.142 + 0.4538 \ln AGDP + 0.1709 \ln IGDP \\ & + 0.0462 \ln CGDP + 0.4012 \ln SGDP \end{aligned} \quad (2)$$

From the explanatory power of the model 2, the T statistics of the coefficients of the four explanatory variables are significant at the 5% level of significance. The relationship between GDP and the number of rural labor transfer was significantly positive, and LnL increased 1% and LnAGDP increased by 0.453%. This shows that the growth of agricultural economy has a great effect on the transfer of rural labor force. The relationship between the industrial GDP and the number of rural labor transfer was significantly positive, and the LnL increased by 1% and LnIGDP increased by 0.170%. This shows that China's industrial economic growth has promoted the transfer of rural surplus labor force. The relationship between the construction industry GDP and the number of transfer of rural labor force is significantly positive, LnCGDP every increase 1%, LnL increase 0.046%. This indicates that the economic growth of the construction industry also promotes the transfer of rural surplus labor force. The relationship between GDP and the transfer of rural labor force is significantly positive, LnSGDP increase 1%, LnL increase 0.401%, which shows that the service industry growth in China's rural labor force transfer has a greater role in promoting.

In reality, the macroeconomic time series data are very few, and the stability of the data is very important. In order to determine whether the results of the above estimates are stable in the long run, we test the cointegration relationship of the model, as shown in table 1. In model 2, there is at least one co integration vector between the explanatory variables and the explanatory variables, so the model is stable during the sample period.

Rank	Parms	LL	Characteristic Value	Statistic	5% Significant level
0	6	63.35791		18.3582	14.28
1	9	70.75468	0.6582	1.6548*	2.37
2	10	81.68524	0.1428		

Table 1 – Johnson Co-integration test

Ho Hypothesis	Lag	F-statistic	P value	Reject Ho or not
LnGDP does not Granger Cause LnL	2	0.004	0.5124	No
LnAGDP does not Granger Cause LnL	2	0.302	0.6024	No
LnIGDP does not Granger Cause LnL	2	0.000	0.3254	No
LnCGDP does not Granger Cause LnL	2	0.078	0.7238	No
LnSGDP does not Granger Cause LnL	2	0.015	0.4189	No

Table 2 – Granger causality test

Grainger from the test results, LnGDP, LnAGDP, LnIGDP, variable LnCGDP, LnSGDP did not reject the null hypothesis, indicating that the overall economic growth, the growth of agricultural economy, industrial economy growth and the economic growth of the construction industry and the third industry economic variables cannot be determined by explanatory variables (the number of rural labor transfer) because they between may simply be related, rather than causal relationship. But the results showed that the transfer of rural labor force is the cause of industrial economic growth, the economic growth of the construction industry and the third industry economic growth.

5. Conclusions

The income gap between the agricultural sector and the non - agricultural sector is the main incentive for the transfer of rural labor force, but the transfer of rural labor force is affected by the factors such as system and policy. The transfer of rural labor force is influenced by two factors: “pull” and “push”. On the one hand, the transfer of rural labor is mainly affected by the high income of non-farm industries. On the other hand, the scarcity of land resources and the low income of agriculture related to the rural labor force transfer is the main thrust of the rural labor force transfer. Although the transfer of rural labor force to non-agricultural employment can obtain a higher income, but the process is generally accompanied by a higher transfer costs. The transfer of rural labor force can promote the whole society economic growth, because labor productivity between different industries are different, the transfer of labor from low productivity sectors to high productivity industries, re allocation of labor resources, so as to improve the overall labor productivity of the whole society. Therefore, the government should take measures to promote the transfer of rural labor force, so as to give full play to the role of labor resources to the economy.

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Study on the Computer Multimedia Application in Exploration of British and American literature Teaching

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Abstract: With the development of computer technology, multimedia shows a huge advantage in the field of assisted instruction. In this paper, the author analyzes the multimedia applications in the British and American literature teaching. The construction of multimedia teaching mode is not only a change of technical means, but also the reform of the teaching mode. Multimedia assisted British and American literature teaching can improve students' interest, and enhance the students' sensory stimulation. It breaks through the teaching mode of one-way transmission of information, at the same time present content to students by using the sound, images and other three-dimensional display. The survey result shows that 72.4% students agree that multimedia teaching has improved their interest in British and American literature learning.

Keywords: Computer multimedia, E-learning, British and American literature, Multimedia teaching

1. Introduction

With the development and popularization of multimedia, multimedia-aided teaching has increasingly become the main means of higher education, and gradually shows its advantages compared with the traditional teaching mode (Fannes, 2013; Carrell, 2015; Lino et al., 2016). American literature course is one of China's College English course for English majors, it is an essential course. It can make professional English learners feel authentic English, so their English expressions are more accurate and vivid, more profound understanding of the Anglo American culture (Dai, 2012). It can not only enrich the students' knowledge of literature, but also effectively improve the students' appreciation level and English level. For non-English major students, it can help students to get rid of the influence of Chinese English, and effectively improve the level of knowledge of the use of English (Hu, 2012; Guo, 2014). However, the current literature classroom teaching mode is single, according to statistics. There are about more than half of the teachers who are still using the traditional mode, ignoring classroom interaction (Huang, 2014). The limited use of resources of teachers and students are eager to learn more knowledge in contrast, so it is not difficult to find, a lot of students

at school will subscribe to some English newspapers or magazines, and download some English related readings. If we can add the video and network information, students' learning interest of British and American literature will be greatly improved (Krstev, 2014; Jian, 2015). It's an important way to improve students' language application and cultural accomplishment, through the stimulation of students' study autonomy.

Literature includes history, tradition, culture and social value etc.. A major breakthrough in the teaching reform is the introduction of the multimedia teaching. Students' learning interests will be greatly stimulated by presenting them classical movie clips, unique artistic charm, vivid film art and impressive outstanding literary works. From the realization of English language knowledge study, American literature works, audio-visual training and the classical movie clips available integrate in English teaching (Zhang, 2012). Multimedia teaching has characteristics as practical, cultural, intellectual content and fun, which fully mobilize and give full play to teachers' teaching and students' learning enthusiasm. The multimedia teaching method with visual and auditory synchronous use, can improve the efficiency and frequency of listening and speaking training, promote the exchange of information between teachers and students, teaching resources sharing and cooperation.

2. Multimedia teaching

2.1. Multimedia technology

IBM Company will be defined as multimedia video, images, audio, graphics and text at the fusion of multiple levels, through the production of computers to make mutual induction. The key of multimedia is the combination of images, sound and animation to form a learning tool for people to use. It takes the computer as the core, the interactive processing all kinds of multimedia information, and carries on the effective control through the computer, causes the information to establish the effective logical connection, thus manifests the more abundant information. Four main features:



Figure 1 – Multimedia technology

multimedia integrated, controllable, interactive and digital. They are far beyond the ordinary books and video content, so they are widely used in the field of education. Based on these characteristics, people are no longer passive acceptance to literature, sound, image and video. Multimedia technology includes: audio technology, video technology, data compression and decompression technology, large capacity optical storage technology, hypertext and hypermedia link technology, media synchronization technology, multimedia network technology. The multimedia computer system is composed of six parts respectively is: CAI multimedia application, multimedia systems, multimedia core input / output control interface, multimedia real-time compression and decompression, multimedia computer hardware.

The multimedia content is rich, it includes video, text, audio that other traditional textbooks cannot cover, compared to the past which were only described by oral or written content. Especially for the Anglo American literature teaching, teachers can use multimedia to some acoustic data, introduce the background of literary works, etc., to show the students through the video or audio, make the students vividly understand teaching content in the limited time. The traditional teaching activities can be used by teachers, the main tool is the blackboard, textbooks and exercise books. By contrast, multimedia teaching has effectively solved the problem of insufficient information. With the development of multimedia technology, its application field is more and more widely and the advantages in education field are becoming more prominent.



Figure 2 – Visualization of classroom teaching

2.2. Multimedia teaching

Multimedia can create a beautiful and efficient learning environment, give full play to the students' autonomous learning function, the classroom teaching is more flexible and effective. Because of its convenience, high multimedia interactivity can effectively avoid cramming teaching, help students follow the teacher's ideas, take notes in class. The use of multimedia can promote the exchange of emotion between teachers and students, stimulate students' interest, virtually narrow the distance between teachers and students, create a good classroom atmosphere. Multimedia teaching can also show

color, sound, animation and video; previous study shows that color can eliminate the students' learning pressure, ease their tension. Also the words can be highlighted in the multimedia teaching by changing the colors and bold, pictures and videos can provide more intuitive teaching, classroom teaching can be injected more vitality.



Figure 3 – Multimedia teaching

According to the investigation and Analysis on the current status of university teaching of British and American literature, and combined with the characteristics of the course itself on American literature and multimedia technology, multimedia courseware, and its application in the teaching of British and American literature will become an inevitable trend. At the same time, courseware is also very easy to classify the data and information storage, if it is combined with the CD-ROM or LAN, you can maximize the sharing of resources. Multimedia courseware can effectively improve the students' enthusiasm, attract the attention of students, courseware can be an image or video. Today's courseware production mainly uses PPT software, this software can largely meet the requirements of Multimedia Assisted British and American literature course.

- **Teaching outline:** It is the main course of brief introduction and learning objectives, course content for different units, students before class can have a general understanding of the teaching content through the courseware; the courseware can be updated regularly and after finishing, adjusted to different students.
- **Background data:** Select authoritative information as the background knowledge, you can download a lot of picture information on the Internet, and use the network video as a support.
- **Writers and works:** The author's age, gender, nationality, as well as works of age, style, characteristics, classification can be made into a module with the film, video clips or pictures to show.
- **The representative:** Representative works can be demonstrated in the classroom, at the same time, the teacher can display video or pictures in class

and let students to discuss. This way is beneficial for students to understand sentences, let the students to express their opinions.

- **Test:** By constantly collecting and sorting, the contents of the curriculum will be organized as a general database or test library, and regularly updated to examine the students' learning situation.
- **Literature review:** In view of different literary works, mutual discussion benefits each other so as to improve students' literary attainments.
- **Related websites:** Introduce students to some practical websites regularly, ensure the high quality of the site, so that students can get useful information, and give full play to their subjective initiative.



Figure 4 – British and American literature PPT

In order to ensure the efficiency of classroom learning, teachers can introduce the general situation of American literature video and play part of the video, in order to deepen the impression of the student, let the students master the knowledge more effectively. Through the multimedia assisted instruction, teachers and students can benefit from it, and the effect is very obvious. First of all, teachers can list the syllabus and give a brief description of the content framework, so that students can clearly understand it, in every lesson, teachers can be modified and added to the original content of the courseware, and timely update the original data. Also, the teacher could modify the courseware according to the student's interest, which improves the students' learning efficiency and increase their learning interest. Second, pictures and video aids can enhance the interest of students learning. Textbooks are boring, students are more interested in pictures and videos and make the text information more vivid.

3. The theory and practice of multimedia teaching in British and American literature

3.1. Constructivism theory

The constructivist learning theory, which was popular in the West in twentieth Century, provides a solid foundation for the use of multimedia in the teaching of British and

American literature. Learning is a process of active construction of internal mental representation, and it is a process of active construction of new knowledge on the basis of previous knowledge and experience. It is not only the construction activity of learners, but also the process of cooperative construction of learning community. Students are the main body of information processing, and it is the active construction of meaning. The teacher's task is to create learning environment for learners, cultivate study autonomy, stimulate learners' interest and motivation. The basic hypothesis of modern constructivism is that understanding is not subject to the objective and passive existence of a simple, but an active process of construction, all meanings are constructed through active internal representation. Knowledge in the meaning construction process has played a particularly important role to the existing knowledge and experience. Visible, constructivist learning theory requires students to construct their own knowledge. It emphasizes the importance of learning environment and the importance of learner centered. These ideas are embodied in the teaching practice of British and American literature based on network multimedia.

3.2. Multimedia teaching practice

The first is preparation before class. The teacher is going to arrange the right amount of work, and supervise the students to complete it. Preparation of the whole process is not under the supervision of the teacher, but the students with personal interest and ability to do. At the same time, they can also download photos of Fielding's portrait and related works, because the picture will give students a deep impression. Encourage students to find the information to sort out, to make slides with appropriate music in the classroom play. The use of music can cultivate their sentiment, to avoid the boring classroom. In addition, you can also allow students to collect some video information. Video materials, including animation and movies, are the expression of a strong form of media.

Classroom presentation requires the use of multimedia devices, including text, pictures, static images, animation, video images, sound and music, and other forms. They can make simple slides; exquisite slides require students to have a hyperlink, such as insert background music, pictures, video and other. Of course, in the course of explanation,



Figure 5 – Classical literary works

the focus should be highlighted. Then, the teacher will make evaluation of the students' performance, point out the advantages and disadvantages, and do the corresponding supplement. Third is the exchange of discussion. Because readers may have different views on literary interpretation, the comment should not rigidly adhere to a pattern or a conclusion. The teacher divided the students into several groups to discuss the topic, the characters, the writing style, the narrative techniques, the prototype criticism, the image analysis and so on. Through the discussion of different forms, students can develop ideas, learn from each other. Practice proves the effectiveness of learning literature. Now a large number of classical literary works were adapted to animation, movies, classical text, traditional reattention and appreciation. Film has rich historical, cultural and social value; it can show the story more vividly, therefore it's more popular with the students.

4. The innovation of the teaching mode of British and American literature

4.1. English and American literary works under the multimedia environment

Under multimedia environment, computer is the core of modern educational technology and network support. In the multimedia classroom, teachers can carry out video teaching and courseware teaching by using computer and other multimedia devices. In the process of film teaching, the courseware content should be consistent with the content of the film. The author introduces the outline of the story: appreciate artwork; comment on works (including the theme, characters, cultural phenomena and social cultural background); enjoy the wonderful works of film clips; learn English film dialogues, difficult words and useful expressions.

At present, more and more teachers begin to teach British and American literature at college English teaching by using multimedia technology, which will become the most effective direct teaching mode, communication mode and teaching platform. This platform can enhance students' learning autonomy, optimize the teaching environment, demonstrate the diversity of teaching forms. Based on these advantages, the multimedia environment of Anglo American literature and film appreciation teaching has the following characteristics:

1. ***The universality of teaching content:*** Multimedia and network is a huge information database in addition to text information, literary works of British and American can also collect more information through the network, introduce students to access information, edit summary of information, access to information content related with the teaching content. At the same time, teachers can also introduce relevant information to the students through multimedia. Film literature is more intuitive, vivid and moving, which makes the ideological and artistic essence as a more concentrated concise display.
2. ***Interactive teaching process:*** Reading is an interactive process of author and reader in literary works. It is also the common process of interaction between the teachers and the students because they rely on each other and communicate with each other. In the process of interaction, the emotions of the movie characters are fully displayed, and make resonate with the audience. So, the characters in the movie with the same fate can communicate with each

other. At the same time in multimedia or network environment, teachers can make full use of open learning space to show information teaching and information communication.

3. **The superiority of teaching condition:** Multimedia and network to construct a good teaching environment and teaching conditions for College British and American literature teaching, it can make the students easier to understand the information in the classroom. As previous study shows that the main way to get information is visual, and 83% of the information is obtained from the image and video. Picture and sound can attract the attention of students.



Figure 6 – British and American literature database

In traditional classroom teaching, teachers often use blackboard and other teaching aids, this kind of teaching mode is simple but not so effective. The modern multimedia teaching method can effectively make up the deficiency of the traditional teaching by using video, computer, projector, VCD, tape recorder, multi-function display instrument. The elaboration in the teaching process of audiovisual materials, animation can provide a wide range of three-dimensional information for students, fully mobilize students' visual, auditory, tactile sensory organs, give full play to the role of increasing memory effect, let the students get rich sense of intuition from vivid sexual knowledge, the final form of law, and other psychological set.

4.2. Advantages of multimedia teaching

The construction of multimedia teaching mode is not only a change of technical means, but also means the reform of the teaching mode. It began to establish a proactive personalized student-centered teaching mode. The Anglo American literature and movie appreciation put forward to higher requirements for teachers, they should not only have good professional quality, but also grasp the operation and use of multimedia teaching facilities, know how to use the computer knowledge to make courseware and other teaching aids. To complete the task of teaching under the multimedia environment,

we must first have the hardware of multimedia teaching and software. The application of multimedia and Internet aided teaching of British and American literature can fully mobilize students' learning, enhance the teaching effect and improve the teaching quality. The surveys results show that by using this teaching method, 72.4% of the students believe that the degree of love for British and American literature is greatly improved compared with the previous. The advantages of multimedia technology and Internet assisted English literature teaching can be summarized as the following four aspects:

- Teaching methods tend to be diversified: it can solve the traditional teaching mode's problem as single and inflexible. The primary task of British and American literature course is to cultivate students' interest in British and American literature, and to improve their cultural accomplishment and humanistic quality. Multimedia Assisted Teaching of British and American literature provides a good language carrier, relax the students' learning environment, enhance the intuitive, vivid teaching and memorize infection, make learners enjoy the aesthetic pleasure, make happy to learn the knowledge of literature, at the same time, greatly mobilize the enthusiasm and autonomy in their learning.
- Multimedia courseware: Multimedia courseware makes students more clearly see a border, beyond the era, rooted in the literary world, to inspire them to take the initiative to understand the countless historical celebrities and sages. Teachers exercise type electronic lesson to the students, saving the students to take notes of the time, increase the amount of information in class, and improve teaching efficiency. Thus teachers and students will have sufficient time to explain the combination of discussion, to cultivate students' ability of independent thinking and innovation ability, make teaching maximize effect.
- Provides a platform of autonomous learning: Based on the constructing of auxiliary teaching website will provide students with a platform and improve the students' interest in literature study, cultivate their cooperation ability, research ability and autonomous learning ability. At the same time, it also promotes the mutual communication between teachers and students, plays an important role to teaching and learning.
- Solve the problem of shortage of teachers: At present, the enrollment of the school is constantly improving, on the other hand, the literature teacher is serious insufficient. In this case, the computer assisted instruction can solve the problem of shortage of teachers. Internet aided teaching of British and American literature can make up for the traditional teaching defects, greatly improved the efficiency of classroom teaching.

5 Conclusion

With the development of computer technology, multimedia technology shows a huge advantage in the field of assisted instruction. In this paper, the author analyzes the multimedia applications in British and American Literature teaching. Multimedia teaching can improve the students' interest, to stimulate students' sensory. It breaks through the one-way transmission of information literature class teaching methods, through multiple channels of information input for students. The multimedia teaching

method can help student's better access to knowledge. It could show the content to the students through the three-dimensional form by using sound and image, which is more vivid and effective than the traditional teaching mode. Multimedia assisted teaching can let students vividly understand western culture, lay a solid cultural foundation, present the exotic culture more intuitively and vividly in front of students and also release learners' learning pressures, these are advantages.

Everything has two aspects. By using of multimedia technology, higher requirements for teacher's technical level are put forward, therefore, in teaching English literature courses or other language courses, we should not blindly use multimedia courseware to understand instead of the blackboard, and should be based on the specific contents of the course to the appropriate use of multimedia means, and improve their own understanding and practice of multimedia assisted teaching.

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Research on the Traditional Residential Building Heritage Protection Technology based on the Multimedia Information Technology

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Abstract: In recent years, virtual simulation technology has been widely used as a visual and efficient intelligent technology. Virtual reality technology can be used not only in the protection of cultural relics, but also can achieve different forms of traditional residential characteristics, decorative components and molding process. Through the visual simulation technology to restore the traditional houses is not only play a role in the tour, more importantly, is conducive to the protection of traditional houses. In this paper, the author analyzes the protection method of traditional residential building, and discusses the application of virtual reality technology in the protection of traditional residential building.

Keywords: Information technology, Virtual reality, Architectural design, Traditional building protection

1. Introduction

Since the reform and opening up, China's rapid economic development, our city has changed a lot. The increasing urbanization process has greatly improved the style of city construction, but the tide of industrialization has been submerged in the traditional residential buildings and historic districts. Ancestors left the building essence has been destroyed, many valuable national building facing the threat of disappearing (Denghua, 2015). Although some cultural relics are still in, but its ecological environment has been destroyed, so that the traditional national construction lost its original value (Qiang, 2014). Facing the protection of these nonrenewable resources, the protection of traditional residential buildings in China is an urgent task at present. Chinese traditional residential building is an important part of China's historical and cultural heritage. It carries a lot of cultural information, such as local historical culture, national culture, customs and habits. With more and more people pay attention to the world architectural sites, the traditional residential buildings in our country are constantly growing and changing (Bo, 2013; Daiyong, 2015). Because of China's traditional dwellings diversity, form structure is in different poses and with different expressions should be based on different, residential buildings distinguish the protection technology and its mode. Traditional residential building is an important cultural and material foundation of

the national industry; our country should improve the traditional residential building protection of the relevant legal system for the establishment of China's protection model has a very important significance.

In recent years, as a kind of visualization, virtual simulation technology has been used in scientific research, military affairs, culture and so on (Yongdong, 2015). The traditional teaching mode of architectural decoration is under the unprecedented challenge and impact, how to make advanced equipment and technical services in the building decoration industry has become an urgent need to solve a big problem (González, 2015; Lino et al., 2016). Virtual reality technology not only can be used in protect cultural relics, but also can realize the traditional dwellings different morphological characteristics, decorative elements, decorative materials and molding process and other aspects of the art application, the visual simulation technology of the traditional dwellings reduction equipment display in digital media. The residential use of virtual reality technology to show not only play a role, more importantly, is conducive to the protection of traditional houses, do a good job of filing. At present, the field of application of virtual reality technology has become more and more widely, such as art painting, scientific research, Internet and education.

2. Multimedia virtual reality

The so-called virtual reality and is present in the computer, virtual rather than real, is through a variety of computer network technology to create a real space and does not exist, it includes virtual environment, visual and auditory, tactile integration. Through a contact and let people in this environment to travel and produce immersive experience, through the contact with the machine to achieve a communication between people and virtual environment. The virtual reality technology, relates to the field of computer graphics, human-computer interaction technology, sensor technology, artificial intelligence, it generates a realistic three-dimensional computer vision, hearing, smell and feeling, make people as participants through the appropriate device to experience and interact on the virtual world. When the user moves the position, the computer can immediately carry out complex operations, the exact 3D world image sent back to produce a sense of presence.



Figure 1 – Virtual reality



Figure 2 – 3d world image

The design of cultural landscape design has a long history, however, the landscape design and virtual technology together has experienced a short period, from the beginning of the development of image processing technology to have professional design software for architectural design services, like 3Dmax and so on. This software has been slowly improving and the rich, three-dimensional sense of space three more and stronger, the effect is more and more realistic, and people are more and more rich audio visual experience. The development of virtual technology is constantly advancing, each country realizes its broad space for development, are studied in a lot of manpower and material resources, in this rapidly developing countries such as the United States, like Germany, Japan, South Korea, China's relatively late in the virtual technology in this area started to develop more slowly at the end of 80s to mid-90s, the domestic emergence of a number of mature artists and excellent works, the digital media art in China started until the end of ninety, the development of digital media in the field of art has been popularized, the effect is more and more widely, such as in architectural renderings, animation, and so began the field of game design widely used in digital media technology. With the progress of science and technology of digital media art in landscape architecture design are more and more widely, the development of digital media to promote the development of architectural design, from the beginning of the free hand drawing architectural landscape renderings to architectural landscape animation, and finally to the virtual reality architectural landscape, which are derived from the development of digital media and the two in the field of landscape architecture. Digital media technology has become a means to better performance of the landscape architect's design thinking, it is beneficial to the designer of a powerful and unconstrained style imagination, better design more quickly realize the designers want to express. Virtual reality technology as long as the parameters can be easily modified to change the color of the environment, the height of the building. In addition, after the completion of renderings, can quickly put the drawbacks encountered in the early feedback to the designer in advance to modify avoid the errors, improve design better and save a lot of money.

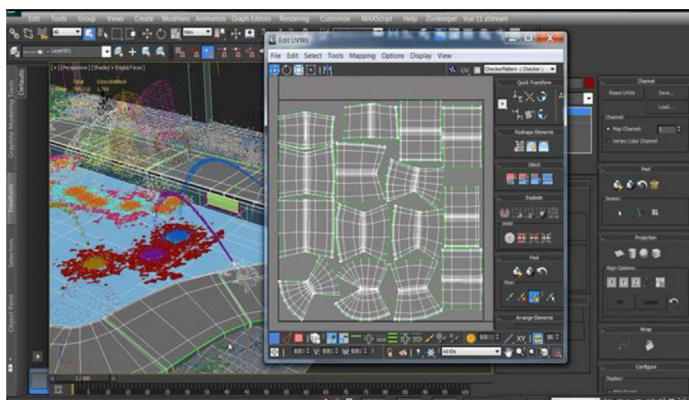


Figure 3 – Analog architectural design

For architectural design, in recent years, three dimensional effect charts has been widely used, but the three-dimensional effect chart gives a person is only a static visual experience, and the lack of a dynamic and can realize the communication between people and the environment. Virtual technology can enjoy the landscape architectural design dynamic, people can use digital man-machine interface technology, by using various special equipment, put themselves in the virtual space environment more real, more comprehensive, more freedom to experience. Virtual architecture landscape design makes full use of the two characteristics of interactive and immersive virtual reality technology, and promotes the construction of landscape design into a new era of virtual, space and time. The spatial layout of multi view and auxiliary public virtual technology can borrow the full range of understanding and observation information diversified architectural landscape environment, control spacewalk angle, observation and understanding of the subjective of architectural landscape structure. Virtual reality technology into the architectural landscape design, digital technology and design art wisdom crystallization,

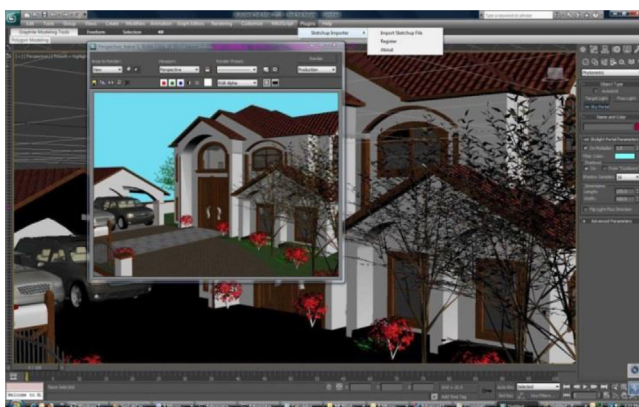


Figure 4 – 3d Max architectural design

for the development of the architectural landscape design provides a new environment. In the construction of landscape design and planning process, the establishment of a virtual environment using virtual reality technology, adopting the scientific prediction and analysis methods, and let the public participate in the review, can fully ensure the design plan, the feasibility and rationality of the results should be modified.



Figure 5 – Virtual landscape architecture

3. The protection of Chinese traditional residential buildings

3.1. Protection mode of traditional residential building

Traditional vernacular architecture is a unique and valuable historical and cultural heritage of our country. Chinese traditional houses from the site to the material are reflected in the wisdom of mankind. Its architectural form reflects all aspects of human life, reflecting the local historical and cultural, economic level. In view of the cultural background of traditional residential buildings, the protection and restoration system of traditional architecture is considered. In practice, the concept of traditional technology and modern protection in China will be combined. The protection of Chinese traditional architecture can not only reflect the “science”, and consistent with the traditional Chinese architectural history and culture, national characteristics and ecological and cultural background, is the study of the traditional residential buildings protection in China should expand the field. After the construction of the traditional building, showing a new look. Since the public view of modern times, the traditional building of our country in the spirit of “old for new” ideas. Originally experienced years, become dilapidated historic buildings in the modern technology and materials under the transformation of the new look, did not leave a trace of history. Because there is no relevant information too many records, reconstruction of the traditional residential buildings have been defaced, lost the original historical value.

The protection mode of traditional architecture in China brings about the “dominant” influence on traditional architecture, and it is very important to the protection of traditional architecture. At the same time, there are many differences between the traditional architecture and the western historical building system. We should aim to keep the traditional architectural culture diversity, the establishment of a can carry forward the traditional construction technology, but also to show protection and restoration work of “science” for the protection of traditional architecture Chinese system.



Figure 6 – Traditional residential building

3.2. Protection system of traditional architecture

There are still a lot of problems in the protection and repair of traditional Chinese vernacular dwellings. The protection measures and the value orientation of traditional folk houses are blurred. “Venice charter” Convention on the protection of historical building sites is universal. It is from the material, structure, environment and technology four aspects of interpretation of the protection of historical buildings in ruins of the “authenticity” of the basic elements. With the human understanding of the protection of traditional architecture, we must first protect the background of “authenticity”, divide the scope of protection of traditional residential buildings, and the buildings of historical environment protection. Shall not be constructed in the protection of any damage to

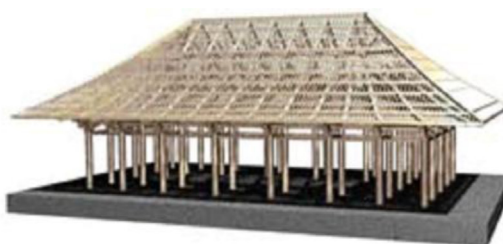


Figure 7 – Building materials for residential buildings

the traditional residential buildings and environmental features of the building is not coordinated. In addition, the geographical environment and natural environment, such as topography, vegetation, and landscape and so on, should be fully considered in the traditional residential buildings, to restore the original artistic conception of the original building, restore the authenticity of the building in function and use. Maintenance of traditional residential building used function, it is conducive to the understanding of the architectural background and historical environment.

“The whole old as the old” is to maximize the reduction of historical information, the preservation of the historical atmosphere, after the vicissitudes of life. The traditional residential buildings in our country are mainly of wood as the main building materials, in the construction of the repair process by the limitations of traditional buildings. In the face of these problems, we should break through the limitation of the construction and combine the characteristics of Chinese wooden structure, so that the traditional residential building repair technology has a new development. For those more serious damage to the building, had to “old for new” part, should be repaired with the construction of the same period of building materials, to maintain the original style.

4. Heritage protection of traditional residential buildings

4.1. Protection principles of traditional residential buildings

The construction of Chinese traditional dwellings according to local conditions, be the most changeable architectural style, distinctive local characteristics, construction technology is flexible and practical. Chinese traditional residential buildings, the builders of manpower, financial resources, technology and so on, has been showing the characteristics of “the effectiveness of a variety of materials, such as stone mountain as the main building materials, the forest is used for timber, it is a characteristic of this has created a rich and colorful local materials and traditional houses in different regions of China regional, technical and artistic characteristics, presents a wooden building, masonry, the overall appearance of adobe building supplement, comprehensive protection idea of each period, the traditional residential architecture protection scheme and technical measures of the principle mainly includes the following aspects.

- **Security principle:** The traditional residential buildings tend to have more than 100 years of history, even the stone member cannot live intact, must have different degrees of weathering or flash. If the principle of full restitution, not only will spend a lot of manpower and material resources, but also may reduce the cultural value of the building. Therefore, the census should be finalized buildings are safe as one of the principles of repair. Here said the security includes two aspects: one is the security of people, two is the main structure is safe, relatively large components and main structure relationship problems can repair or repair, such as foot stamp stone, stone weathering, order small displacement, small displacement of the fracture, steep slate.
- **Integrity principle:** The historic buildings into the historic district to consider, the building should be individual historical style and the entire neighborhood coordination should also be and the historical circumstances

surrounding the coordination; the single component in the construction of the whole to consider, the repair site should as far as possible with the original style. All buildings should be in place, design, setting, g materials, workmanship, feeling, association, and integrity.

- **Authenticity principle:** Authenticity is the core of the value of historical buildings. Under the principle, as long as it can ensure the safety, does not affect the use, the old buildings may be more ornamental value.
- **Principle of recognition:** It is closely related to reality. Any new components, new practices, not only should be coordinated, retains the original process and technology, but also should be identifiable, which retained the contemporary features, but not deliberately imitate even mix of old and new members.
- **The principle of the minimize using modern technological intervention:** The requirement of modern structure and protection technology is proposed, that is, the technology should be fully scientific and proved to be effective. Because of the particularity of China wood construction, using the method of sheet metal wood structure repair in ancient times, and modern historical buildings for repairing wooden bars, steel, epoxy resin and various anti-corrosion, fire prevention, moisture proof paint application is more and more widely. However, there are no clear provisions for modern technology maintenance and update of the traditional residential buildings in the intervention, thus causing a large number of local residents and government abuse of modern building materials cheap in the maintenance and update process, that contains the true historical information of the traditional building components are replaced, architectural form is greatly changed.

4.2.Application of virtual reality technology

For the use of virtual reality technology in residential buildings, he is not only a three-dimensional interactive technology, a kind of interface and the virtual reality technology can be very good in the reality of the technology to provide many of the other traditional ways cannot be compared, the model of information exchange.

1. Can make the designer's design idea to achieve dynamic space. The so-called dynamic design is the ability to use VR technology to enable the designer to be converted into a three-dimensional space model of two-dimensional form of traditional residential buildings in the design, the consideration of inheritance and protection and renovation of residential buildings with more plasticity.
2. Use of design information to be systematic. Can be very good through the network technology to collect the relevant information in the design for the traditional residential buildings in the use of 3D technology will be a better image of the traditional dwelling building model painting exhibition, and through the combination of application technology in VR system, the real space abstract reality in computer.
3. Carry out scientific and accurate analysis. The VR system of high-tech information technology as a comprehensive performance is very strong, can the very good application interface model system for some applications directly into the complex of accurate analysis can help designers good for the whole space of objective, comprehensive and accurate and effective analysis, and can simulate

realistic lighting effects a very good room in the atmosphere and analysis system combined with the. To make the creation, transformation and analysis of the space of these models is more realistic, scientific, visual and accurate.

4. Makes the traditional residential building construction system through the whole process. In the construction of the traditional dwelling building, from the beginning of data collection, integration of a large number of information about the arrangement, and through 3D technology to build the model, from the analysis of information base to treat the whole design of conceptual ideas, from the development stage of some simple space to change some combination of space and combined with the surrounding environment until the construction stage, simulation technology, VR technology can be very good to play a big role.



Figure 8 – Analog traditional architecture

Using virtual reality technology to protect and inherit the traditional architecture, and has the advantages of real-time, communication, experience and preservation.

1. **Real time:** In the protection, inheritance and display, the use of virtual reality technology can achieve the purpose of quick and convenient. For example, the traditional form, people want to recover on the village at the scene to conduct a comprehensive investigation, takes a certain amount of time, and the use of virtual reality technology, can, whenever and wherever possible in a virtual environment is not limited by space and time to carry out real-time observation and roaming.
2. **Easy to spread:** Virtual reality technology for digital protection of architecture, which is conducive to the spread of architectural culture, for the specific cultural heritage and carries forward, has important significance. It cannot be limited by time and space, spread to all over the world, and not like the traditional architectural culture protection, subject to geographical and time constraints.
3. **Experience nature:** In a virtual reality environment, people can be multi-sensory experience, so as to achieve the immersive feeling. Can observe, listen and even touch the digital model of the virtual environment, and can achieve the panoramic experience and perception of things.

4. ***Can be stored for a long time:*** The use of computer and the corresponding equipment to create and realize the virtual environment in digital form is conducive to long-term preservation and continuous replenishment and improvement. With the technology update, so that constantly improve the performance and play an advantage, the basic data information cannot be limited by the time and long-term storage.

5. Conclusions

In addition to the practical value of the building itself, the traditional folk houses in our country have a high value in history, culture, science and emotion. How these values can be realized in the premise of protection, is the traditional residential buildings use to face the issue; therefore, should be based on through a variety of techniques, economic, legal means, including the aboriginal cultural relic protection units, local government, tourism market to fully participate in the traditional residence of the protection and utilization, and through the formation of protection and use is closely related to the interests of the chain, to achieve the purpose of promoting the protection and utilization of each other. The use of traditional houses, in the final analysis is still in order to better protect and carry forward the value of the additional. Virtual reality technology will become the digital media art in landscape architecture design in the future application prospect, with the continuous development of information technology, the building will gradually get rid of the traditional landscape design expression, is a new mode of thinking and habits to create a new landscape design. Let the designer play a greater imagination to get rid of obstacles to the original expression, design better help building designers through the advantages of this technology, design of landscape architecture, even release support and promotion, expansion and innovation on the development of landscape architecture design.

Acknowledgement

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Study on the Innovation Mechanism of College Mathematics Teaching Based on Digital Multimedia Technology

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Abstract: The application of multimedia and network technology in higher education is a reform of education mode in twenty-first Century. As a kind of new and advanced teaching mode, multimedia teaching is challenging to the traditional teaching mode. In this paper, the author analyzes the innovation mechanism of college mathematics teaching based on digital multimedia technology. Multimedia computer teaching uses a large number of graphics, sound and other processing means to enhance the learning initiative, greatly improve the students' learning interest. Through the mathematics software, the thought of mathematical modeling can be realized in the course of advanced mathematics. The result shows that multimedia mathematics teaching is an effective auxiliary teaching method, which can visualize the abstract mathematical theory; it could help to eliminate the confusion of students' understanding of mathematics knowledge and improve students' learning interest.

Keywords: Computer multimedia, Virtual classroom, Mathematics teaching, Innovation mechanism

1. Introduction

The multimedia teaching method has been widely used in literature and art image teaching, and easy to accept. However, due to the particularity, abstraction, therefore, the multimedia teaching method into abstract teaching will inevitably lead to a lot of controversy (Gopinathan, 2012; Aguilar, 2014). With the higher mathematics teachers more and more use of multimedia teaching mode people, a lot of beneficial exploration for higher mathematics multimedia classroom teaching, how to improve the quality and effectiveness of teaching of higher mathematics has been a concern. Under the background of the global economy, the first-class research and education is the key to the success of a country (Chung, 2013). The ultimate power and strength of modernization is knowledge, that is, education, especially college education. College Mathematics public basic courses are the required courses, the most class of public basic courses. Mathematics is very important to the training of people, mathematics, focus on logical thinking; it can cultivate your thinking and methods, to adjust your thinking, analysis of the problem. Mathematics helps people to grasp the principal contradiction,

and to discard the minor issues (Gikas, 2013). Mathematical logic, the people who have been trained in mathematics are clearer. With the rapid development of science and technology, the role of mathematical thinking, more and more outstanding role in mathematics. It is becoming more and clearer that modern high technology is a kind of mathematical technique in essence (Kozhevnikov, 2014; Lino et al., 2016). Mathematical science plays a very important role in the cultivation of innovative talents.

The application of multimedia and network technology in higher education is a change of the twenty-first Century education. At present, the multimedia teaching for literature and art image has been relatively mature, but because of the particularity of abstract subject, how will the multimedia teaching successfully applied to abstract subject is an urgent task for the higher education. And innovation of mathematics teaching reform in university plays an important role in the cultivation of talents and talents (Mahony, 2012; Porter, 2014). To realize the innovation of college mathematics teaching is a systematic project, which involves many aspects. Outdated concepts need to be converted, the classic theoretical content needs to be given a new era background, the old model needs to be abandoned, teaching methods and methods should also keep pace with the times, and constantly innovate.

2. Multimedia mathematics education

2.1. Multimedia technology

At present, multimedia technology has been widely introduced in the classroom, multimedia teaching as a new, advanced teaching mode is to the traditional teaching mode to challenge. Different courses have different characteristics, so the teaching mode is not the same, the higher mathematics course is different from other non mathematics curriculum, and has its own characteristics compared with other mathematics courses (Schoonenboom, 2014). The characteristic of advanced mathematics is a high degree of abstraction and generality, and it is very strict, accurate and logical. Higher mathematics teaching is not only to provide a method and a calculation tool for students, more important is to provide a method of abstract thinking and logical thinking for students, enable students to abstract thinking from the infinite image thinking transition limited (Taras, 2013). By learning to enable students to learn higher mathematics, analysis and inductive methods and skills, improve students' ability of logical reasoning and argumentation, to cultivate students' mathematical quality, for the analysis of the problem and solve the problem of further lay theoretical foundation of mathematics. In view of the characteristic of higher mathematics, although multimedia teaching has obvious advantages, leaving the traditional teaching method, can not really achieve the goal of cultivating students' mathematics quality. Of course, the traditional teaching methods also have some limitations, multimedia assisted teaching can make up for the deficiency of traditional teaching mode. In order to better achieve the teaching purpose of higher mathematics and improve the teaching quality of advanced mathematics, we must make full use of the advantages of multimedia teaching and reform the traditional teaching mode.



Figure 1 – multimedia technology

The use of computer teaching is developed in recent years, the highest level it represents the application of multimedia technology in education, has become a modern education mode (including distance education and virtual education) the mainstream and direction. The multimedia computer teaching CAI (Computer Aided Instruction) features:

1. Interactive teaching is beneficial to the establishment of an equal exchange of academic interface between teaching and learning.
2. Raise the awareness of participation, to achieve resource sharing, to improve the ability of teachers and students to apply modern teaching methods.
3. Using a large number of graphics and sound processing methods, illustrations, enhance learning initiative, improve the students' interest in learning.

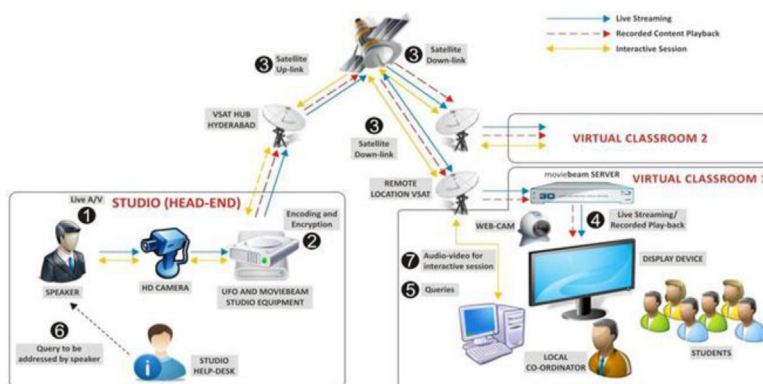


Figure 2 – virtual classroom education

The advantage of using multimedia teaching software to teach advanced mathematics is its advantage:

1. multimedia software new topics, a large amount of information, covering the syllabus for undergraduate teaching of higher mathematics required including all theorems, definitions and examples, teachers use it in classroom teaching, the teaching content of the 95% no longer need to use the blackboard and other teaching aids, students also can use this software to self-study. This can reduce repeat labor, but also saves the teaching time, is beneficial to the teacher in the classroom is limited in teaching more abundant knowledge and provide more information.
2. the use of computer in the advantages of image processing, from abstract to concrete, static into dynamic, the theory and practice better combination. Not only reduces the difficulty of learning, but also highlight the key and difficult points and increase students' learning interest.
3. the use of animation can be displayed during the formation of abstract concepts, as seen under various conditions and the relationship between the number of constant change, also can be "potential relationship and dynamic changes of shape" and "number" to appear on the screen, and can according to the needs of teaching for students in the context of regulation. And even if the teacher does not speak, students also will find the mathematical rule. This method is used in explaining the limit and the integral, dynamic interactive computer and students, to enable students to find their own mathematical rules in the process of practice, expand the software demonstration and explanation function.

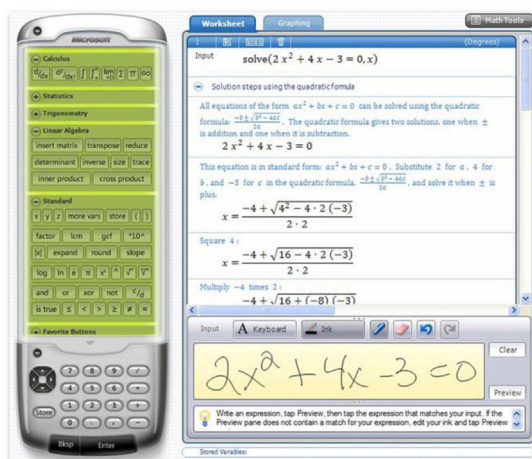


Figure 3 – Multimedia mathematical software

2.2. Advantages of multimedia teaching mode

Using the modern multimedia teaching methods for teaching, the learning content of the original abstract and boring through graphics, animation and other forms and become

intuitive, enhance the students' interest in learning; can show various geometric spatial relations in higher mathematics; can save hours and increase the amount of information in the classroom teaching. To improve the efficiency of classroom teaching; contribute to the introduction of mathematical modeling ideas in multimedia teaching in higher mathematics, to cultivate students' ability to solve practical problems with mathematics

- **Enhance learning interest:** First of all, the big screen showing the text clear and standardized, the use of microphone to make up for deficiencies in the teachers' volume small, either the front or the last row of the students can see and hear. Not only that, but also according to the characteristics of teachers' teaching content set font, font, color and special sound effects; secondly, graphics and animation multimedia function while strong students bring visual beauty to help students understand the abstract space in the graphic, lit the students' listening enthusiasm, easy to create a positive learning atmosphere.
- **Visual image:** Space analytic geometry and vector algebra in advanced mathematics curriculum contains a lot of space graphics. In the calculation of the weight integral and the line, the area is divided into complex space. The traditional teaching method is: for some simple graphics, the teacher on the blackboard is drawn directly, for some of the more complex graphics can be through the use of charts and die, show to the students. Direct drawing on the blackboard, not only wasted time, and cannot be perfect, but could not die wall charts, and powerful graphics functions of multimedia cover and contain everything, just make up for this deficiency
- **Improve the efficiency of classroom teaching:** The use of multimedia teaching, teachers only need to be prepared for courseware presentation in the classroom, tell the teacher time to write on the blackboard, save the class, which can increase the amount of information in teaching, improve teaching efficiency. From the current situation of higher mathematics teaching, a teaching hours are generally compressed; on the other hand, mathematical modeling and mathematical experiments with the new version of the textbook content much fewer hours have become the teaching content, and according to the requirements of the teaching syllabus, teaching quality can not only reduce, but also further improve the multimedia teaching method provides a possibility for. The defect of multimedia teaching is that the presentation speed is too fast, the students' thinking cannot be synchronized, and the impression is shallow and the effect is poor. Therefore, how to introduce multimedia into advanced mathematics classroom needs to be deeply studied and explored.
- **Develop students' ability to analyze problems:** Quality education is the core of university education, mathematical modeling and experiment course is the key to the implementation of quality education, for the introduction of mathematical modeling in mathematics curriculum ideas, cultivate students' ability to analyze and solve problems, try doing a variety of effective. First, multimedia teaching saves hours, provides the possibility for the introduction of mathematical modeling in higher mathematics thought, followed by a large number of mathematical software package such as: the development and utilization of Mathematic, Matlab, Lingo, Lindo and so on, so the idea of mathematical modeling can be really realized in Higher Mathematics course. In

the course of advanced mathematics, there are many problems in the calculation of the approximate calculation, the extreme value, the function approximation and the solution of the differential equation, which are good materials for mathematical modeling. By studying, the theory is connected with practice, students understand the use of mathematics knowledge.

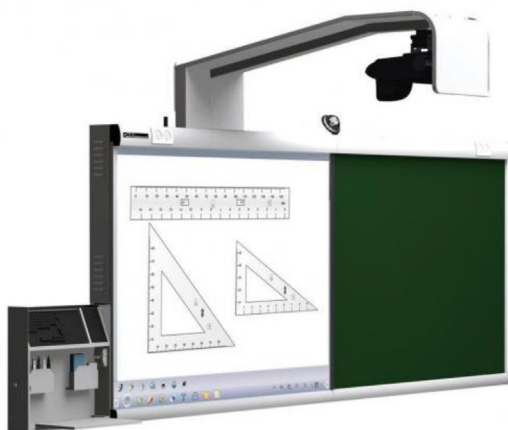


Figure 4 – Multimedia teaching

3. Mathematics teaching idea and content innovation

3.1. Innovation of teaching idea

Teaching idea plays a guiding role in teaching. In order to carry out the cultivation of excellent creative talents, the first is the innovation of the teaching concept of teachers. Only the transformation of teaching ideas, teaching will radiate new vitality and creativity. Therefore, teachers should keep pace with the times, clear the new era of outstanding innovative talents training objectives, to the vision of modern education, to examine the traditional mathematical teaching, the establishment of the correct concept of College Mathematics teaching. The study of modern educational psychology points out that the process of learning is not only a process of accepting knowledge, but also a process of constructing, exploring and trying knowledge. This process on the one hand, the students are exposed to various questions, difficulties, obstacles and contradictions, on the other hand is to demonstrate the students' intelligence, intelligence and innovation ability of the process. Therefore, different from the traditional cramming teaching, mathematics curriculum of the modern university teaching purpose is not only to impart knowledge to the system, the more important is through the process of teaching and learning, cultivate students' interest in learning and learning ability, training, ability to analyze and solve problems that students, improve students' mathematical quality as well as the overall quality. Every link of the teaching process should be launched around this purpose.

3.2. Innovation of teaching content

The innovation of teaching content is an important link in the implementation of the innovation of College Mathematics teaching. Teaching material is the main carrier of teaching content, and the organization of teaching content has a great guiding role to the training of talents. An excellent textbook should be of importance, simplicity, readability, interest and inspiration.

3.2.1. Optimization of integrated curriculum system and curriculum content

The higher mathematics curriculum must not only pay attention to related to the content of calculus in high school mathematics, but also pay attention to it and linear algebra and space analytic geometry, physics and engineering courses contents and description of contact; not only pay attention to the classic content of modern mathematics expansion, too formal expression is also interested in weakening the mathematical theory in order to reduce the difficulty of learning. At the same time, pay attention to reduce the course content is repeated, between the curriculum system of seamless and smooth transition of knowledge, so as to realize the optimization of course system, the complete elimination of the students in the knowledge representation is not consistent in terms of cognitive burden.

3.2.2. Integrating the ideas and methods of mathematical modeling and mathematical experiments into the content of teaching materials

The general mathematics teaching material is usually confined to the mathematics theory itself, but has neglected “uses the mathematics”, causes the student to study mathematics, but does not know mathematics has any use. In the preparation of this set of textbooks, we according to the student’s professional background and the current development level of science and technology, fine and featured a large number of real examples, using the ideas and methods of mathematical modeling and mathematical experiments integrating teaching materials. The design of teaching contents, helps to

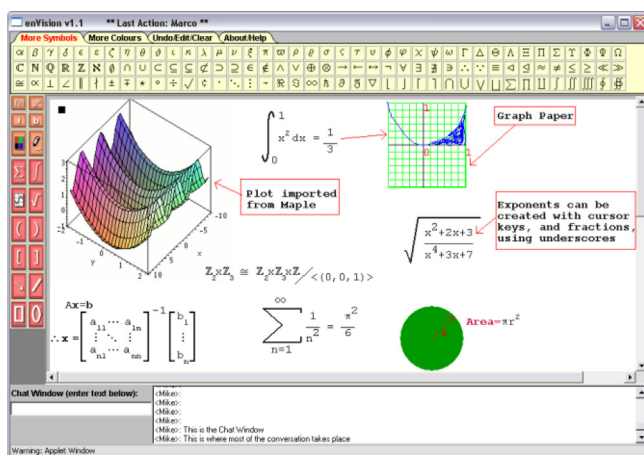


Figure 5 – mathematical modeling

cultivate students' interest in learning, help students multi-level multi angle, habits, helps to enhance students' practical ability, help to broaden their knowledge and vision, help to improve the students' ability of using mathematics, help on the cultivation of students' scientific exploration spirit and innovation consciousness. We in the selection of content selection and exercises, especially increasing the application and experimental content, focus on the application of calculus in modern science, engineering and military fields, in order to strengthen the practical teaching of mathematics curriculum, through the exploration of open problems, cultivate students' innovative spirit and ability.

3.2.3. Optimize content organization, enhance readability and inspire

With the popular but there is no lack of rigorous language to describe mathematical phenomena and rules can be understood and accepted by students, therefore, whether it is the introduction of the concept and theorem established or application example explanation, we are carefully from different angles and different levels described in inspired guidance, and with a large number of graphics and intuitive real life examples to explain, let the reader can grasp the learning content in self reading and comprehension. This organization teaching content changed the traditional teaching materials due to the expression of concise and profound theoretical understanding of the reading and understanding of the difficulties greatly enhance the readability of the content of abstract mathematics and students' acceptability. At the same time, the textbook is readable, but also for the classroom teaching details may provide less training.

4. Teaching innovation of College Mathematics

4.1. Innovation of teaching mode

The traditional teaching mode is to students as a passive process of mathematics learning in the classroom is only the knowledge of dogmatic a lot of irrigation to the students, ignoring the students of mathematics learning initiative and creativity, and ignore the cultivation of students' mathematics innovation consciousness and innovation ability, direct damage to the the formation of students' innovation consciousness and ability. A good teaching model should be able to cultivate students' mathematical knowledge through the lively and vivid carrier of rational thinking and creative thinking, the implementation of dynamic and intelligent psychological guidance to students, inspire students' interest, wisdom and beauty, the development of students' understanding, tap the potential of students, to stimulate students' enthusiasm to create.

- **Research Teaching:** The teaching of mathematics and other science and not from the outside world in isolation, but he kept on the concept, mathematical methods and theories in the internal circle, which is not conducive to the understanding of mathematical concepts, theories and methods of the sequence of events, reality is not conducive to inspire students to consciously use mathematical tools to solve all kinds of, is not conducive to improve the students' mathematics accomplishment. The teaching mode of college mathematics should guide students "participation" to the formation background and formation process of mathematical concepts and theories, guide students to mobilize

the original knowledge and experience, to learn the knowledge of ourselves to study and create “, this kind of teaching mode called” research teaching”. In the study of teaching process, teachers should carefully design the teaching process, all along “to find problems, analyze problems, solve problems, put forward the new problem of” circular rising ideas, participation of all research on creating atmosphere, provide everyone the opportunity to participate in the study, stimulation of the participation of all the enthusiasm, to have enough time to inspire and guide the students, allow students to experience the joy of the harvest of knowledge in the “research”, to enable students to cultivate innovative consciousness and innovation ability in the “research”. In addition, we also advocate the teaching, course set up before the unique “blackboard” show links, give students adequate opportunities for self-expression, to further improve the students’ interest in learning and learning ability.

- **Personalized teaching:** With the college enrollment has expanded each year, the current university mathematics education is facing many new problems: students are widely distributed, uneven level; too many students “difficult to implement small class teaching”; unified teaching often encounter such as “gifted students do not have enough, not bad, difficult to grasp the progress of raw” and so on. The object of teaching is the student, the teaching mode that suits the student is the best teaching mode. The mode of combination of the unified teaching and individual teaching mode is the unity of teaching but the respect for individual development. With the unification of teaching and individualized teaching mode, truly individualized, more conducive to improve students’ learning efficiency, more conducive to play the initiative and enthusiasm of students, promote the development of personalized, more conducive to the cultivation of excellent talents of the new era.
- **Bilingual teaching mode:** Bilingual teaching is an inevitable requirement to adapt to the development of the times and the trend of globalization and the deepening of educational reform. The common basic course of college mathematics is the foundation of many subjects. It is beneficial for students to contact with foreign advanced educational concepts and excellent textbooks, and improve students’ ability to use mathematics. But there are also many practical difficulties in bilingual teaching. Such as the difference of listening and oral English level of the students, knowledge of mathematics curriculum, the understanding of the content of mathematics is difficult, the emergence of a large number of professional vocabularies and so on, which makes the students and teachers are worried about the effect of teaching and learning. Based on extensive research and repeated demonstration, according to the characteristics of the psychological characteristics of college students and college mathematics courses in higher mathematics, we put forward the bilingual teaching of “1 + 1” mode, namely English textbooks also issue in University in the first grade the first semester, the implementation of Chinese teaching materials, teaching materials English as students self reference the implementation of the second semester of teaching materials; English using English materials, Chinese reference materials, the implementation of Chinese answer questions. Bilingual teaching of the “1 + 1” model helps students to overcome the fear and fear, so that students in a gradual and imperceptible way to accept English teaching.

4.2. Innovation of teaching methods

4.2.1. Multimedia technology assisted classroom teaching

The emergence and development of multimedia technology has brought revolution in teaching methods. Multimedia teaching has many advantages, such as clear, intuitive, vivid, can increase the amount of classroom information, etc.. In the university mathematics teaching process, the multimedia technology can be used as a good auxiliary means of teaching, use it to highlight the books and blackboard is difficult to performance aspects (such as complex geometric intuitive graphical display), use it to increase the amount of information (such as the expansion of the mathematics classroom, the book has the vision) long the definition or theorem with multimedia presentation can save time, some complicated and difficult problem to calculate the pen can use multimedia presentations to complete, etc..

However, the blackboard is also an important teaching media, showing teachers in lectures and writing on the blackboard in the artistic appeal and charm and multimedia teaching can not replace. How best to apply multimedia teaching and blackboard teaching, we have been exploring and researching, through the teaching content processing and integration of the teaching process optimization design, reasonably applying multimedia teaching and blackboard teaching combined strengths, teachers and students share the teaching situation, comprehensive play a guiding role in the subject the role of students and teachers, realize the organization structure and implement method of classroom teaching reform.

4.2.2. mathematics experiments into classroom teaching

In the university mathematics curriculum to integrate the mathematics experiment, in particular mathematics software's use, has brought the new meteorology to the classroom instruction. In the process of teaching, mathematics experiment and design of teaching contents, using modern mathematical software (Mathematica software) to demonstrate or solve the teaching of mathematics calculation, numerical analysis, graphics processing and other issues, on the one hand, the concept of mathematics can be abstract and theoretical, experimental and direct visualization, help to eliminate the students' mathematical knowledge to understand the confusion, improve the learning interest of the students; on the other hand, can better cultivate students' observation, analysis and use of advanced technology and the ability to solve problems. Moreover, in order to further strengthen the training of students' ability, we also use the army Public Mathematics Laboratory set up a special lesson after class. Mathematics experiment is not only a kind of scientific research method, but also a kind of learning method. Students can use the mathematical software to draw graphics function, making the dynamic picture, found some phenomena from the observations, guess some properties from the phenomenon, the nature of speculation to prove or disprove, experience is not available in a traditional learning environment knowledge and learning.

4.2.3. The use of network teaching platform

The new educational technology provides us with the network teaching platform. The use of network teaching platform can broaden the university mathematics teaching

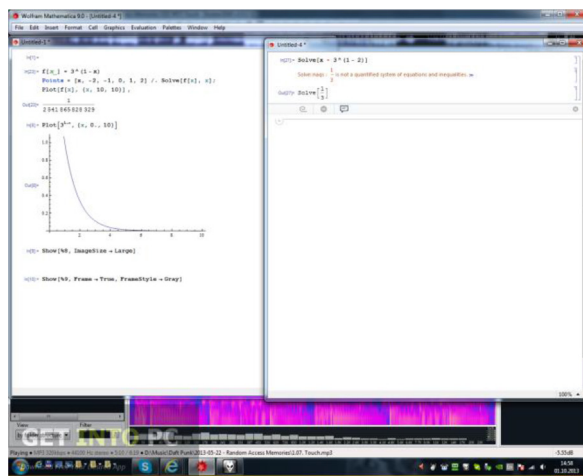


Figure 6 – Mathematica

and learning time and space; can shorten the distance between teachers and students, strengthen the communication of teacher and student; can share the excellent teaching resources and to promote the rapid development of university mathematics teaching; teachers can facilitate the implementation of students' individualized teaching and guidance, through the point of the operating point of the communication with the students; can use the network platform to complete the online answering, courseware and lesson plans online; use of network teaching platform is convenient for teachers to collect and feedback of teaching and learning information, so as to further improve the effect of classroom teaching.

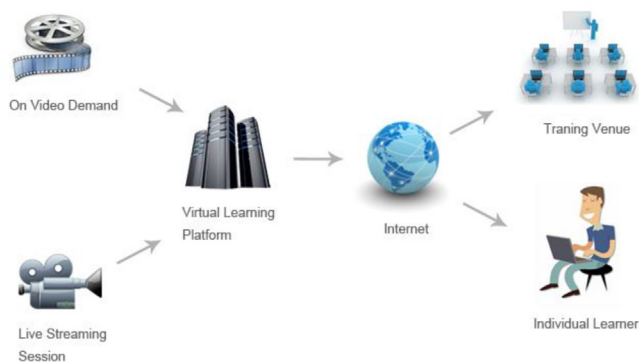


Figure 7 – Network teaching platform

5. Conclusions

Using the modern multimedia teaching methods for teaching, the learning content of the original abstract and boring through graphics, animation and other forms and become intuitive, enhance the students' interest in learning; can show various geometric spatial relations in higher mathematics; can save hours and increase the amount of information in the classroom teaching. To improve the efficiency of classroom teaching; contribute to the introduction of mathematical modeling ideas in multimedia teaching in higher mathematics, to cultivate students' ability to solve practical problems with mathematics. Practice has proved that the use of multimedia technology in teaching of higher mathematics has its unique advantages. At the same time, teachers should not abandon the traditional teaching mode must be blackboard and chalk and lesson plans. In addition, modern teaching methods cannot do without the modernization of higher mathematics teaching ideas, teachers should keep pace with the times, updating the original ideas, and to master the advanced mathematical software, to produce excellent electronic courseware, to achieve the perfect combination of many teaching methods, to further improve the teaching of higher mathematics.

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Research on Information Management and Profit Model of Logistics Enterprise Inventory: A Supply Chain Perspective

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Abstract: With the rapid development of economic globalization and information technology, the market competition of logistics enterprises is becoming fiercer. By using information technology, logistics enterprises could improve the level of service, reduce operating costs, and effectively improve the efficiency of inventory management. In this paper, the author analyzes the information management system and profit model in logistics enterprise inventory management. Through analyzing the present situation of logistics information management, the result proves that the application of logistics information system plays an important role in maintaining the competitive advantage of logistics enterprises. At the same time, the author put forward relevant optimization suggestions of the inventory management from the perspective of supply chain coordination.

Keywords: Information system, Radio frequency technology, Logistics inventory, Supply chain

1. Introduction

With the rapid development of economic globalization and information technology, the market competition is becoming more and fiercer. For a big country like China, the development of the logistics industry plays an important role in other industries (Anand, 2010). Facing the increasingly fierce competition and rapidly changing market economy, all walks of life have adopted advanced information technology to improve their service level, and improve the competitiveness of enterprises (Druehl, 2001; Carvalho et al., 2016). Economic globalization, the development of productive forces, to promote the expansion of trade, capital flow acceleration, production and resource allocation in a larger range, the logistics demand is also growing (Cattani, 2006; Kim, 2009). The requirements of modern logistics at the right time, the right place to accurately price to the delivery of supplies to the customer, it embodies the strategic management of the entire supply chain, put forward a more professional, more quickly and more cheap logistics service requirements. With the process of China's opening up the development of logistics market, gradually liberalized, foreign logistics enterprises with capital, technology, brand and advanced management concept, in Chinese logistics market gradually expand its market share, the domestic logistics enterprises are facing an important opportunity, also faces a major challenge.

In recent years, the third party logistics as a new form of modern logistics in China's rapid development has been recognized by the production enterprises, but also caused widespread concern in the community (Enders, 2005; González, 2015). Third party logistics is the embodiment of modern logistics technology and logistics management modernization, specialization is the information age, refers to the production and operation of enterprises to do the industry as the focus, originally belonging to deal with their own logistics activities, to entrust to professional logistics service enterprises, to maintain close contact through information systems and logistics services enterprise, a logistics management mode to achieve the whole logistics management and control (Huang, 2013). Although China's logistics and distribution in the past few years has been developing rapidly, but overall still exist the following problems: poor transmission of information, goods distribution efficiency is low, the lack of planning and design of distribution lines, customer service level is low (Niklas, 2003; Yao, 2005). How to solve the logistics enterprises to provide the quality of service is not high, the service is not strong. How to optimize logistics processes, reduce logistics costs, improve customer satisfaction, is an important subject in front of the third party logistics enterprise. And strengthen the logistics distribution of information construction, improve the logistics distribution management information system, is to change the logistics and distribution service capacity is poor, the service quality is not high, a key way. Therefore, the development of logistics information management system, to provide logistics information accurately and quickly and comprehensively, and provide decision support for the enterprise, to the integration of social resources, to achieve the integration of the supply chain, is the realization of enterprise logistics strategy, and an important guarantee to gain the advantages in market competition.

2. Logistics information technology

2.1. Current situation of logistics information management

The development of logistics information of foreign enterprises is very fast, and it has become the important aspect of leading enterprises to improve the efficiency of logistics. In contrast, China's modern logistics level is still lagging behind, and the slow development of logistics information, there are still a lot of problems, to be solved. In recent years, with the development of the logistics market, China's logistics information has achieved remarkable results, and gradually become one of the most popular areas of information technology in China. On the whole, in China has begun construction of information logistics enterprises, about 70% are still in the initial stage of construction, information construction is to achieve the goal of timely collection and effective integration of information and data; on this basis, a higher level of information logistics enterprises began to improve the application level, promote the optimization of management by information construction business process and construction stage; otherwise a handful of logistics enterprises began to enter the full supply chain system. At present, the basic situation of the construction of China enterprise logistics information, information is a growing awareness; two attaches great importance to the development and investment system, the establishment of information system of enterprises is the main driving force for information publishing and sharing and improve operational efficiency, reduce costs, focus on enterprise information stage is used to strengthen and improve the internal the management level of external publicity; three is the enterprise more rational investment.



Figure 1 – Supply chain management

The application of information technology and logistics information system in the field of logistics of our country mainly has the following several aspects:

- **Application in the commercial field:** The application of information technology in the field of commercial circulation is most obvious, and it has quickly changed the face of China's commercial circulation field and the way of shopping with the business model of chain stores and supermarkets.
- **Application in transportation and storage:** In the field of transport and storage, vehicle scheduling system, RF radio frequency technology, GPS satellite positioning technology, GIS geographic information systems, cargo tracking system, etc..

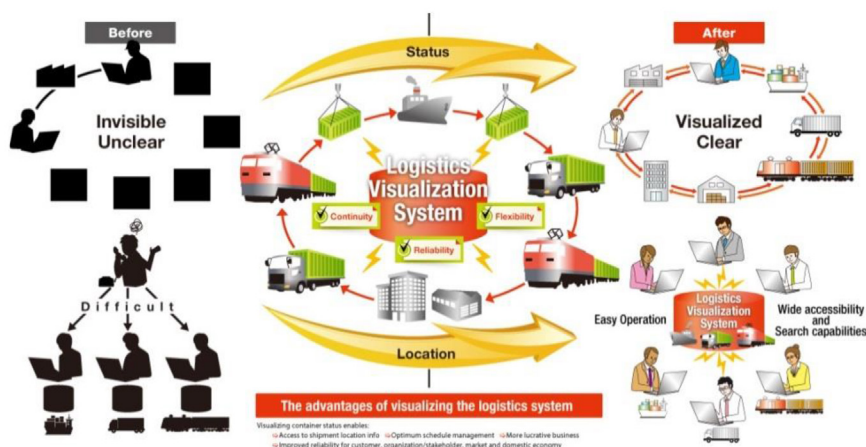


Figure 2 – Cargo tracking system

- **Application in the field of manufacturing:** MRP, EPR and other systems have been used in some enterprises, in which the logistics supply chain integration technology based on Intranet/Internet has been applied and developed in large and medium-sized manufacturing enterprises.
- **The part of the enterprise using the self-developed software or purchase professional software:** Some enterprises or their own development or application of software vendors to provide logistics application software to improve enterprise logistics management.

2.2. Logistics information system technology

Barcode technology is an automatic identification technology produced and developed in practice in the application of computer, because of its high input speed, high accuracy, low cost, high reliability; it is widely used in logistics system. Bar code is composed of a set of black and white, different size of the bar symbol. Bar code implies digital information, information, information; letters sign symbol information is mainly used to express the product name, origin, price, variety, commodity code. EAN barcode universal is an international commodity code; our general commodity bar code standard adopts EAN bar code structure. The main version is composed of 13 digit code and the corresponding bar code symbol, and also uses the 8 digit code and the corresponding bar code symbol on the small commodity. Check code: consists of a digital, for each check code in front of right and wrong. To identify the barcode recognition device, barcode recognition device using optical scanning equipment, collect barcode data visually, and converts it into usable information, scanning equipment used a light pen scanner, desktop scanner, handheld scanner, photoelectric scanner and laser rapid fixation. All kinds of scanning equipment and the subsequent electro optic conversion, information signal amplification and the formation of a complete system of scanning and reading system, complete the collection of electronic information. Bar code technology is an effective means to achieve rapid, accurate and reliable data collection. It has been used to solve the problem of data entry and data acquisition. It provides a strong technical support for logistics management.



Figure 3 – Bar code technology

RF technology is also called radio frequency identification technology, is based on the wireless channel as the transmission media, network communication is rapid, flexible, can provide users with efficient, convenient, real-time network connection. The

advantages of RF system is not limited to the line of sight, recognition distance than the optical system, radio frequency identification card has the ability to read and write, can carry a large number of data, difficult to counterfeit, and have certain intelligence. Radio frequency technology is suitable for the material tracking, vehicle and shelf identification of logistics system.

Electronic data interchange (Electronic Data, Interchange, EDI) is in accordance with the protocol format information exchange and automatic processing technology in computer system, namely EDI users according to the standard format of the general message, in machine-readable form structured information in accordance with the agreement will be transmitted through standard message communication network. Computer software and hardware, communication network and data standardization are the three elements of EDI. In 90s, with the appearance of the Internet, the EDI expanded from the private network to the Internet, which reduced the cost and used more widely. The difference between a EDI and an ordinary email is that it is communicating formatted information between the computer and the application system. The information exchange is carried out between two or more enterprises or institutions. Because the message is formatted by standard computer processing of information, effectively improves the information transmission speed, safety and accuracy, promote the development of all walks of life, especially on the development of logistics industry.



Figure 4 – Logistics information exchange

3. Logistics enterprise information construction

3.1. System characteristics of logistics enterprise information system

The logistics information system, is a leading, using computer hardware and software, network communication equipment especially Internet IT technology, combined with various types of mechanization and automation of logistics tools equipment, logistics information collection, transmission, processing, storage, updating and maintenance, implementation of integrated logistics management entity of digital and intelligent standardization and integration, logistics command information and network, to improve the efficiency and effectiveness of the overall logistics, reduce the logistics cost, so as to support the management of modern enterprises and integrated human-

machine system competitive advantage. The application of logistics information system plays an important role in maintaining the competitive advantage of enterprises in the fierce competition in the fast pace of the market. The system can improve the accuracy of data management, logistics information management, avoid duplication of data error, information exchange speed of internal and external to the enterprise, improve the efficiency of logistics management; to reduce the logistics cost of flow, improve the efficiency of logistics operation and flow of goods; a reasonable allocation of resources to optimize the enterprise, improve the input-output ratio is; the relevant information for the analysis of suppliers, customers and partners, the establishment of information decision system, help enterprise decision.

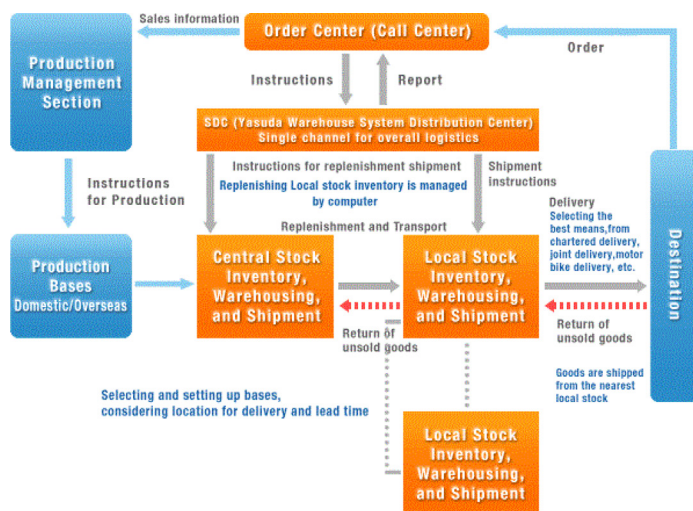


Figure 5 – Logistics information system

Logistics information system not only to meet the needs of the company's internal business processing, but also on the upstream and downstream enterprises and customers to provide services, in general, the logistics information system has the following characteristics:

- **Openness:** In order to realize the share of the logistics business management and resource integration, logistics management information system should have with other internal systems such as financial and personnel management system connected to the system performance, and not only to achieve data integration and smooth circulation within the enterprise, should also have the ability to exchange data with each link outside the enterprise supply chain. At the same time, the system needs to be considered with the international standard.
- **Flexibility:** Logistics information system should have the ability to develop with the development of the enterprise. In the construction of logistics information system, we should fully consider the future management of the enterprise and business development needs, in order to establish a higher level of management

module on the basis of the original system. With the development of society and economy to accelerate the development, management and business enterprises are speeding up, this requires that the system can keep up with the reform of the enterprise, but also fully consider the flexibility of the system, to have the ability to provide specific data can cater to the needs of customers.

- **Security:** The establishment of intranet (Intranet), Internet access to the logistics business tentacles extends farther, the data is more concentrated, but the issue of security also followed. With the development of the system, especially the realization of online payment, the use of electronic documents, security has become the primary problem of logistics management information system.
- **Synergy:** Logistics information system should have a good synergy, including with customers, between the various departments within the enterprise, supply chain and the coordination between the various sectors and social sectors. Collaboration with customers: the system should be able to connect with the customer's ERP system, inventory management system. The system can be regularly sent to customers all kinds of logistics information, inventory information, such as the arrival of the goods information, tips and reminders; coordination between various departments within the enterprise, such as business data can be entered into the system of customer and goods, to transmit information through the network.
- **Rapid response:** System should be able to users, customers, online inquiries, modify, input and other operations to make a quick and timely response.

3.2. The development trend of logistics information

With the development of human society into the era of network economy, with the increasing frequency of international economic cooperation and communication, the trend of global economic integration is becoming more and more obvious. Third party logistics distribution is the following trend:

1. **Service content integration:** Third party logistics enterprise logistics distribution is system engineering can be divided into logistics operation service and logistics system design and management services. Logistics services include transportation, warehousing and other services for single link basic; design and management of logistics system is the main service overall plan to provide logistics design, logistics control and supply chain management for the user, the main function is to control the chain overall cost control and the implementation of dynamic management of integrated services, can be divided into system design and management of single do not engage in specific operations, services, and set operation and management system design in a large integrated service.
2. **Information of logistics distribution:** Logistics information for logistics information commercialization of logistics information, collect data and code, electronic and computerized logistics information processing, logistics information standardization and real-time logistics, digital information storage. Logistics information is the inevitable requirement of the development of the information society, information technology will be widely used in the

logistics and distribution logistics distribution faces completely change the world. Therefore, the technology of bar code technology, database technology, electronic ordering system, electronic data interchange, enterprise resource planning and so on will be widely used.

3. ***The network of logistics distribution:*** The basis of logistics distribution network is information. The trend of network which has two meanings: one is the computer communication network of distribution system, including external network and internal network and external network (e-commerce network platform based on Internet) is mainly used for distribution center with upstream suppliers or manufacturers contact with customers, and the downstream link between the internal network (Intranet); mainly used for the transmission of information between the various departments within the enterprise. Two is the network of distribution network. According to its own marketing scope and objectives, the establishment of logistics distribution network, improve the service quality of the logistics system and distribution speed.

4. Logistics enterprise inventory information system

4.1. Inventory information management objectives

The network not only for the development of logistics enterprises play a leading role, to logistics enterprise key in inventory management has put forward higher requirements, therefore, the information management of inventory links, improve the management level, we need to design a suitable background of electronic commerce inventory management information system, and the first to be identified is the inventory management system to achieve the goal is what. A lot of business transactions become online transactions, buyers can buy global goods, but not limited to the domestic. And with the increasing amount of online consumer groups, the amount of goods in circulation is also rapidly increasing; these cannot be achieved without a strong logistics. Therefore, the logistics inventory system must be able to provide a large amount of information in the inventory of goods for the logistics enterprises, including storage, warehousing, storage period; also for manufacturers and buyers to provide information in the circulation process, whether the storage, the storage state or the library and other information, to achieve all aspects of production, logistics and sales information sharing, improve management efficiency. If the warehouse will be arranged according to the type of service enterprises, determine the number, name, goods warehousing date information such as storage, storage, query and for goods or prepared for inbound and outbound information.

Inventory management information system is to achieve as much as possible the use of warehouse from space and time efficient, hand to ensure the use of warehouse space layout, space to the maximum extent without affecting the safety of goods storage case, on the other hand, a reasonable time planning, reduce the backlog of goods, the residence time, which not only reduce the cost of management, it is also the key to improve service satisfaction rate. In addition, the effective handling and transportation tasks, so that it does not affect the warehouse management plan, as well as convenient manufacturers and customers of the information cannot be ignored.

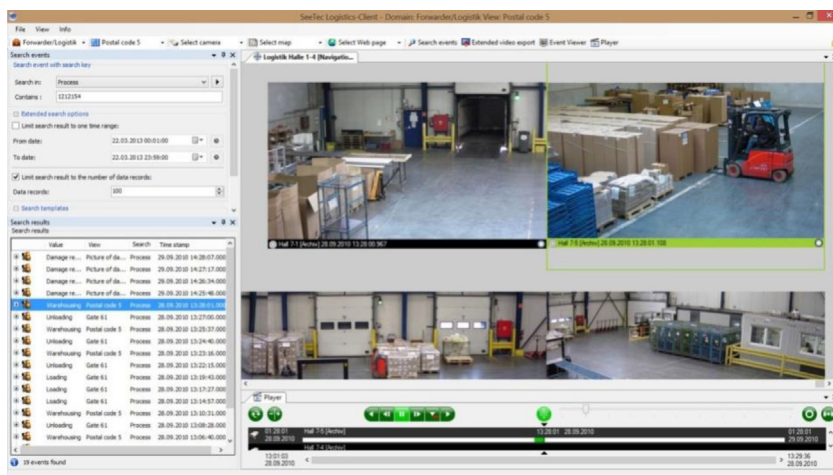


Figure 6 – Warehouse dynamic management

4.2. Function module of inventory information system

Logistics enterprise information system is not the same model, according to the characteristics and needs of the service object, you can also build a different system function modules. According to the design goals, and ensure the inventory system of logistics enterprise has the versatility and compatibility, here will module inventory information system of logistics enterprises according to the inventory process consists of warehousing information system, warehouse management information system of Library and information system.

- Storage information system:** The goods into the warehouse inventory management is the first step, according to the requirements of standardized management, the process includes transportation, warehousing, shipping, inventory, unloading goods inspection, storage and sorting warehouse registration procedures. According to customer's request, the logistics enterprise receives and stores the goods on time according to the warehousing procedures. The inventory information system needs to be completed according to the customer's warehouse cargo information arrangements to receive the logistics vehicles, storage locations, unloading of employees, to confirm the goods warehousing and replacement of inventory locations, etc.. Specifically, there are the following functions: arrange personnel and inventory locations. The inventory information system first receives the order information of goods inventory management from the customer side, in order to receive the responsible for receiving, unloading of the staff and the location of storage when the order is arranged according to the order. Before the goods in storage, the number of goods inventory, and inventory information in order to verify the order information, confirmed after the next step in the storage of the next step.

After the goods are stored, the inventory system should register the relevant information of the goods, including the quantity, the name, the time and place of the goods. If a change occurs in the location of the store, the information system is still to be recorded, to ensure the accuracy of the information. The last is the formation of accounting information. The final step in the completion of the storage management, the goods have been accepted into the enterprise accounting system used in the accounting information, such as cargo transport accounts, inventory accounts and so on.

- Warehouse management information system:** Warehouse management is an important link for warehousing, storage of goods stranded management in logistics enterprise warehouse, logistics enterprises will inevitably bear the loss of goods, damage and other risks, thus effectively guarantee the safety of the goods and keep its original value is reflected in the high quality service of logistics enterprises, a job is the most difficult. In this part of the inventory information systems need to have the goods to retrieve, timely inform the latest status of the warehouse, such as whether to provide full warehouse, or warehouse and a lot of spare space has not yet been used and other information. In order to ensure that customers need to transport the goods safely and accurately, in the storage of goods after the system needs to provide a data for storage of goods inspection personnel, inspection personnel to verify the inspection of warehouse goods, and inspection registration. Inspection personnel not only do not need to check the quantity of goods, but also need to check whether the goods themselves included in the handling of the damage, damage degree. If the goods were damaged during shipment to be registered to the inventory retrieval system, to reflect the inventory, while protecting the interests of customers, so that customers have the right to know. And the cause of the damage is explained; the proposed return replenishment requirements timely record information and meet the customers.



Figure 7 – Warehouse management information system

- **Library information system module:** As the last part of the inventory management, a library cannot be ignored, its goal is to store the goods in a timely, accurate, zero loss to consumers in the hands of the lost. This part of the system module to complete the inspection is the goods, including the number, name, condition, location of delivery and other information records; in addition to the goods data to classify goods, reduce the transportation cost. Library information summary: this is the first step out of the management, which requires the inventory system will is the data summary, the name of goods, quantity, delivery time, delivery address and other information sent to the editor of a storehouse, and are allocated according to the distribution route, transport capacity, transport of goods given distribution scheme, to provide enterprises with reference. Sorting and handling of goods: After the summary of the information out of the library, the operator according to the system to provide picking list of goods sorting processing, the delivery of the goods were transported to the sub shelf, the order picking inventory included in the inventory system. Confirmed library: according to the inventory system and the data picking out goods collection, comparison verification and inventory reduction of data, confirm the storage data, the quantity of goods, whether or not the same type and requirements out of order. The sorting of goods in the warehouse, the library system reads the bar code of goods, the final delivery confirmation, and then classify the distribution of goods.

5. Conclusions

As an advanced organization mode and management technology, modern logistics is widely regarded as an important profit source for enterprises to reduce production costs, improve competitiveness and increase economic efficiency. The characteristics of modern logistics is the most important information, a market oriented economy, advanced technology, improve the function of the logistics information network system, to achieve the sharing of information between enterprises and departments within the enterprise logistics and supply chain, set up logistics enterprises and customer resources, supply chain information bridge between resources, logistics, funds guarantee flow smoothly. Therefore, strengthen the information construction of logistics enterprises, improve the logistics enterprise information system, improve the level of logistics information management, is an important weapon in the modern logistics enterprises in an invincible position in the fierce competition in the market.

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Empirical Analysis of Dividend Policy and Stock Volatility based on Fixed Effect Model

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Abstract: Dividend policy and stock volatility are very important concepts in finance area; the relationship between them has been studied for decades already. However, different researchers get contradictory findings. In addition, only few researches were studied about China's stock market. For this topic no one knows what situation China's stock market will be. This dissertation will investigate the relationship between stock volatility and stock dividend policy. Based on the empirical findings, the dividends policy has a significant negative impact on stock price volatility. Based on the results of the fixed effect model estimation, dividend yield is significant negative impact on stock price variance. Furthermore, the individual stocks are strongly connected with market index variance.

Keywords: Dividend policy, Stock volatility, Empirical analysis, Panel data

1. Introduction

Dividend policy and stock volatility are the major contents in corporate finance. Dividend is the main channel for corporations distribution their profit to the shareholders, furthermore, it is the cornerstone for the whole corporate system. If there is no dividend, there is no cash flow for investors to share the profit from the firm's operation, the whole system will collapse. In addition, the volatility of the stock price is the risk measurement for investments. According to the idea of stock valuation model, the present stock price should equal to the discounted present value of all the future dividends. It is a natural idea to link the dividend policy with the fluctuation of the share price.

Previous researchers established different theories to explain the relationship between dividend and stock volatility, and numerous economists examined those theories by empirical studies. However, the results of different studies are inconsistent, so the conclusion is still in debate.

China's stock market is the largest and the fastest growing one among the emerging markets, moreover, it might be the most unique one in the world. Shanghai Stock Exchange found in 1990, at the beginning, there are only 8 stocks exchanges in the market, nowadays, it has 1150 securities in trading and there are 1828 stocks trading in the Shenzhen Stock Exchange. Despite the fact of fast growing, China's stock market

has a short history for only a few decades, that makes both the companies and investors lack of experience. The market is still immature and the protection for investors is not enough (Deng, 2015). The China Securities Regulatory Commission announced Semi-mandatory dividend policy to protect the investors' interest since 2001. However, the dividend ratio of China's list companies is lower than similar firms which operating in the stronger regulatory countries. Another unique feature of China's stock market is large portion of firm's equity was owned by the state which is non-tradable (Anderson, 2011). China's trading regulation is different from majority markets, the authority forbid purchase and sell out the same securities in the same day. The research on dividend policy of Chinese firm is scant. There are still a lot of work could be done.

2. Literature Review

2.1. The different theories of dividend policy

For a long time, numerous scholars have been studying whether the dividend policy has an impact on shareholder wealth or enterprise value. There are two main theories of the western dividend policy: the dividend irrelevance theory and the dividend relevance theory. The former asserted that the dividend policy has no effect on the price of the stock, while the latter believed that the dividend policy has a strong influence on the stock price of the enterprise.

MM theory: Miller and Modigliani, pointed out that dividend policy would not affect firm's value in the fully efficient market. Company's value was determined by the company's investment policy, and it depended on the company's own profitability. MM theory has revealed the relationship between dividend policy and stock price. However, these theories divorced from reality. In fact, the investors have to pay the income tax, and the companies are also inevitably going to spend on the stock issuance costs or transaction costs. In addition, the information managers get would certainly be more than the investors. Thus it can be seen that in the weak efficient market, this theory is lack of practicality.

The Dividend relevance theories asserted that the company's dividend distribution and the company's market value were related. There are five main theories as follow:

Bird-in-hand theory: a dividend in hand is worth more than two capital gains. Al-Malkawi (2007) thought that due to the uncertainty and information asymmetry on stock market, the dividends are valued differently from capital gains. This theory was also developed by Shapiro and Lintner, they asserted that the fluctuation of the stock price is not entirely determined by the company, which has great uncertainties. however, the dividends could be certainly obtained on time, thereby eliminating the uncertainties of investors. Hence, as for the risk averse investor, they may prefer the "real" dividends. Moreover, Walter indicated that when other conditions were the same, the investors were willing to spend a higher price in buying the stocks of companies who were able to pay higher dividends. Therefore, there are two core ideas of this theory: the stock price was positively proportional to the dividend payout ratio and the cost of equity capital is inversely proportional to the dividend payout ratio. Hence, based on the Bird-in-hand theory, the companies must take a high dividend payout policy, so as to maximize the value of the company.

Tax differential theory: The tax differential theory was on the basis of MM theory, broaden the strict assumptions of the MM theory through introducing the tax, it was proposed by Fala and Selwyn in 1967. They alleged that, shareholders need to pay the personal income tax when they obtain the dividends. If the dividend tax rate was greater than the capital gains tax rate, then investors would continue to hold shares, so as to delay the time to pay tax and get benefits from the deferred tax. Therefore, when other conditions were unchanged, in order to obtain a higher expected capital gain, the shareholders preferred to low dividend payment rate of stock. In addition, for companies, only taking a low dividend payout ratio policy can they maximize their wealth.

Signalling hypothesis: The signalling hypothesis of dividend policy, which was firstly proposed by Linter, it broadens the assumptions of the information symmetry of managers and investors in the MM theory. The Signaling theory was based on two main theories: the efficient market hypothesis and the information economics. Stigler put forward that the information has its cost and value, so the information could be regarded as an element of economic activity. As Fama put out that, all the information in a security market was fully reflected in the price, the market price of the securities was equal to its true value. According to the degree of efficiency of the stock market, the market could be divided into three kinds, such as weak form effective stock market, semi-strong form effective stock market and strong form effective market. He believed that, in the weak form and semi strong effective market, the informations were asymmetric. In general, the managers of the company were insiders, they knew more about the present situation, the future prospects and the real value of the enterprise than the outside shareholders, thus creating a gap between managers and investors. In order to bridge this gap, the managers can provide information about the company's future profitability through dividend policy (Al-Malkawi, 2007). Also, high quality companies were always willing to raise the dividend payout ratio to attract more investors. Therefore, the dividend will be able to transmit the information of the future profitability of the company, which will have a certain influence on the stock price.

Agency cost and the free cash flow theory: One of the hypotheses of MM theory is that interests of managers and shareholders are completely consistent, so there will be no conflict of interest and agency problem between them. However, Ross et al.(2008) thought that the goal of client and agent was both to maximize their effectiveness, and it would be difficult to ensure that the agent's behavior was most beneficial for the client, so there may exist a conflict. Therefore, in order to ensure that the agent's activities would not be too far from the interests of the client, the client through the following two ways to restrict the behavior of the agent: First, appropriately motivated and supervised the agent. Second, the client would require the agent to guarantee that it would not harm their own interests, otherwise, the agent shall give the client the necessary compensation. Easterbrook (1984) divided the agent costs into two parts: the cost of monitoring managers and the cost of risk aversion on the part of managers. Furthermore, Jensen and Meckling pointed out, dividend payout can effectively reduce agency costs. First, after the companies pay the dividends, the free cash flow was reduced, thus, to a certain extent, it would restrain the excessive expansion of investment by firm's managers, thereby protecting the interests of investors. Second, the companies might be forced to return to the market to seek new financing after a large dividend. This means that the company will accept more and more

stringent supervision and inspection, and the new investors help the old shareholders to supervise the manager. Hence, dividend policy could be indirectly restrain the managers, thereby reducing the supervision cost of the client.

Clientele effects of dividends theories: Al-Malkawi (2007) believed that, the shareholders as the company's investors, their interests came from the two parts: dividends and capital gains. The shareholders have different preferences for these two kinds of benefits, some shareholders prefer the dividends, while some others prefer the capital gains. Indeed, the investors will be attracted by the companies which can satisfy their particular need. Therefore, in order to meet the preference of investors, the company's dividend policy would be different.

2.2. The empirical study result

Based on the dividend policy theories above, numerous researchers have done the empirical studies. However, the conclusion is inconsistent.

In the early stage, event study is applied in the majority of studies. By using event study method Charest analyze the companies which list in the New York Stock Exchange to test the signalling hypothesis and find the change of dividends could deliver the market information effectively, increase in cash dividends payment will increase the stock price. Brickley (1983) does the similar research, the result supports Charest's finding that increase in dividends payment will increase the stock price. Benartzi, Michaely and Thaler (1997) analyze the association between dividends and companies' earnings. To get a reliable result, the research uses a large sample and takes many factors under control. In the result, they argue that dividend change is strongly connected with earnings, which might support the signalling hypothesis. However, there is no evidence to prove that the dividends have correlation with the future earnings.

Baskin (1989) used multiple regression method to analyze the relationship between stock volatility and dividend policy. In his study, dividend yield and payout ratio are considered as independent variables to measure dividend policy. Based on the findings, Baskin argue that both dividend yield and payout ratio have a negative correlation to the stock volatility. However, the conclusion is contrast with Allen and Rachim (1996). Based on their findings in Australia, Allen and Rachim argue that dividend yield does not correlate with the price movement. After Baskin (1989) the multiple regression is wildly used to analyze the relationship between the dividend policy and stock volatility. Hussainey, Mgbame and Chijoke-Mgbame (2011) follows Baskin's research to analyze the stock market in the UK, similar with Baskin (1989), Hussainey et al. (2011) add firm size earnings and debt. However, the growth rate was excluded from their regression model. Despite the slight difference between the models, the result of Hussainey's study is consistent with Baskin (1989). Both the dividend yield and payout ratio have a significant negative impact on the stock price volatility. Furthermore, they add dummy variables which represent different industries the firms belong to in the model. This is advanced than Baskin's (1989) model. However, there are only two categories of industries which indicate the service and the industrial company, the individual heterogeneities are still in the model. Different from Hussainey et al. Rashid and Rahman (2008) add the dummy variables into the slop term to allow the control variables have different coefficients for different industries. In addition, the result of their findings against with previous research, it shows that in Bangladesh security market the correlation between

stock volatility and dividend yield is insignificant. Dewasiri and Banda analyze (2014) the Srilanka's stock market with the random effect model, they chose the return rate volatility to represent stock volatility, based on their findings, they argue the association between dividend yield and return rate volatility is insignificant.

3 Research Methodology

Based on the relevance theories, the dividend policy should have influence on the stock price movement, Therefore, it might associated with stock volatility, from the empirical findings of Baskin (1989) and Hussainey et al. (2011), it is a reasonable assumption that in China, dividend policy has a negative influence on stock variance which were measured by the stock price volatility and return rate volatility in this paper. The research hypotheses are presented as follows:

- H1: the dividend yield negatively affects the security price volatility.
H2: the payout ratio has a negative impact on the security price volatility.
The variables which will be include in this study are presented in table 1.

Variables	Indicators
Dependent Variable	
Stock price volatility (PV)	Standard deviation of daily log return
Independent Variables	
Dividend yield (DY)	Dividend per share / Market price
Dividend payout ratio (PR)	Dividend per share / Earning per share
Control Variables	
Profitability (EPS)	Earning per share
Debt (DPS)	debt per share
Firm size (LA)	Nature log value of total asset
Assets growth rate (GA)	The first order difference of nature log value of total asset
The volatility of the market index (SI)	Standard deviation of daily log return of the index

Table 1 – Variables and definition

This paper will take 2000 to 2015 as the range of the time period. To take full advantage of the information, this paper will use the full sample size, that means all the companies those list on the China's security market will be chosen except those have missing data. However, the financial institutions should be excluded from the sample because of the specific regulations. In the final, this study will contain 603 non-financial firms as the cross-section and 16 time periods as the sample size. All the data that was used while doing the calculation was download from the GTA database.

The model will be:

$$PV_{it} = \alpha_1 + \beta_1 DY_{it} + \beta_2 PR_{it} + \beta_3 EPS_{it} + \beta_4 DPS_{it} + \beta_5 LA_{it} + \beta_6 GA_{it} + \beta_7 SI_t + \mu_{it}$$

4. Empirical Result

According to the previous research, dividend yield and payout ratio should taken as independent variables while the earning per share, debt per share, natural logged total assets of the firm and the assets growth rate was taken as the control variables (Baskin, 1989; Hussainey, Mgbame & Chijoke-Mgbame, 2011; Sadiq, ahmad, Anjum, Suliman, Abrar and Khan, 2013; Dewasiri & Banda, 2015). However, the market index has a strong impact on the individual stock, therefore, this paper will add index volatility as the control variable. The equations are as follows:

$$PV_{it} = \beta_0 + \beta_1 DY_{it} + \beta_2 PR_{it} + \beta_3 EPS_{it} + \beta_4 DPS_{it} + \beta_5 LA_{it} + \beta_6 GA_{it} + \beta_7 SI_t + \varepsilon_i + \mu_{it}$$

Table 2 is the correlation analysis, the result shows that Both dividend yield and payout ratio are negatively impact on stock price volatility. In addition, compare the two proxies of dividends policy, the dividend yield is more correlated with both stock price volatility and return rate volatility than the payout ratio. This is slightly different from Hussainey, Mgbame and Chijoke-Mgbames' (2011) research, in their study, the payout ratio has stronger impact on the stock price volatility than the dividend yield. This might cause by the different feature of the two markets.

	PV	DY	PR	EPS	DPS	LA	GA	SI
PV	1							
DY	-0.118	1						
PR	-0.03	0.132	1					
EPS	-0.034	0.381	0.020	1				
DPS	0.010	0.126	-0.009	0.317	1			
LA	0.028	0.315	0.016	0.336	0.588	1		
GA	0.014	0.077	0.019	0.122	0.023	0.011	1	
SI	0.509	-0.089	-0.020	-0.012	0.006	0.037	0.009	1

Table 2 – the Correlation of variables

Because 16 years is a long period, it is necessary to do the unit root test to check if the data is stationary. By adopting the Levin-Lin-Chu unit root test. The result shows all the variables are stationary.

Variable	t	P value
PV	-26.5293***	0
DY	-19.181***	0
PR	-1.30E+02***	0
EPS	-17.3483***	0
DPS	-5.7932***	0
LA	-8.0444***	0
GA	-24.541***	0
SI	-38.0707***	0

Note: *means the significance level is 10%, ** means the significance level is 5%, *** means the significance level is 1%.

Table 3 – the result of Unit Root Test

By adopting the Breusch-Pagan test, there are significant individual heterogeneities among the firms. Therefore, the pooled OLS regression is inappropriate. And do the hausman test The P value is 0, therefore, there is correlation between individual effects and regressors, the fixed effect model should be applied for the regression. The equations for fixed effect model are as follows:

$$PV_{it} = \alpha_i + \beta_1 DY_{it} + \beta_2 PR_{it} + \beta_3 EPS_{it} + \beta_4 DPS_{it} + \beta_5 LA_{it} + \beta_6 GA_{it} + \beta_7 SI_{it} + \mu_{it}$$

Where i refers to individual company, t represents for different time period and α_i indicate the individual heterogeneities of the different firms. It is unobservable, such as the personality of the CEO or the culture and the organization of the corporation. However, we assume it remains in constant for each firm during the time periods. To estimate the regression, the equations should be transformed into:

$$PV_{it} - PV_i = (\alpha_i - \alpha_i) + \beta_1 (DY_{it} - DY_i) + \beta_2 (PR_{it} - PR_i) + \beta_3 (EPS_{it} - EPS_i) + \beta_4 (DPS_{it} - DPS_i) + \beta_5 (LA_{it} - LA_i) + \beta_6 (GA_{it} - GA_i) + \beta_7 (SI_{it} - SI_i) + (\mu_{it} - \mu_i)$$

Rewrite these equations as

$$\ddot{PV}_{it} = \beta_1 \ddot{DY}_{it} + \beta_2 \ddot{PR}_{it} + \beta_3 \ddot{EPS}_{it} + \beta_4 \ddot{DPS}_{it} + \beta_5 \ddot{LA}_{it} + \beta_6 \ddot{GA}_{it} + \beta_7 \ddot{SI}_{it} + \ddot{\mu}_{it}$$

Estimate the equations with STATA, the results as follows:

Dependent variable PV				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.10243***	0.006211	-16.49	0
DY	-0.06243***	0.018314	-3.41	0.001
PR	-0.00012	0.00013	-0.93	0.352
EPS	-0.00022	0.000384	-0.56	0.575
DPS	-0.00036***	5.67E-05	-6.42	0
LA	0.004371***	0.000295	14.85	0
GA	0.001314**	0.000583	2.25	0.024
SI	1.839852***	0.03208	57.35	0
R-squared		0.2226		
F-Statistic		542.23		

Note: *means the significance level is 10%, ** means the significance level is 5%, *** means the significance level is 1%.

Table 4 – the result of fixed effect model estimation

Form table 4, the F value is 542.23 and the R square is 0.2226 for overall, that shows the regression is significant, more than 22 percent of the fluctuation of the dependent variable could be explained by the model. The P value for variable DY equal to 0.001, so the coefficient of DY is significant, and it is equal -0.06243. The dividend yield has a significant negative impact on the stock price volatility. However, the payout ratio is insignificant that means the stock price volatility will not be affected by changing in payout ratio. The hypothesis H4 should be rejected, in China, the payout ratio could not significantly affect the stock price variance. As this paper mentioned before, the result, which is payout ratio is insignificant for the price volatility, is different with Hussainey, Mgbame and Chijoke-Mgbames' (2011) finding in UK, however, that might be acceptable, because the distinguish between China and UK is significant, there might be different features between these two markets.

It is worth to mention that, the earning ability dose not significant impact on the security price volatility. While the debt per share is significant negatively affect the stock price volatility and the firm size has a positive effect on the variance of the stock price. In addition, the variance of the index is strongly affecting the individual stock price fluctuation. Therefore, the hypotheses of H1 should be accepted while H2 should be rejected.

5. Conclusion and Suggestion

Based on the empirical findings above, the dividends policy has a significant negative impact on stock price volatility. Based on the results of the fixed effect model estimation, dividend yield is significant negative impact on stock price variance. Furthermore, the individual stocks are strongly connected with market index variance.

Both companies and investors care about the stock volatility. For the investors, because the majority of the investors are risk aversion, to pick up the low risk investment target, people

should choose the companies which pay cash dividends regularly. According to the empirical research, the investors should focus on the dividend yield; the higher the dividend yield is the lower the stock volatility will be. In addition, shareholders need to pay attention to the firm size, debt ratio and company growth rate, those variables also will affect the stock volatility.

The managers also wish to lower the stock price volatility to make the share become more attractive to the investors. However, unlike the investors, the features of the firm, such as the size, leverage, and assets growth rate, are not choices for the managers, it might be difficult to change the company size or increase the debt ratio. Therefore, distribution the cash dividends and increasing the dividend yield might be the only choice for these CEOs, and based on the outcome of the empirical finding, the dividend yield is significantly affect the stock price volatility, and its' coefficient is much larger than other variables. Therefore, increasing in dividend yield might be the most efficient way to decrease the firm stock price variance.

Different from the companies and the shareholders, the regulatory authority concern about the volatility of the whole market. However, the whole market is constituted by individual securities, by adopting appropriate policies, like Semi-mandatory dividend policy, to induce companies to distribute cash dividends, the authority could stable the market volatility through reducing the fluctuation of individual stocks.

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Appendix

		Var	Sd
for PV	μ_{it}	0.000258	0.016046
	ε_i	3.80E-06	0.001949
P value	0		

The result for Breusch-Pagan test

	Coefficients			
	(b)	(B)	(b-B)	$\sqrt{\text{diag}(V_b - V_B)}$
	fe	re	Difference	S.E.
DY	-0.06243	-0.12622	0.063797	0.009152
PR	-0.00012	-0.00015	2.64E-05	3.23E-05
EPS	-0.00022	-0.00033	0.000115	0.000165
DPS	-0.00036	-3.5E-05	-0.00033	3.99E-05
LA	0.004371	0.000842	0.00353	0.000236
GA	0.001314	0.001023	0.000292	0.000153
SI	1.839852	1.856846	-0.01699	0.002495
_cons	-0.10243	-0.02703	-0.0754	0.004992

b = consistent under H_0 and H_a ; obtained from xtreg

B = inconsistent under H_a , efficient under H_0 ; obtained from xtreg

Test H_0 : difference in coefficients not systematic

$$\chi^2(7) = (b-B)'[(V_b - V_B)^{-1}](b-B)$$

$$= 284.09$$

$$\text{Prob} > \chi^2 = 0.0000$$

The hausman test for PV

Analysis on Growth Mechanism of the Internet of Things Industrial Cluster

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Abstract: According to two necessary conditions and four sufficient conditions of industry cluster, the industry of the Internet of Things has a obviously tendency of clustering. The theory of regional production complex, resource dependence theory, high-tech relevance effect theory and agglomeration factor theory explain growth process of the Internet of Things industrial cluster, which are also theoretical origins of the growth mechanism of the Internet of Things industry cluster. The evaluation of industrial clusters based on clustering factor model further validates the relationship between the effective growth of the Internet of Things industrial clusters and its scale, effectiveness, leading enterprises and local governments. Effective networking and concentration of the Internet of Things industrial cluster, can form a cluster effect, is the development of Internet of things a viable way.

Keywords: Internet of Things, Industrial cluster, Industrial growth

1. Introduction

The definition of industrial clusters was first derived from Porter's 1990 edition of *The National Competitive Advantage*. At present, two definitions of industrial clusters are more representative. One is definition of industrial clusters by Porter (Porter, 1998). Porter from industrial cluster of geographical clustering characteristics, as a link to the value chain, interpreted industrial clusters as "a set of companies or institutions which was interconnected, geographically concentrated in a particular area." The other is definition of industrial clusters by JATheo, Roelandt and others (1998), from organizational learning and knowledge innovation effect motive of industrial clusters, industrial cluster is defined as "To gain new and complementary technologies, gaining benefits from complementary assets and coalitions that use knowledge, accelerating the learning process, reducing transaction costs, overcoming market barriers, achieving collaborative economic benefits, and diversifying innovation risks, a network of interdependent firms, knowledge production institutions, intermediaries and value-added chain of customer" (Gonçalves et al., 2016). Industrial cluster is the concentration and concentration of industrial value chain activities, which is conducive to the coordinated production and operation between different enterprises, which is beneficial to the economies of scale and scope economy. Then, from the existing research results, the internet of things is

suitable for the way of industrial clusters, the inherent growth mechanism of the internet of things industrial clusters, effective aggregation of the Internet of Things industrial cluster growth, the research results in this area is litter very much, the following to carry out systematic research on these issues.

2. Whether the Internet of Things suitable for industrial clusters

2.1. Analysis on Forming Condition of Industrial Clusters Based on Traditional Economic Theory

Although industrial cluster research is a hot topic in academia, whether or not any industry can form a cluster, and suitable for cluster existence and development has been a hot topic in the academic debate. German scholar Cluasstenile and other published in 2002, “when would the industrial cluster emerge?” The article suggested that any one industry can form industrial clusters need to be necessary conditions and sufficient conditions to examine the two aspects. Among them, the necessary conditions refer to the industrial production process is separable and the product has transportability. Sufficient conditions refer to the industry has a long value chain, differentiation, innovation network and changing market environment. Look at picture 1. Chinese scholars such as Li Yi (2005) and Liang Qi (2010) also have similar academic views.

Among them, what is the so-called separability of the production process is that the production process can be clearly broken down into several different stages or a few procedures. Only can be the production process divided, division of labor and specialization can be formed. The products of transportability include manufactured goods and services, and the flow of service products is the transfer of the service product

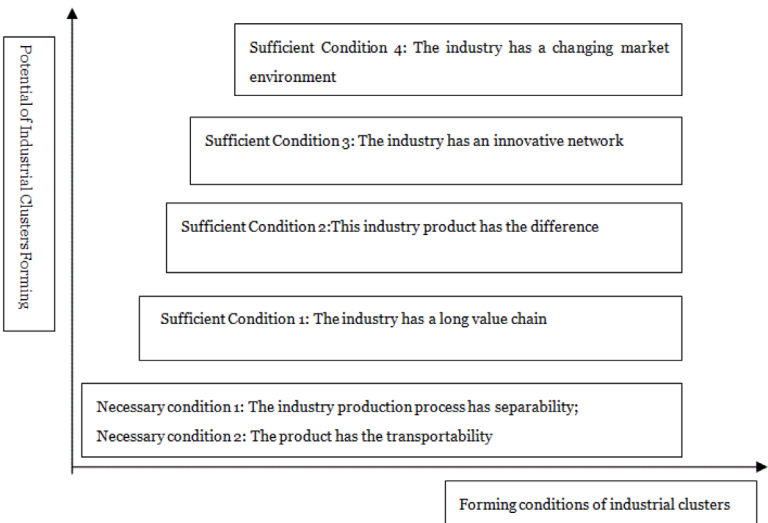


Figure 1 – Shows whether the industry can form a industrial clusters for its sufficient and necessary condition

provider together with its work apparatus. The value chain of industry is influenced by two factors: technology and profit. The longer is industry value chain, industry coordination and cooperation is more difficult, the industry is more needed to split into industrial clusters. Product differentiation can effectively avoid the disorderly competition of similar enterprises, but also improve the level of enterprise specialization and stimulate product innovation. Innovation network referring to the innovative organization form is a network structure, not a point or line. If an industry mainly depends on the network innovation, the industry cluster has the vital significance in the knowledge dissemination. The more is industry sensitive to changes in the market, the more is easy to form clusters. Many empirical studies confirm that Small and medium enterprises clusters are more flexible in their operations and management and that production adjustment costs are smaller and more responsive to market changes.

2.2. Study on the Reasons of Industrial Cluster Formed by the Internet of Things under the New Economic Conditions

From industrial cluster formation of the necessary conditions one “The industry has a separable production process”, the Internet of things upstream industry is mainly related to sensing and sensing technology R&D and manufacturing, the middle reaches of the network communication channel construction and communications equipment production, downstream is the application of software development, system design and sensing industry applications, the whole industry chain is very long, and has discrete manufacturing and development of economic and technical feasibility of the production separation of the industry has been achieved, so the industry can fully production process Split.

From the industrial cluster formation of the necessary conditions two “The product has transportability”, the Internet of things products can be divided into two categories, one is a variety of hardware and equipment facilities, and the other is related to application software and system solutions, The former due to solid, shock, moisture and other characteristics of obvious, no special logistics and distribution taboos, with transportability, the latter most of the digital software or service products, there is no transport problems.

From the industrial clusters formed a sufficient condition one “The industry has a long value chain”, the internet of things industry has a long industrial chain, the front of the industry chain related to sensing and identification of cutting-edge technology (such as induction technology, optical technology), And the design and manufacture of sales process; the middle of its industrial chain involved in data collection, data transmission and management of the network; the back of its industrial chain related to massive data processing, software development, program, system integration, personalized applications, Not only the industrial chain link, but also a long distance, all aspects of the industry chain of innovation activities that form the value chain, so the value chain is very long.

From the industrial cluster formation of sufficient conditions two “the product differentiation”, the Internet of things industrial structure is a monopolistic competitive market structure; the industry can develop in the global market, in open competition environment it can form a natural difference, products are with different characteristics.

From the industrial cluster formation of sufficient conditions three “The industry has an innovative network”, the Internet of things is an innovation-driven industry, around the world have relevant research institutions and enterprises, and the technical structure is complex. Internet of things can not be an individual or organization to undertake all the innovative tasks, it will naturally have to be innovative network in the form of innovative tasks.

From the formation of industrial clusters sufficient conditions four “The industry has a changing market environment,” Internet of Things industry is a technology constantly updated industry, which directly led to its unpredictable market, product replacement fast, consumers Information products are very picky; at the same time as the industry in the global distribution, the industrial market distribution of the world, countries and regions due to political, economic and cultural differences, the industrial market is also changing, such as European consumers’ requirements on the Internet of things privacy and security is completely different of Asians consumers, the market environment is also different.

Can be seen from the above, the Internet of Things industry in full compliance with the formation of industrial clusters necessary and sufficient conditions, and has a high clustering tendencies.

3. Theoretical Explaining of the Internet of Things Industrial Clusters

The basic theories of industrial clusters include the external economic theory, the classical location theory, the neoclassical theory of location, the theory of the location theory of industry, the theory of the development of the industrial cluster, New industry location theory, transaction cost theory, new economic geography, competitive advantage theory, regional innovation system. In this paper, from characteristics of the Internet of Things industry and law of internal and external development, it will focus on the following basic theoretical perspective problem and its support relationship with the Internet of Things industrial clusters, in order to seek theoretical roots of the Internet of Things industrial cluster growth.

3.1. The Theory of Regional Production Complex and Growth of in Internet of Things Industry Cluster

The theory of regional production complex is put forward by Kolosovsky, Niklasov, Peng Deman, and other famous scholars of the former Soviet Union, on the basis of summing up the practice. Its meaning is: “in an industrial point or a complete area, according to the region’s natural conditions, transportation and economic location, the appropriate placement of various enterprises, in order to obtain a specific economic effect, such an inter-enterprise Economic organization known as the production complex.” This regional production complex has obvious characteristics of planned economy, is based on the traditional planned economic system based on the concentration of human, material and financial resources and other advantages of doing big things, the complex construction is entirely completed by the state investment . With the continuation of the last century 50’s, the French scholar Perug in the non-equilibrium growth theory based on the

“growth pole” theory. He believes that “the dominant sector and innovative enterprises, in some areas or large cities gathered to form the development of production, trade, finance, technology, human resources, information, transportation, services, decision-making and other economic activity center is like a ‘ Magnetic pole ’, can produce a strong absorption of radiation effect. This magnetic pole not only accelerates its own development, but also promotes the economic growth of other departments, regions as well as the surrounding areas through outward diffusion. It can be seen that both the theory of regional production complex and the theory of growth pole advocate the existence of a mechanism through which government intervenes to form industrial clusters. The Internet of Things is not only a huge industry, but also has a considerable public product attributes in the early stage of development. Government participation is a common practice of all countries. This theory has theoretical relevance with the regional production community. The theory of the growth pole of small-scale hills can be found from the two aspects, and the theoretical basis for the development of the industrial cluster of the Internet of Things can be found. However, the government’s ability is limited, how to grasp the role of industry cluster support is the theory and industry needs to focus on issues of common concern.

3.2. Resource Dependence Theory and Industry Growth of Internet of Things

Pfeiffer, Saranchick, Zard, Thompson and others is the earliest advocates on resource dependent theory. They argue that “the survival of an organization depends on its ability to acquire and maintain good relationships and resources and to maintain a good relationship with the provider of key resources is the key to the existence of the organization, and the impact of key resource providers on the organization or control The degree depends largely on the value of the resources provided, and if such resources are more valuable, their providers should have greater influence or control.” In essence, the resource dependence theory takes the resources which the organization depends on as the variables. Through the analysis of the exchange of resources between the organization and the external environment, it studies the operation behavior and the dependence rule of the organization. The availability of the necessary resources and the distribution of such resources among the organizations is an important condition for the survival of the organization. Resource dependence theory is very concerned about the organization’s access to critical resources. From the perspective of open system, the resource dependence theory takes the single organization as the research object, emphasizes the interaction between the organization and the external environment, gives the organization an active role, and gives a new way of thinking for the organization’s innovation behavior from the perspective of resource acquisition channels. . For example, the new innovation organization of the Internet of Things industry can form its own innovation system. The theory of resource dependence will provide a better theoretical basis for explaining the operation mechanism of the Internet of Things-based cluster innovation system. How to participate in cluster construction enterprises, how to obtain cluster innovation resources, how to build clusters of innovation system, and other theoretical questions will be able to find the answer from the resource dependence theory.

3.3. The Theory of High - tech Related Effects and Growth of in Internet of Things Industry Cluster

Neoclassical theory of location suggests that inter-industry is interrelated and interdependent through product, technology, labor and employment. The growth and development of an industry is bound to affect or spread through the development of its related industries. Any activity that is not unique in nature to meet final requirements will lead to the use of its product as an input to a new production activity, through the application of its products will result in a series of new Health sector and industry. Hirschman argued that the forward-link approach is the association of industry through supply relationships with other industrial sectors. Forward association emphasizes the application of upstream technology will stimulate the formation of downstream industries. From the post-industrial relationship, the generation of an industrial sector can generate demand through its supply, leading to the emergence and development of its raw material industry, that is, the association with other industries through demand linkages. Hirschman argues that backward linkages will have a backward linkage effect. "Every non-primary economic activity will lead to the emergence and development of its raw material industry." The industrial linkage effect means that the change of production, output value and technology of an industry has direct and indirect influence on other industry sectors through its forward association and backward association. Industry association effect in the most widely used high-tech industries, it effectively explained the new materials, new energy, optoelectronics and other industries to promote the role of other related industries, for the Internet of things this application-oriented industries to promote the development of related industries Theoretical basis, but also explained inevitable formation of inherent mechanism of the internet of things industrial clusters on the internet of things industry chain upstream and downstream links from industrial relationship between the theory of push-pull relationship.

3.4. Agglomeration Factor Theory and the Growth of the Internet of Things Industrial Cluster

Alfred Weber (1909) argues that industrial clusters are geographically clustered by a large number of enterprises and related institutions based on specialized division of labor and collaboration, intermediate organizations between pure market organizations and hierarchical organizations. In analyzing the process of capital accumulation, Marx pointed out that the expansion of capitalist enterprises in two basic ways: namely, accumulation and concentration. From the perspective of Marx's research, industrial cluster is a kind of concentration and concentration of industrial value chain activities. Different enterprises in the same value chain organize and cooperate with each other to carry out production and business activities. They can achieve the same or even the same as large enterprises, superior to the economies of scale and economies of scale of large enterprises. Western scholars on the basis of Marx's research further suggested that the degree of concentration and concentration of enterprises can be expressed through the aggregation factor. Moreover, agglomeration factor has two institutional factors. First, cluster integration (c) is a measure of cluster enterprise attributes and organizational efficiency boundaries. The second is the cluster difference (d), which is a measure of the cluster's market attributes and transaction efficiency boundaries. Cluster is a system factor that reflects the cooperation and competition among cluster enterprises, and the

reasonable integration of cluster integration and cluster diversity is the key factor for the development of industrial cluster. market. In the neoclassical production, the western scholars also introduced the clustering factor $f(c, d)$ into the production function, and proved the necessity of the industrial cluster as the organization between the enterprise and the market through the empirical analysis. Agglomeration factor theory provides a qualitative research idea for the clustering and concentration of industrial clusters in the Internet of Things, and helps to scientifically define to what extent the industrial cluster of the Internet of Things is gathered and gathered.

4. Evaluation of the Effectiveness of the Internet of Things Industry Cluster Based on Agglomeration Factor Model

Effective concentration of the internet of things industrial clusters will be able to form a cluster effect, and be able to reduce transaction costs and improve the business benefits on the internet of things from the system and organizational structure, and expand the scale of the internet of things industry. It is a feasible way on development of the internet of things.

How to gather things and how to gather the most effective is a real problem. With regard to the clustering effectiveness of industrial clusters, Wang Fengrong and Gao Minghua put forward the conception of agglomeration factor. The clustering factor is used to measure the efficiency of the internal market, and a cluster output model is constructed. The clustering factors are different. Evolution and type of cyclical phases, clustering factors = $f(c_1, c_2)$, c_1 representative the Conformity of Cluster, It is used to measure whether the industrial cluster has a sound organizational structure and governance rules, whether enterprises within the cluster is cooperation; c_2 representative the Diversity of Cluster, It is used to measure cluster market attributes, Transaction efficiency and competition. Agglomeration factor is a measure of the relationship between cooperation and competition, and reasonable cooperation and competition is conducive to the development of industrial agglomeration.

When production function of the enterprise is $Y = AL^\alpha C^\beta$ under the non-cluster environment, for enterprises in a cluster environment, if their production factors are the same proportion of investment, the input-output relationship of its production factors will change due to existence of cooperation and competition under the industrial cluster environment. When the Conformity of Cluster(c_1) and the Diversity of Cluster(c_2) change, the industrial cluster output will also change. Based on this, the agglomeration factor $f(c_1, c_2)$ can be introduced into the production function of industrial clusters, the degree of integration of the cluster is indicated by c_1 / c_2 , the production function of the cluster is as follows:

$$Y = AL^\alpha C^\beta \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)}$$

Among them ,Where a and b are the boundaries of cluster integration c_1 / c_2 , $a \leq b$.

$$\text{When } \frac{c_1}{c_2} < a, \left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right) > 0, \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)} < 1,$$

$$AL^{\alpha}C^{\beta} > AL^{\alpha}C^{\beta} \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)},$$

When $\frac{c_1}{c_2} > b$, $\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right) > 0$, $\left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)} < 1$,

$$AL^{\alpha}C^{\beta} > AL^{\alpha}C^{\beta} \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)};$$

When $a < \frac{c_1}{c_2} < b$, $\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right) < 0$, $\left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)} > 1$,

$$AL^{\alpha}C^{\beta} < AL^{\alpha}C^{\beta} \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)};$$

When $\frac{c_1}{c_2} = a$ or $\frac{c_1}{c_2} = b$, $\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right) = 0$, $\left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)} = 1$,

$$AL^{\alpha}C^{\beta} = AL^{\alpha}C^{\beta} \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)}$$

From the above formula can be seen, $a < \frac{c_1}{c_2} < b$ is the effective interval of industrial

clusters, Clusters are more productive relative to firms. Early in the cluster, several companies close to each other will form regular cooperation or potential cooperative relations, due to lower transaction costs and the convenience of sharing resources.

At that time, $\frac{c_1}{c_2} = a$, $\left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)} = 1$, the transaction cost between enterprises

within a cluster is close to the intra-enterprise transaction cost, thereby attracting more enterprises to join, improving the integration of enterprises c_1 , Aggregation factor * — will Increment; when $a < \frac{c_1}{c_2} < b$, the enterprise cluster is in an active

state, $AL^{\alpha}C^{\beta} \left(\frac{c_1}{c_2} \right)^{\left(\frac{c_1}{c_2} - a \right) \left(\frac{c_1}{c_2} - b \right)} > AL^{\alpha}C^{\beta}$, when the factor of production is the same

proportion of investment, the output performance is better than the pure market transactions and intra-enterprise transactions. However, with the further increase

of $\frac{c_1}{c_2}$, the coordination costs of enterprises will rise, when $\frac{c_1}{c_2}$ reaches the boundary point b, the cluster output performance is no longer superior to the internal transaction conditions of the output performance, at this time, the cluster size tends to be stable. When $\frac{c_1}{c_2} = a$, under the condition that the cluster integration degree c_1 is invariant, if there are different types of enterprises, the clustering difference c_2 will increase, and the cluster will be inefficient. Similarly, when $\frac{c_1}{c_2} = b$, under the condition that cluster diversity degree c_2 is invariant, If continuing to have the same type of enterprise to join the cluster, it will leads to c_1 increase, then the cluster will also be inefficient.

Analysis and Inspiration of Model Evaluation:

1. The scale of the internet of things industry cluster is not the bigger the better, there is an effective interval for the internet of things industry clustering factor, only in a certain aggregation interval is efficient;
2. The effectiveness of the internet of things industrial cluster is affected by the integration of the cluster and the degree of difference, and only to promote the internet of things industry cluster integration and control the degree of difference in a certain range of fluctuations, that is to say, within the cluster of cooperation between enterprises and competition in the relationship a certain range of flexibility, the Internet of Things industrial cluster growth is the most efficient;
3. The leading enterprises in the cluster can make a difference in the choice of cluster enterprises (such as through it to adjust competition and cooperation relation between the internet of things industrial cluster enterprises, through which to adjust the internet of things industry clusters clustering factor) in order to promote the effectiveness of cluster operation;
4. Local governments can do some work in the formation and development of the Internet of things industrial cluster, can provide land-use support and financial support for some enterprises of the internet of Things, introduce industrial planning, and promote the agglomeration factor in the effective range from the policy level, $a < \frac{c_1}{c_2} < b$ and Close to $\frac{c_1}{c_2} = b$. This also once again proves that the Government has played an important role in the internet of things industrial cluster growth.

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