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# Solutions for the Application of CMS in the Printing and Publishing Industries of China

Wuhan University, Wuhan, Hubei, China

Prof. Qiang Wang

Students

Jie Wu

Liang Tian

Jun Lu

Wu Lin

Hui Li

Xuefang Wang

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## **Executive summary**

This project aims to reveal the application of Content Management Systems (CMS) in printing and publishing enterprises in China.

Our research shows that a notable percentage of large and medium-sized printing and publishing corporations in China are using CMS, and that the use of CMS has already become a developing trend in Chinese printing and publishing businesses. With the diversification and regionalization of the Chinese printing and publishing industry, a trend has emerged regarding CMS market share. For large and medium-sized business enterprises, the use of CMS to achieve effective management and to face the fierce competition in the printing and publishing industry is the only solution.

### **Purpose**

The purposes of this project are:

- First, to reflect the application of CMS in the printing and publishing industry in China.
- Second, to summarize and work out a CMS scheme suitable for the Chinese printing and publishing industry based on the research results.
- Third, to build a prediction model for the market to use as a reference of CMS providers.

### **Method**

**1. Information collection:** Definitions and other information about CMS were collected from the library and the internet. Also collected from the internet were targeted corporations and their related information. The targeted corporations consisted of the top 100 Chinese printing and publishing enterprises based on 2006 revenue and the 160 prizewinners in China Print Awards 2007.

**2. Questionnaires:** Two questionnaires were designed respectively for CMS users and providers. Some of the questionnaires were completed by exhibitors and attendees at the 2007 Print China Exhibition. The other questionnaires were filled in via an online questionnaire survey system.

**3. Telephone interviews:** Telephone interviews were conducted with some of the enterprises that responded to the survey in order to get more accurate and complete information.

**4. Expert Interviews:** Interviews with several well-known CMS experts in China were conducted in order to learn more about the industry.

**5. Analysis:** After analyzing the data from all of the methods outlined above, the following key findings were identified:

### **Key Findings**

- CMS has been used in the publishing industry for a comparatively long time, and as a result, productivity has greatly increased. The application of CMS within the print industry started later and didn't get applied to production except in some large and medium-sized printing enterprises which have used CMS for a relatively long period of time. Nearly 75% of printing enterprises have used CMS for less than 3 years.

- In the Chinese Printing and Publishing industry, enterprises in the Pearl River Delta region<sup>1</sup> use CMS more than in other areas; joint ventures and foreign-owned enterprises use CMS more than other enterprises.
- Most of the printing enterprises that use CMS are not completely satisfied with CMS. They think that improvements in compatibility and functionality need to be made. The majority of the printing and publishing enterprises only use a few important modules of CMS rather than the entire system.
- The future of the CMS application in Chinese printing and publishing enterprises is analyzed and forecasted from a microcosmic and macroscopical point of view. It turns out that the CMS application in these enterprises will have a bright future. It was predicted that more than 50% of companies in large and mid-sized printing and publishing companies will use CMS by 2012.
- The solutions for printing and publishing enterprises have been put forward to CMS users and suppliers as a reference.

### **Conclusion**

This research provides insight into the implementation of CMS in the printing and publishing industry and its influence. On the whole, nearly 30% of the large and medium-sized printing enterprises are using CMS. Presently, CMS implementations in China are different from place to place due to cultural and economic differences. CMS implementations in China also differ from corporation to corporation based on the type and size of the enterprise. As a result, enterprises wanting to select a CMS solution should do so according to their own needs. The solutions put forward by this research are a good reference for enterprises wanting to implement a CMS system.

As for the CMS providers, they should try to increase their CMS compatibility with other software so as to enable more output methods. The prediction model in this study can be used to analyze CMS implementation by a printing or publishing enterprise. Lastly, a forecast of the use of CMS in China is presented.

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<sup>1</sup> Pearl River Delta is in the east of Guangdong Province, including the cities of Guangzhou, Shenzhen, Zhuhai, Foshan, Jiangmen, Zhongshan, Dongguan and part of Huizhou and Zhaoqing. It is one of the most developed areas in China.

## Research Objectives

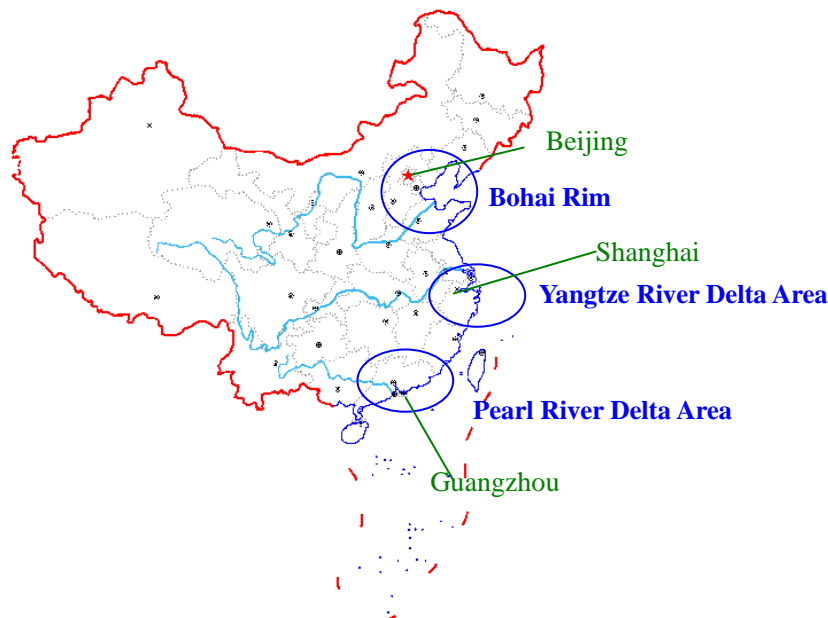
### Background

#### 1. Concept of CMS

With the development of Data Management Systems, CMS emerged. CMS focuses on resolving the problems of various unstructured or semi-structured digital resources regarding their collection, management, utilization, transference and value-add. Using CMS, digital resources are managed via structured information systems and provide a wider source of data for application systems. Unstructured data refers to a text document, videos, images and other document types. Structured data refers to values that have been organized in a defined format. Printing and publishing enterprises may have different requirements for Content Management. Within the publishing industry, News Editing Systems are the core function for CMS, such as Lotus Notes, while for the printing industry Process Data Management is the key function of CMS, such as ERP, and so on.

#### 2. Centers of the printing industry

Geographically, the concentration of the Chinese printing and publishing industry decreases from the south to the north. Approximately 80% of the top 100 Chinese printing enterprises are located in the following three areas: Pearl River Delta, Yangtze River Delta and Bohai-Rim, as shown in the following illustration. Pearl River Delta is led by the Guangdong province which includes Guangzhou, Shenzhen, Dongguan, Zhongshan, Foshan, Huizhou; Yangtze River Delta mainly includes Shanghai and some cities of Jiangsu and Zhejiang province such as Nanjing, Suzhou, Wuxi, Hangzhou; Bohai-Rim is comprised of Beijing and Tianjin and includes Tangshan, Baoding and Dalian.



- Pearl River Delta is based in the Guangdong Province. Since the 1980s when Hong Kong printing enterprises moved northward bringing advanced technology, equipment, market knowledge and modern management concepts, the Pearl River Delta has become more advanced. The Pearl River Delta was built using an international business model with strong financial support and seasoned professionals. This led to the development of a strong printing industry with large-scale

enterprises, abundant products, advanced equipment, increased technology and quality products.

- The Yangtze River Delta is one of the most prosperous economic regions in China. It is known as “the sixth largest group of cities.” In recent years, throughout the entire Yangtze River Delta printing industry, state-owned enterprises are being restructured and intensified; joint-stock and non-government enterprises are rising rapidly; capital from Taiwan, Hong Kong and foreign countries is continually coming into this area
  
- Currently the Bohai-Rim is economically behind the Pearl River Delta and the Yangtze River Delta. Its printing industry is also relatively backward. Structurally speaking, although there are many outstanding enterprises in this area, there is a lack of vitality because there are too many large enterprises, and very few medium and small enterprises. Beijing has paid a great deal of attention to this problem and the government is planning to accelerate the development of the printing industry, and to promote it within the entire region Bohai-Rim.

### **3. National Policy**

According to the printing industry development goals planned in "The Outline of the Eleventh Five-Year Plan", the national printing industry will realize the following annual growth rates:

1. Industrial output of approximately 8%
2. Publication industrial output of approximately 3%
3. Packing and upholstering industrial output of approximately 10%
4. Other industrial output of approximately 1%

If the above goals are achieved, at the end of "the Eleventh Five-Year Plan", the Chinese printing industrial output will reach 440 billion RMB, about 25% of the GNP. Printing production and processing capacity will become one of the largest in the world.

With the introduction of advanced technology from overseas, the printing and publishing enterprises are actively implementing information strategies. The State Economic & Trade Commission, Ministry of Information Industry, Ministry of Science and Technology and other government departments are strongly promoting an "upsurge of informationization". As a result, the implementation of CMS has become the goal of many enterprises. For example, in order to meet the challenges of the newspaper industry and exploit the opportunities of the digital content industry, China Press and the Publication Administration proposed the strategic goal of vigorously developing the digital newspaper industry. As a result, they started the "China Digital Newspaper Laboratory Program" in August 2006 at The Third Annual Meeting of Chinese Newspaper Competitiveness. However, implementing CMS in the Chinese printing and publishing industry is still full of risks, pressures and hardships. There are still many difficulties to overcome.

## **Objectives**

The general goal of this research is to provide a reliable reference for printing enterprises to use in selecting a CMS, and at the same time, to reveal the present and developmental potential of content management applications in the printing industry for CMS providers. Specifically, the objectives are as follows:

1. To reflect the current state of CMS
  - a) The market share of CMS
  - b) Different applications of CMS in different areas of China
  - c) The mainstream uses of CMS
  - d) The main functions of CMS used in printing work flow.
2. To reflect possible benefits that a printing or publishing enterprise may get from CMS
  - a) Improve information processing efficiency
  - b) Reduce the cost of human resources
  - c) Improve the ability to re-use information
3. To define the demand/fit for CMS in enterprises of varying types and sizes
  - a) Printing enterprises with a single service
  - b) Printing enterprises of composite services
  - c) Large publishing groups
4. To predict potential markets for CMS
  - a) Hardware systems
  - b) Software systems

## **Approaches**

The research was mainly performed in three stages:

### **1. Information Collection**

Research subjects were primarily chosen from Print China 2007, China Print Awards and the top 100 Chinese printing enterprises in 2006. They are located mainly in China's three economic centers: Pearl River Delta, Yangtze River Delta and Bohai-Rim. The principle methods of information collection were interviews, questionnaires, telephone interviews and e-mail.

### **2. Questionnaires**

We designed two sets of questionnaires for CMS users and providers, respectively. The questionnaires were submitted for review to the EDSF experts. Once completed, we placed the questionnaires on Wenkee investigation website (<http://survey.wenkee.com>). The research was performed using three methods:

- During Print China 2007, 633 questionnaires were sent out and 122 were completed. We offered gifts to our participants to encourage participation.
- Two thousand and sixty (2,060) e-mails were sent to the top 100 Chinese printing enterprises and those who had won China Print Awards. Each e-mail invitation contained a link to the web site (<http://survey.wenkee.com/eq.asp?U=4001003202429163666>) where the questionnaire was located. Two hundred twenty-one (221) valid questionnaires were returned.
- On the Wenkee website, a total of 158 questionnaires were sent back, of which only 12 were valid.

At this stage, a total of 1,051 questionnaires were sent out and 35.11% of them (369 questionnaires) were completed and valid.

### **3. Telephone Interviews**

Telephone interviews were conducted to gather information from survey participants that provided incomplete responses. For data analysis and market forecast, we sent invitations to 10 professors/experts. Five of them agreed to an interview, including representatives from the Founder Group, ASIWEB technologies and Artron Enterprises Group Limited.

### **4. Analysis, prediction and conclusions**

CMS applications in China were analyzed. Results included the identification of core functionalities that CMS should address, along with best practices applicable to a variety of printing enterprises looking to implement CMS in the next few years. In addition, CMS' feasibility and future in Chinese printing enterprises were predicted.

## Key Findings

### CMS Market Share in Printing Enterprises

According to the survey of 151 enterprises that won the China Print Award 2007 and participated in Print China 2007, 39 of them hold an annual production value between 10 million and 50 million RMB, and 66.8% of them (88 enterprises) hold an annual production value of more than 50 million. The Chinese government report “The Eleventh Five-Year Plan” defined those whose annual production value is more than 10 million as large and medium-sized printing and publishing enterprises. Therefore, most of the 151 enterprises can be classified as large and medium-sized enterprises. Sixty-one among these large and medium-sized enterprises have applied CMS, which means 40.4% of them are using CMS. This rate is much higher than that in all the Chinese printing and publishing enterprises. Following is the analysis from different perspectives.

#### 1. Geographical Distribution

In China, most of the printing enterprises are located in Yangtze River Delta, Pearl River Delta and Bohai-Rim, so it is important to investigate these areas. The CMS implementation rate in printing and publishing enterprises in these areas is illustrated in Figure 1:

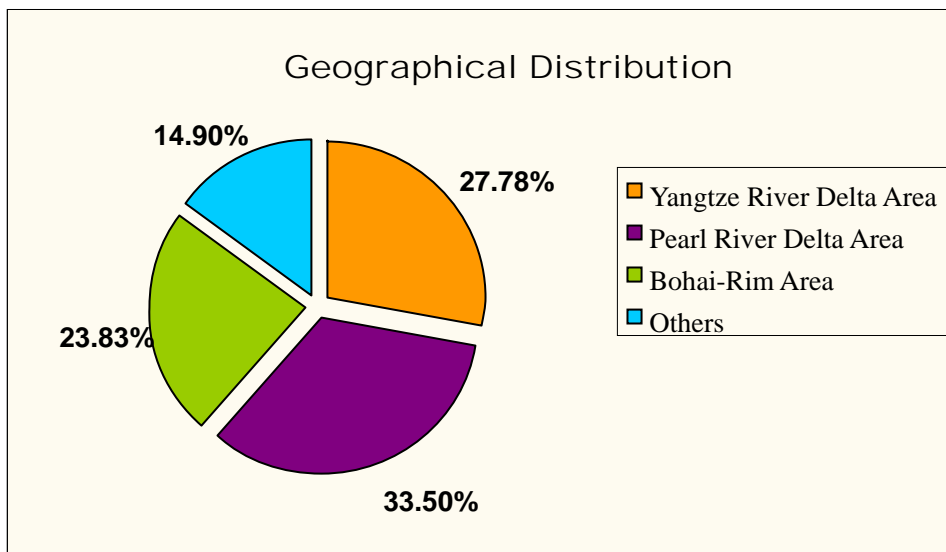


Figure 1 Geographical Distribution

Figure 1 shows that the percentage of enterprises using CMS in the Pearl River Delta is 33.5%, which is the highest; 50.8% of the large-scaled enterprises in this area are using CMS. The percentage of enterprises using CMS in the Yangtze River Delta is 27.8%, and about 42.1% of large enterprises in this region are using CMS. The percentage in Bohai-Rim is similar to that of the Yangtze River Delta, which is 23.8%, and about 36.1% of large enterprises in this area have CMS. Comparatively speaking, CMS is used less in the inland areas of the Chinese Continent (14.9%), than in the above three Deltas.

#### 2. Types of Enterprises

There are five types of Chinese enterprises: State-owned, joint-stock, sole proprietorship, joint venture and Non-government Enterprises (NGEs).

The property of the State-owned enterprises belongs to the nation, as indicated by the name. The nation appoints a management team to be responsible for the business operations.

Sole proprietorship is a company that is legally set up inside China. The company and all its properties are owned by a person. The owner of the company is liable in an unlimited capacity for its debts to the extent of his personal property. Sole proprietorship enterprises include Hong Kong-funded enterprises, Taiwan-funded enterprises and foreign-owned enterprises.

Joint-stock enterprises refers to the organization built by two or more subjects of interest set, which is adapt to social large-scale production and development of the market economy needs.

Joint venture generally refers to Sino-foreign joint ventures that are built by the Chinese investors and foreign investors.

NGEs are the economic entities of civil private investment and management.

There may be some overlap between state-owned and joint-stock companies, as some state-owned companies are carrying on a reform toward stock systems.

According to the above classification, the statistical results are as follows:

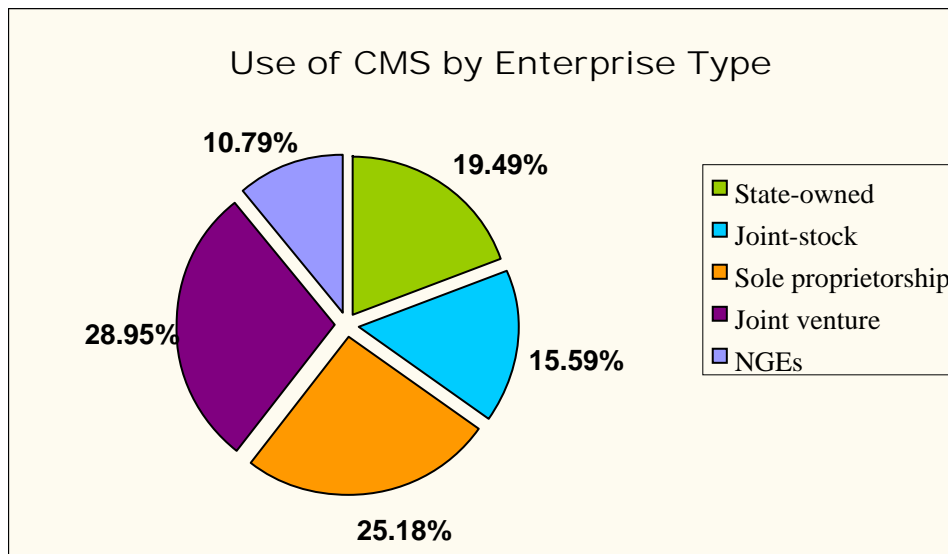


Figure 2 Use of CMS by Enterprise Type

It can be seen from Figure 2 that joint ventures are the most prevalent: about 28.95% of joint ventures have used CMS (We investigated mostly large and medium-sized enterprises. Among the 11 joint venture enterprises that we investigated, only 2 enterprises' annual output is below fifty million and the other 9 are all large and medium-sized). Following is sole proprietorship enterprises with 25.18% uptake of CMS that are mostly built upon Hong Kong capital, Taiwan capital and other offshore funds. They have used CMS for many years, and their investment in CMS is much larger than others, but the CMS systems they use are developed primarily by foreign or Hong Kong companies. Compared with

other enterprises, State-owned, Joint-stock and NGEs enterprises are smaller in proportion. The State-owned enterprises with 19.49% adopt CMS that is built upon state capital, which are facing innovation. Not all of the Joint-stock and NGEs enterprises have enough capital to adopt CMS.

### 3. Service Distribution

Diverse types of services will have unique requirements for CMS. We divide the types of services into books/magazines, newspapers, packaging, commercial printing, labels and others (which includes bill printing, cards printing, printing suppliers and packaging tins making). It is worth noting that commercial printing is focused on color commercial newspapers, brochure printing, etc. It can be seen from Figure 3 that commercial printing enterprises use CMS the most, with a percentage of 21.36%. Following is books/magazines and packaging enterprises (almost the same percentage of use), and then label printing enterprises.

The survey also shows that enterprises that have multi-type businesses, as well as larger enterprises are more likely to use CMS which can be found in Table 1.

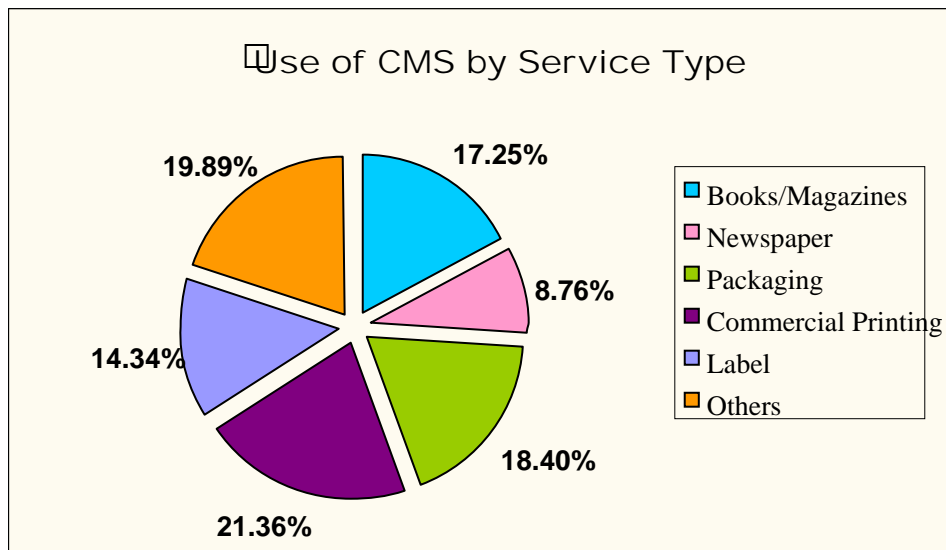


Figure 3 Use of CMS by Service Type

During the investigation, many enterprises expressed their dissatisfaction with their CMS systems. They stated that CMS has limited applicability. Software designed by different developers provided varying functionality and performance when implemented. Some excellent software which is highly efficient for a certain purpose (the purpose refers to the property management, production management, human resource management, etc.) has been developed by the enterprise itself, such as Jinjia CMS developed by Shenzhen Jinjia Group, Kewanglian CMS and Founder Electronics CMS (a wholly owned subsidiary of Founder Group)..

### 4. Other classifications

We can also classify our findings by the annual production value of enterprises and number of employees. We found that larger enterprises apparently use CMS more frequently.

Table 1 Other Classification

employee number	<50	50-100	100-500	500-1000	>1000
proportion	12.3%	18.6%	22.7%	24.0%	22.5%
annual production value(10 thousand)	<500	500-1000	1000-5000	5000-10000	>10000
proportion	10.4%	5.2%	17.6%	33.5%	33.3%

### The Application of CMS

We determined the rate of application of CMS by analyzing the questionnaires received at Print China 2007 and via the advice of experts. Experts from the Founder Group Electronics, Printage, Artron Enterprises Group Limited, Want I.T.Co and KAME were interviewed.

The application of CMS in the publishing and printing industry is still in the elementary stages. Popular CMS providers include Founder Electronic’s DAM, Webish, Xiang Yu and Want I.T.Co. Usually, enterprises learn about CMS through exhibitions. Enterprises are adopting CMS to improve enterprise management, control material costs, and provide document management efficiencies. More than 60% of enterprises use CMS because it improves management.

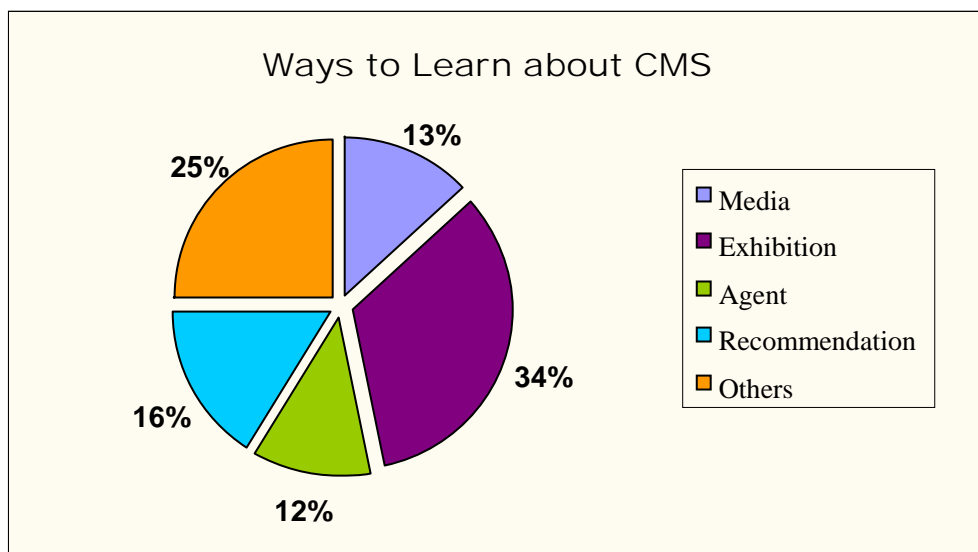


Figure 4 Ways to Learn about CMS

Among the users of CMS, 24.0% of them are in the construction phase (i.e. they are still implementing the system). Another 24.0% have used CMS for less than one year. 41% have used CMS for two to five years. Only 11% have used CMS for more than five years. These numbers are in accordance with what CMS experts have stated: “The history of CMS in the Chinese publishing and printing industry started quite recently and CMS is in the beginning stage.”

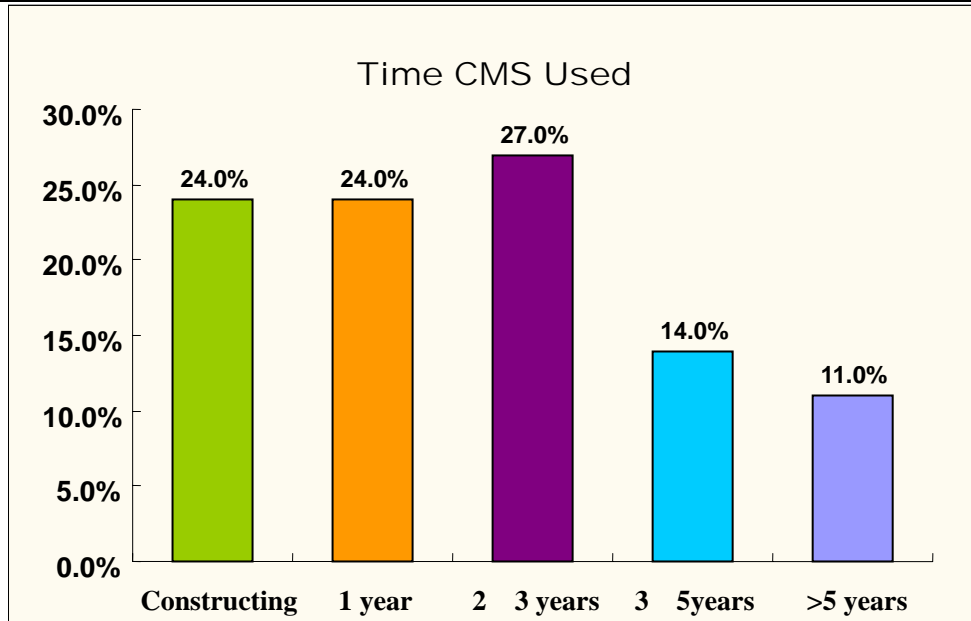


Figure 5 Time CMS Used

The research revealed that the main functions of CMS include macro-monitoring and inquiry, optimizing workflow and improving search speed. 52% of users mentioned macro-monitoring and inquiry as their primary target benefit from CMS, while 49.33% of users considered workflow optimization a key function. 50% of users believe that CMS meets their expectation, but another 32% of users complained that CMS had not produced expected benefits yet. The experts from Printage state that enterprises should select CMS according to their own specific requirements. Generally speaking, CMS can bring about a 10% increase in profits, but this can vary depending on the enterprise and their systems. The expert from the Founder Group believes that the key issues in using CMS includes careful examination of the requirements of the enterprise, effective communication between vendor and user, an understanding of the enterprise’s budget for the CMS investment and good implementation capabilities.

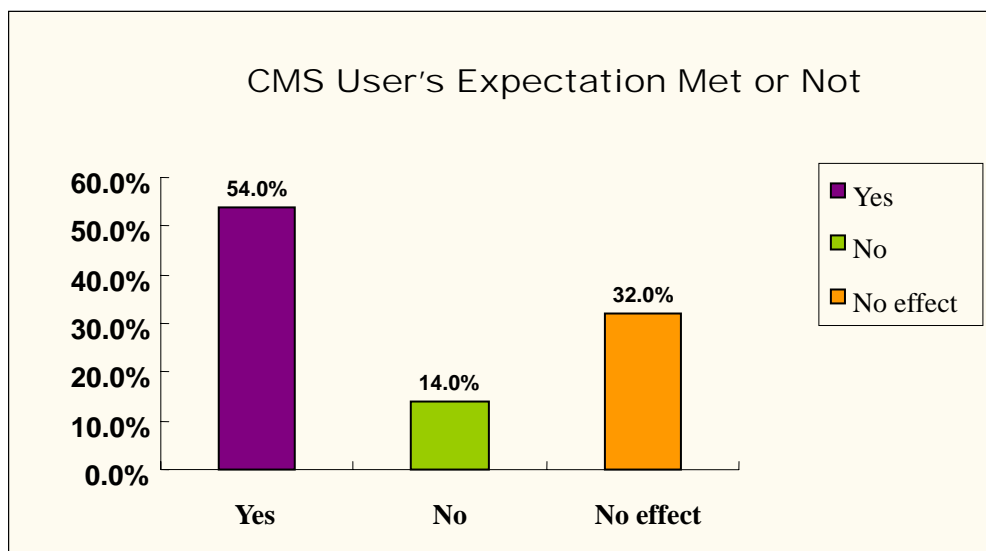


Figure 6 CMS User's Expectation Met or Not

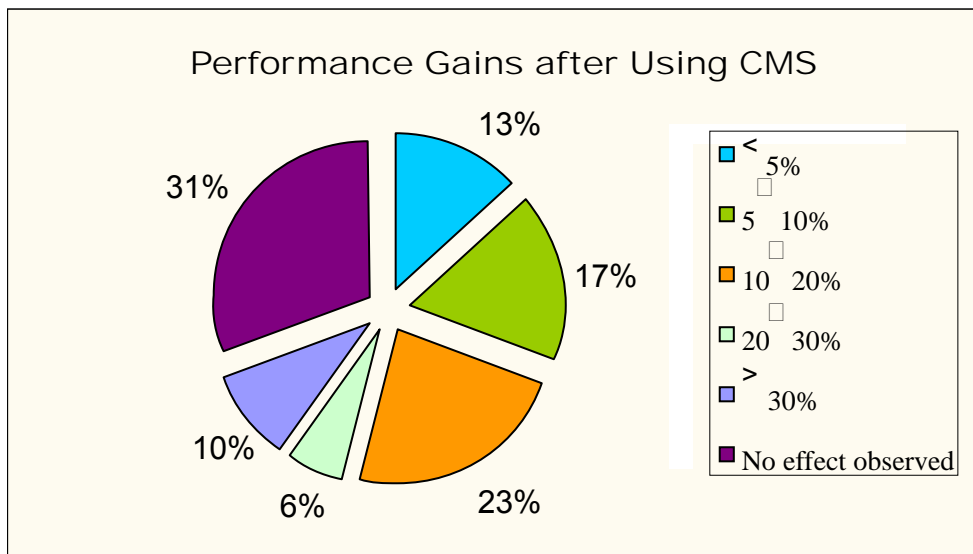


Figure 7 Performance Gains after Using CMS

At present, the technical focus of CMS is plan management and resource integration. There are still some limitations to CMS implementation such as a long training cycle, high costs and limited system compatibility. Module functions and the user interface also need improvement. More than 80% of the enterprises believe that CMS may have a wonderful future, but the market is still immature and needs cultivation.

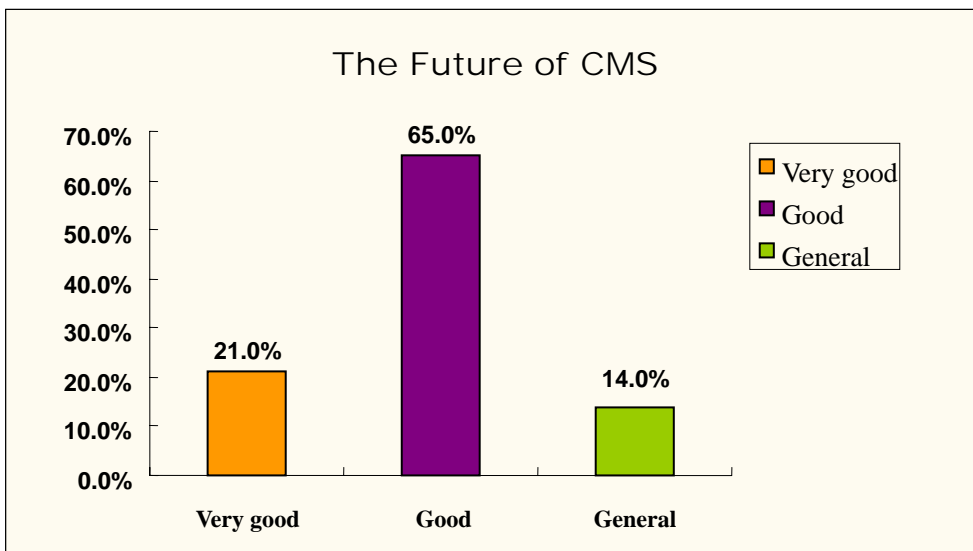


Figure 8 The Future of CMS

Because current competition in the Chinese printing and publishing industry is fierce, enhanced management is very important to enterprises. Most enterprises select CMS intending to deal with this pressure. Very few enterprises use CMS just because their competitors do or just to improve the enterprise image.

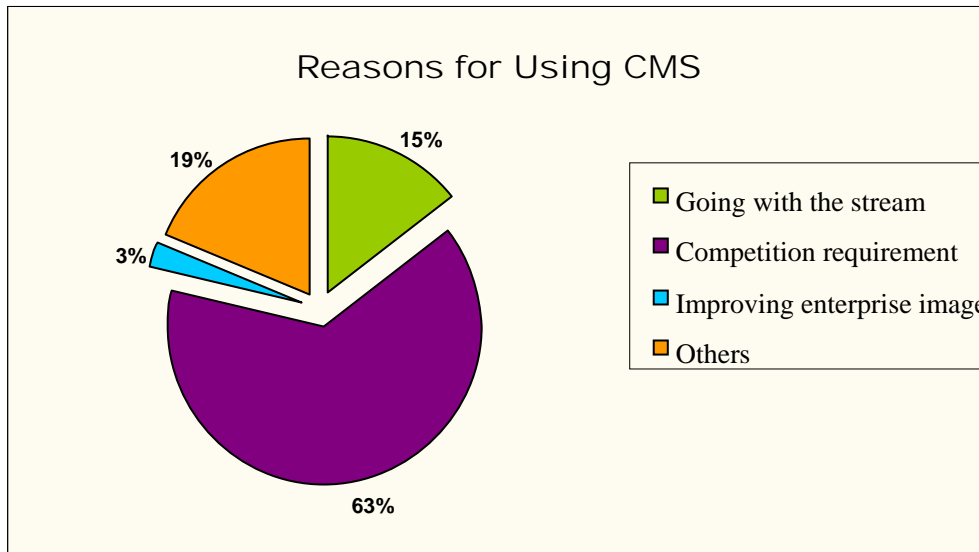


Figure 9 Reasons for Using CMS

All of the experts believe that CMS is helpful for enterprises. 49.4% of enterprises say they will continually invest in CMS and the most common investment is system updating. In addition, 27% of enterprises will buy a new system and 22% will develop a system internally.

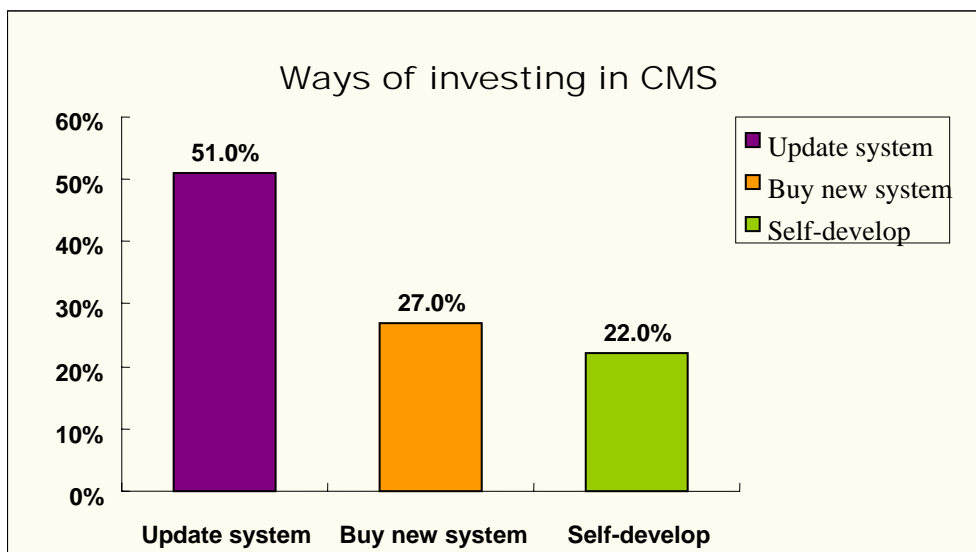


Figure 10 Ways of Investing in CMS

52% of enterprises think that CMS will develop rapidly in the future, while another 48% think the development will be steady. In other words, all of the enterprises researched thought CMS would experience continuous development though with some disagreement over the speed or rate of that development. 73% of the enterprises surveyed said they would recommend CMS to other companies, so we predict that CMS will have a bright future in the printing business.

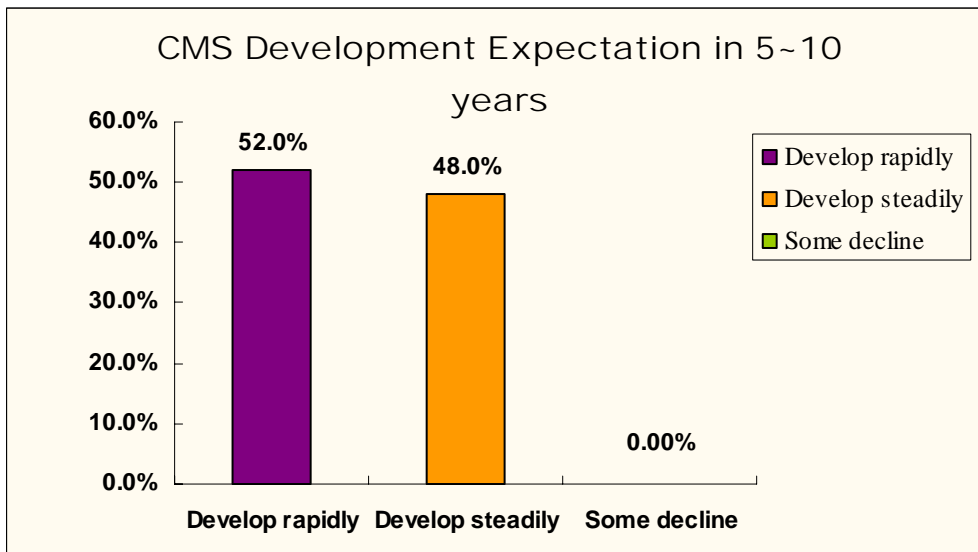


Figure 11 CMS Development Expectation in 5~10 years

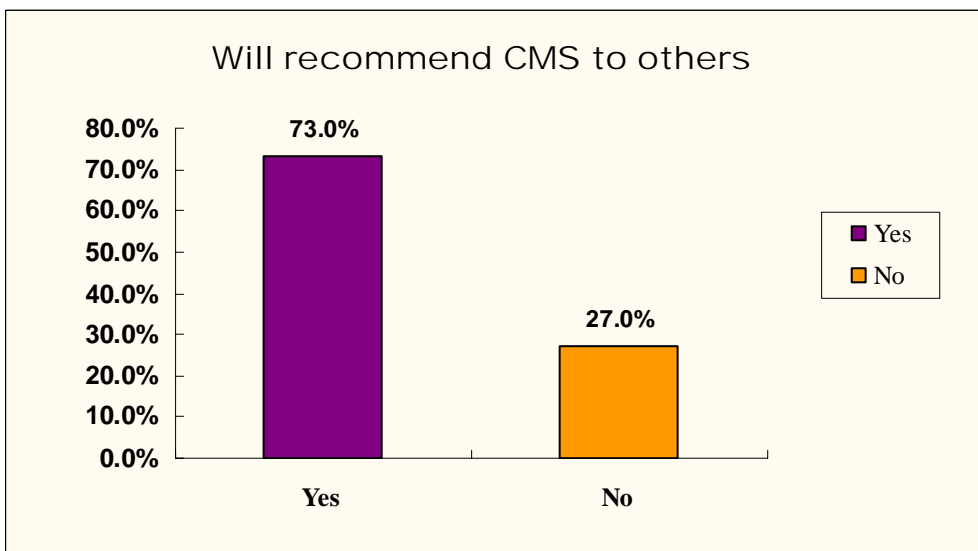


Figure 12 Will Recommend CMS to Others

The expert from the Founder Group believes that it is difficult to popularize CMS because the profits of the printing and publishing industries are declining, while the cost of using CMS is high. That's why the study of CMS in China is still at a preliminary stage. The CMS study is limited to basic concepts and is still not operable enough to permit detailed investigation. However, all experts have faith in CMS and believe it will develop favorably.

### Prediction

The future of CMS applications in China can be analyzed from a microcosmic and macroscopical point of view. Microcosmically, CMS implementation probability will be affected by several basic factors, such as geographic area, enterprise type, number of employees, annual production value and service type. A prediction model was developed to predict printing or publishing enterprises' using CMS. Macroscopically, using relevant government policies and CMS applications in the printing and

publishing enterprises in the past 7 years, we made a prediction of the CMS popularizing rate in these enterprises for the next 3 to 5 years. Following are details of the prediction.

## Microcosmic point of view

### Prediction model for CMS using probability

The model was developed from the data in the questionnaires and should be considered as part of the results analysis. It can be used to predict the probability of a printing or publishing enterprise implementing CMS. Following are some details:

#### 1. Form

According to the research results and experts' suggestions, parameters that affect CMS usage include: geographic area ( $x_1$ ), enterprise type ( $x_2$ ), number of employees ( $x_3$ ), annual production value ( $x_4$ ), business type ( $x_5$ ), employees' opinions ( $x_6$ ) and leaders' expectations ( $x_7$ ). In order to simplify the calculation process, a linear modeling method was chosen to form this probability model. The form of the function is specified below:

$$p = a * f(x_1) + b * g(x_2) + c * h(x_3) + d * l(x_4) + e * q(x_5) + f * t(x_6) + g * s(x_7)$$

In the function,

$$f(x_1), g(x_2), h(x_3), l(x_4), q(x_5), t(x_6), s(x_7)$$

are functions meaning the probability relative to each of the above parameters, and

$$a, b, c, d, e, f, g$$

are weight coefficients.

Ideally, when

$$f(x_1) = g(x_2) = h(x_3) = l(x_4) = q(x_5) = t(x_6) = s(x_7) = 1$$

we can get the following equation:

$$a + b + c + d + e + f + g = 1$$

However, the probability functions can not be 1. That is to say, it is impossible to get a result of 100% according to this model. Similarly, CMS usage probability cannot be 0. Generally speaking, "p" will be a number between 0 and 1. In order to evaluate the veracity of "p", "p" is multiplied by 100 to get a value between 0 and 100. We set a parameter "Score" as the value multiplying "p" by 100 in the following.

#### 2. Details

Based on the research data we received, the probability functions of the seven parameters are as follows:

$$\begin{array}{l}
 \text{Area:} \quad f(x_1) = \begin{cases} A = 0.278 \\ B = 0.335 \\ C = 0.238 \\ D = 0.149 \end{cases} \\
 \text{Enterprise Type:} \quad g(x_2) = \begin{cases} A = 0.195 \\ B = 0.156 \\ C = 0.252 \\ D = 0.290 \\ E = 0.108 \\ F = 0.0 \end{cases} \\
 \text{Number of Employees:} \quad h(x_3) = \begin{cases} A = 0.123 \\ B = 0.186 \\ C = 0.227 \\ D = 0.240 \\ E = 0.225 \end{cases} \\
 \text{Annual Production Value:} \quad l(x_4) = \begin{cases} A = 0.104 \\ B = 0.052 \\ C = 0.176 \\ D = 0.335 \\ E = 0.333 \end{cases} \\
 \text{Business Type:} \quad q(x_5) = \begin{cases} A = 0.173 \\ B = 0.088 \\ C = 0.184 \\ D = 0.214 \\ E = 0.143 \\ F = 0.199 \end{cases} \\
 \text{Employees' Opinion:} \quad t(x_6) = \begin{cases} A = 0.12 \\ B = 0.41 \\ C = 0.30 \\ D = 0.24 \\ E = 0.24 \\ F = 0.122 \end{cases} \\
 \text{Leaders' Expectation:} \quad s(x_7) = \begin{cases} A = 0.494 \\ B = 0.096 \\ C = 0.277 \\ D = 0.133 \end{cases}
 \end{array}$$

In order to get properly weighted coefficients, a program was developed to facilitate the calculation process.

### 3. Testing program

We designed a testing program to calculate several groups of weighting coefficients and got a proper group of weighted coefficients for the final function.

### 4. Data Analysis

#### 1) Weighted coefficient

Employees' Opinions and Leaders' Expectations have less effect than the other five factors. Therefore, the weighted coefficients of these two factors are much lower than the Enterprise Type, Number of Employees, Annual Production Value, Area and Business Type. In order to decide the five factors, the following six groups of weighted coefficients were calculated and the results were analyzed.

Table 2: Six Groups of Parameters

Parameters Groups	a	b	C	D	e	f	g
G1	9	9	18	14	36	7	7
G2	9	9	36	18	14	7	7
G3	9	9	18	36	14	7	7
G4	9	36	18	14	9	7	7
G5	36	9	14	18	9	7	7
G6	9	18	14	36	9	7	7

✧ Because “p” is multiplied by 100, the coefficients are between 0 and 100.

## 2) Calculation results

After calculating the above six groups of data, the results are shown in Appendix A.

From the six graphs in Appendix A (Pearl River Delta Area), we can find that the sixth curve (Figure 13) can clearly distinguish the CMS users and non-CMS users. So we selected the sixth group of weighting coefficients as the final function’s coefficients.

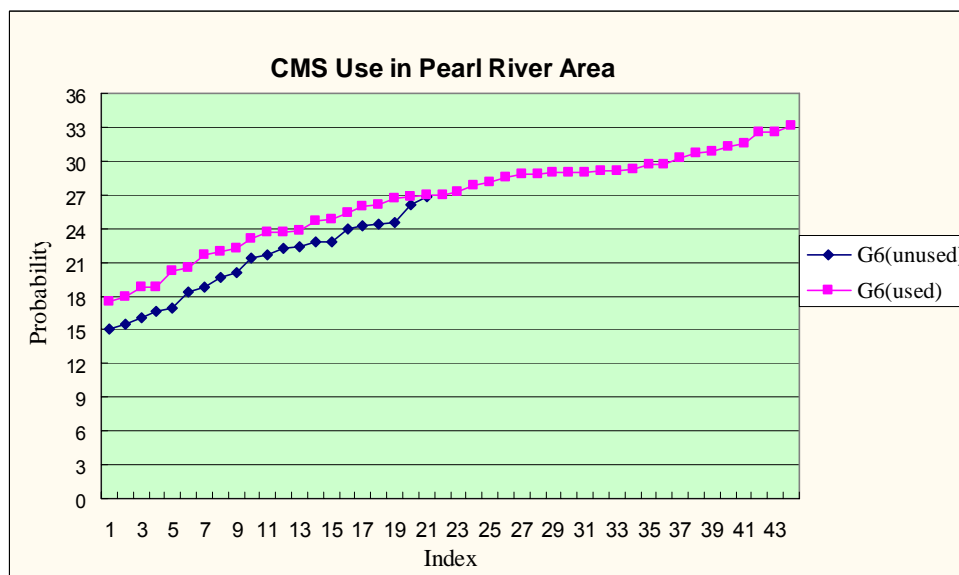


Figure 13 CMS Use in Pearl River Area

For the Yangtze River Delta Area, the data was calculated in the same way, and the result is shown in Appendix A as well.

From the graphs in Appendix A (Yangtze River Delta Area), we can see that the first curve (Figure 14) can clearly distinguish the difference between enterprises using CMS and enterprises not using CMS. So we choose this group of weighted coefficients as the final function’s coefficients.

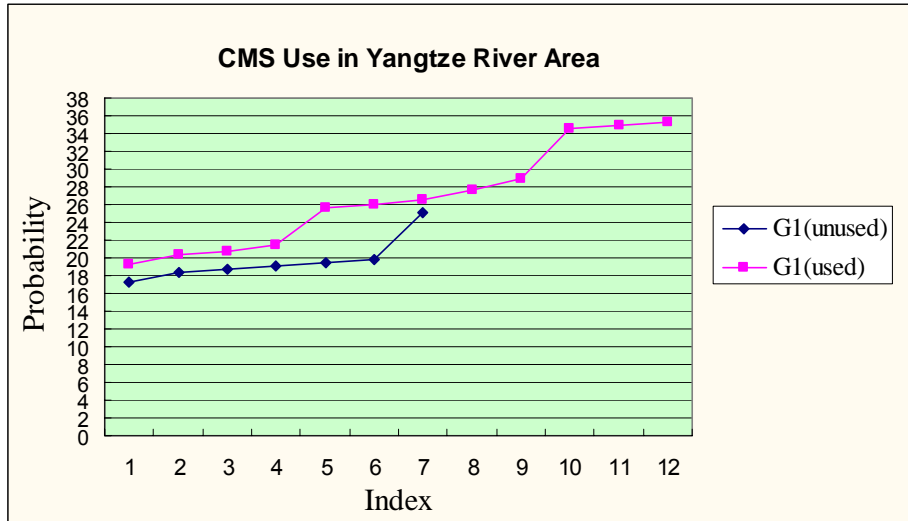


Figure 14 CMS Use in Yangtze River Area

For the Bohai-Rim Area, the result is shown in Appendix A (Bohai-Rim Area):

Because the enterprises in the Bohai-Rim Area are more influenced by some exterior factors such as political reasons, the six groups of the data above can not show the function of prediction well, so this model is not applicable to the Bohai-Rim Area.

### 3) Conclusion

According to the above analysis, the following function:

$$p = a * f(x1) + b * g(x2) + c * h(x3) + d * l(x4) + e * q(x5) + f * t(x6) + g * s(x7)$$

can predict CMS application in the Yangtze River Area and the Pearl River Area.

To enterprises in the Yangtze River Area, the first group of coefficients is best, that is a=9, b=9, c=18, d=14, e=36, f=7, g=7 and the graphical model is as follows (score=100\*p):

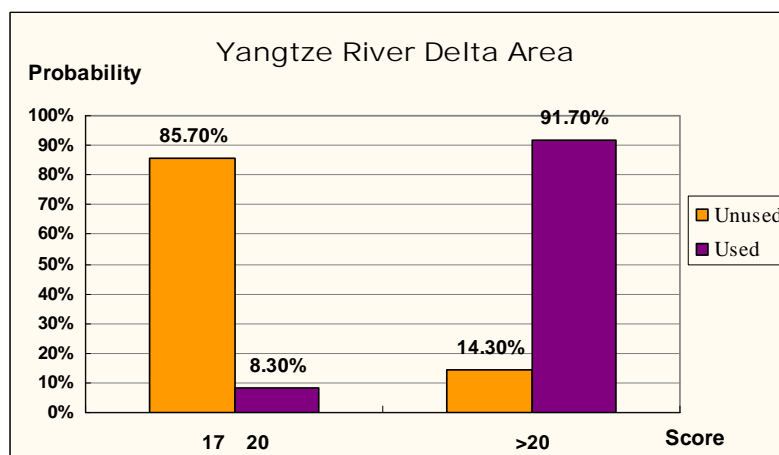


Figure 15 Forecasting Model for Yangtze River Delta Area

Through the above formula, if the score of the enterprise in the Yangtze River Area is between 17 and 20, the enterprise's probability of using CMS is only 8.3% and its probability of not using CMS is 87.5%. If the values are 20 and above, the enterprise's probability of using CMS is 91.7% and its probability of not using CMS is 14.3%.

For the enterprises in the Pearl River Area, the fifth group of coefficients is best, that is  $a=36$ ,  $b=9$ ,  $c=14$ ,  $d=18$ ,  $e=9$ ,  $f=7$ ,  $g=7$  and the graphical model is as follows (score= $100 * p$ ):

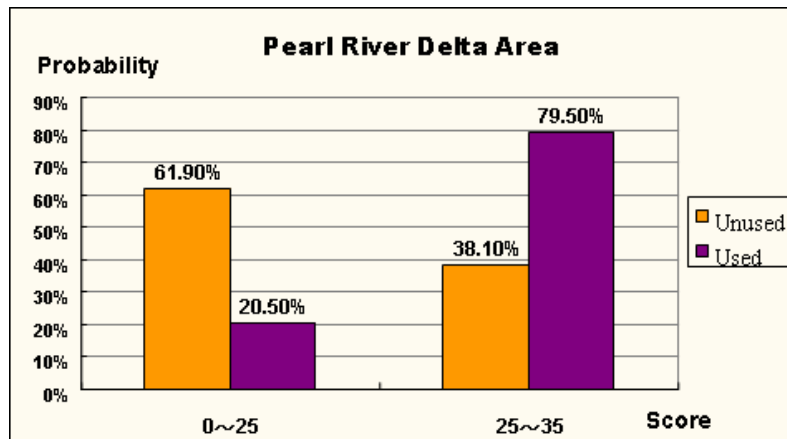


Figure 16 Forecasting Model for Pearl River Delta Area

Similarly, through the above formula, if the score of the enterprise in the Pearl River Area is between 0 and 25, the enterprise's probability of using CMS is 20.5% and its probability of not using CMS is 61.9%. If the score is between 25 and 35, the enterprise's probability of using CMS is 79.5% and its probability of not using CMS is 38.1%.

#### 4) Verification

The data of the top 100 Chinese printing and publishing enterprises in 2006 was collected and used to test the validity of the probability prediction model. Following are the results:

- **For Yangtze River Delta Area**

There are 36 enterprises in this area among the top 100 Chinese printing and publishing enterprises of 2006. Among these enterprises, there are 23 using CMS and 13 not using CMS. It can be seen after calculating the model, 87% of enterprises' have values above 20 points of the ones that have been using CMS. Among the non-CMS users, 30.8% of the enterprises have a score near 20 and 69.2% of the enterprises score more than 20, which mean they have a high probability of applying CMS in the near future.

- **For the Pearl River Delta Area**

There are 32 enterprises on the list. Among these enterprises, there are 23 enterprises using CMS and 9 not using CMS. It can be seen after calculation with the model, 95.7% of CMS users get a score of more than 25%. Among the non-CMS users, 25% of the enterprises have a score less than 25 and 75% of the enterprises score more than 25, which mean they have a high probability of applying CMS in the near future.

In summary, the model is valid in its predictions about enterprises in Yangtze River Delta and Pearl River Delta areas.

### Macroscopical Point of View

As the survey shows, from 2001 to 2007 CMS application in Chinese large and medium-sized printing and publishing enterprises has witnessed a steady increase (Figure 5). According to the government’s developing plan, “The Outline of the Eleventh Five-Year Plan”, the government will promote development of the printing and publishing industry and the application of CMS. The Plan predicts that there will be nearly 10 thousand large and medium-sized printing and publishing enterprises in China by 2010. In the macroscopical analysis, 151 printing and publishing enterprises can be regarded as samples of these enterprises with a population of 10 thousand. A curve that depicted the CMS application in these enterprises in the past 7 years is shown in Figure 17. The function ( $y = 0.131x^2 - 0.169x + 0.8143$ ) in Figure 17 is deduced from the past 7 years’ data by a curve fit method. In addition, it can be calculated with this function that the application rate will be 12.22‰ in 2010 ( $x=10$ ) and in 2012 the data will be 17.65‰. As a result, the application speed will be much faster in the next 3 or 5 years.

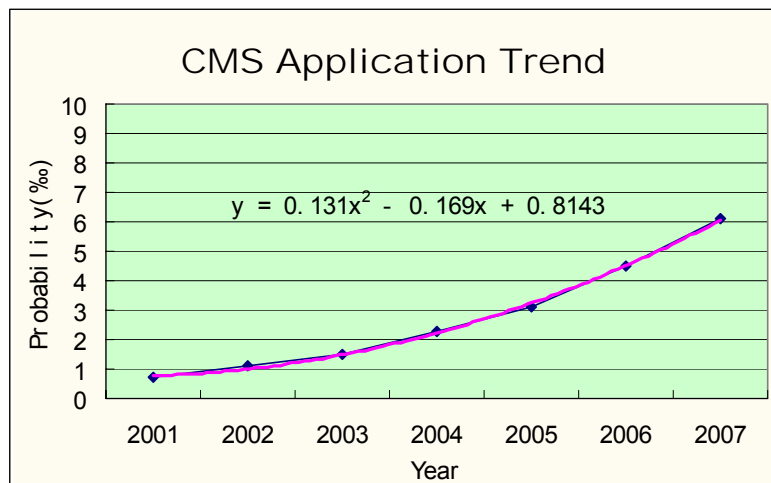


Figure 17 CMS Application Trend

The microcosmic prediction model indicates that it is highly probable that CMS will be applied more and more in large and medium-sized printing and publishing enterprises in the Yangtze River Delta and Pearl River Area in the next few years. And the macroscopical prediction analysis also shows that CMS applications in these areas will obviously increase. With the rapid increase of CMS use, there will be more opportunities for CMS’ development, promotion, consultation and technological cooperation. From a technology perspective, it is important to establish standard file formats, data standards and data exchange methods for the CMS’ popularization. CMS will have a bright future in China.

## Conclusion and Suggestion

The conclusions are based on three aspects: market share, application condition and market prediction.

The investigation presents that the application of CMS in the printing and publishing industries is still at a primary stage which is caused by the current industrial environment in China. Most of the printing enterprises concentrate on production without attaching importance to data storage and management. As a result there is a lack of effective content management. Although the application of CMS in publishing enterprises is better and many of the publishing companies have a news publishing system, they still lack innovation for management which is essential to business development.

Different enterprises need different types of CMS. Generally speaking, business printing enterprises tend to use CMS the most. The more services provided by an enterprise, the higher the possibility of a CMS application. Although there are still problems in the application of CMS, it is poised to grow because it meets the needs of enterprises.

Based on the above conclusions, the following are some suggestions for choosing a suitable CMS solution:

**1. An accurate type of CMS is essential for a successful implement.**

It will be better for multi-business enterprises to have a comprehensive CMS system. However, for some single service enterprises, such as a graphics company, individual modules of CMS may be sufficient.

**2. Customize your CMS.**

The CMS system should be able to connect with every department of the enterprise efficiently so that it can make daily production easier to plan and collaborate on. The system should be scalable so that it can be updated easily when necessary.

**3. Review your CMS and maximize its function.**

The enterprise should analyze workflow information from all areas in order to identify system resources, develop a maintenance strategy, streamline management decisions, optimize production, and standardize the work of CMS operators.

According to our research, we predict that: the printing and publishing industries are facing the challenge of digitalization brought forth by information technology. More and more enterprises realize the importance of applying information technology to traditional manufacturing processes to improve productivity. In recent years, printing and publishing enterprises have developed from merely a manufacturer to manufacture and information service providers. For example, Yachang Group has created a new developing mode called “traditional resource + IT + arts” which is an innovation in this industry. More than 30 large publishing enterprises are doing cross-media news distribution.

With the popularization of CMS, there will be an increase in the demand of related software and hardware. Increasing the content capturing speed and accuracy will be the focus of future digitalization software. The application software such as Optical character recognition (OCR), intelligent image processing software, high speed and veracious search engines, automated layout software and database software will be in great demand. Similarly, hardware such as high speed scanners, cameras with high

---

resolution, and large capacity disks will be standard devices for an integrated CMS system.

Based on this research, further studies can be done on enterprises not using CMS. This research did not contain detailed information about the reasons for not using CMS. A more in-depth look at the enterprises that have not applied CMS might shed more light on CMS applications in the printing and publishing industries in China.

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## **About (EDSF) The Electronic Document Systems Foundation**

EDSF (The Electronic Document Systems Foundation) is a charitable foundation dedicated to preparing the next generation of professionals for the industry. EDSF supports the industry's future by granting scholarships to students in support of their academic careers, by sponsoring a research grant/mentor program for colleges and universities, by building awareness about industry careers, and by recognizing innovative educators and educational programs. EDSF serves vendors, suppliers, and users who design and implement document solutions for business applications.

For more information about EDSF, please visit [www.EDSF.org](http://www.EDSF.org) or phone (817) 849-1145.

## **About Wuhan University**

Wuhan University is a key multiversity, directly under the national ministry of education, one of the key universities in the national "211 Project" and "985 Project". Ziqiang School was built in 1893 and was renamed to Wuhan University in 1949. Its subjects contain: philosophy, economy, law, education, literature, history, science, engineering, agronomy, medicine, management and so on. There are many national key laboratories, 4 national laboratories, 2 national engineering and technological research centers, 1 national field scientific observation research center, 8 key laboratories of the ministry of education and 2 engineering and technological research centers of the ministry of education.

The Printing and Packing Department of Wuhan University was built in 1983. There are 2 specialties: printing engineering (including electronic publishing) and packing engineering (including packing design). The printing area is the only key printing engineering built in the national "211 Project". The Printing and Packing Department has offices of specialty research, such as printing and packing engineering, professional laboratories and research organizations, image communication engineering and technology research center, printing new technology research center, and multimedia electronic publishing experiment center.

For more information about Wuhan University, please visit [www.whu.edu.cn](http://www.whu.edu.cn).

## **About the Research Team**

Qiang Wang is the professor of Printing and Packaging School of Wuhan University of China. He is one of the most famous and outstanding professors in the field of printing and publishing industries in China. In recent years he successfully promoted the application of digital workflow in printing factories and had helped many firms increase their productivity. With the rapid development of Cross-Media in China, Professor Wang draws his attention to CMS and has led his research team to do a great deal of wonderful work in this field. More information about him can be found in the web page: <http://www.manrolandchina.com/scholarship/judge.htm> (Simplified Chinese).

Jie Wu is a September 2006 graduate with a Master of Engineering in School of Printing and Packaging, Wuhan University. She has completed her Bachelor of Printing Engineering in School of Printing and Packaging, Wuhan University, Wuhan City, Hubei Province, China. She was a counselor of students and chairwoman of the student union.



Liang Tian is a September 2006 graduate with a Master of Engineering in School of Printing and Packaging, Wuhan University. She has completed her Bachelor of Printing Engineering in School of Printing and Packaging, Wuhan University, Wuhan City, Hubei Province, China.

Jun Lu is a September 2006 graduate with a Master of Engineering in School of Printing and Packaging, Wuhan University. He has completed his Bachelor of Printing Engineering in School of Printing and Packaging, Beijing Institute of Graphic Communication (BIGC), Beijing City, China.

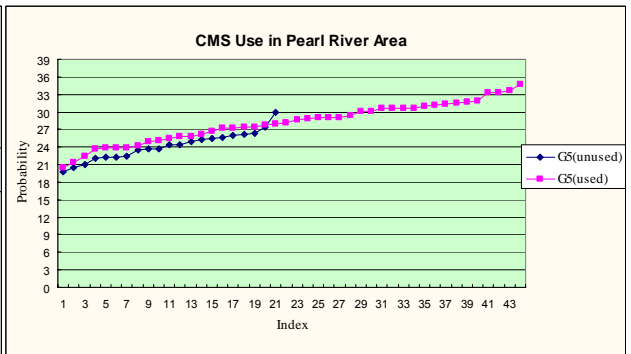
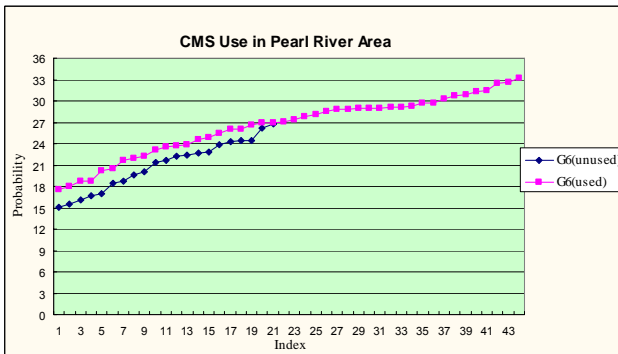
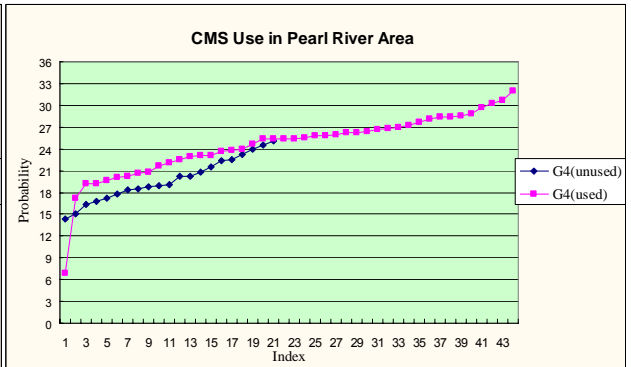
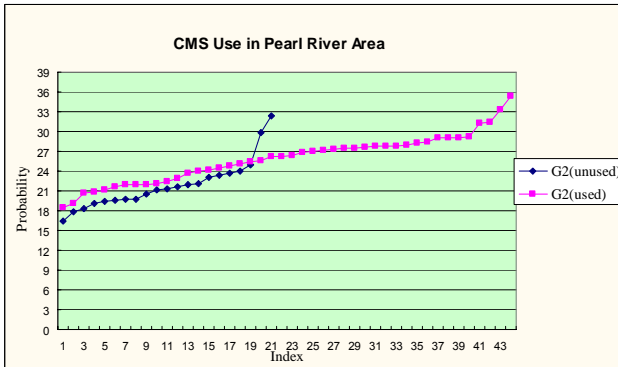
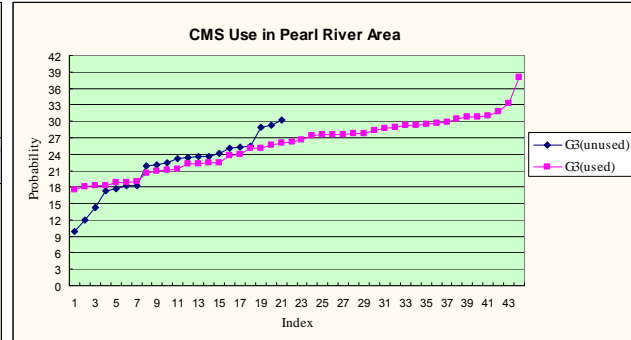
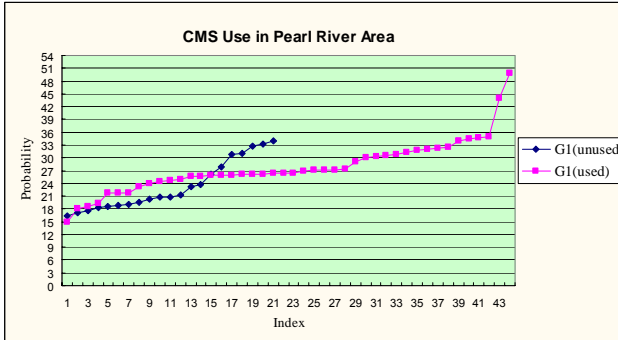
Wu Lin is a September 2006 graduate with a Master of Engineering in School of Printing and Packaging, Wuhan University. He has completed his Bachelor of Printing Technology in Information Engineering School, Southern Yangtze University, Wuxi City, Jiangsu Province, China

Hui Li is a September 2006 graduate with a Master of Engineering in School of Printing and Packaging, Wuhan University. She has completed her Bachelor of Packaging Engineering in School of Materials Science and Engineering, Zhengzhou University, Zhengzhou City, Henan Province, China.

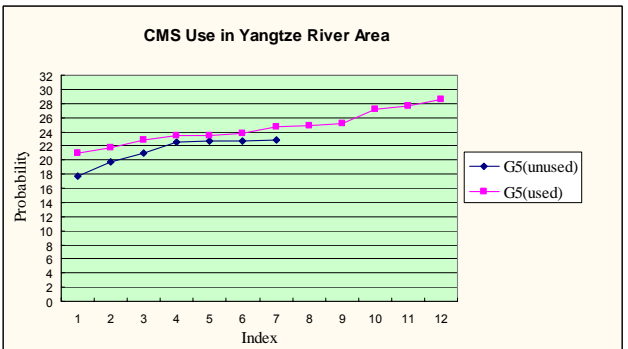
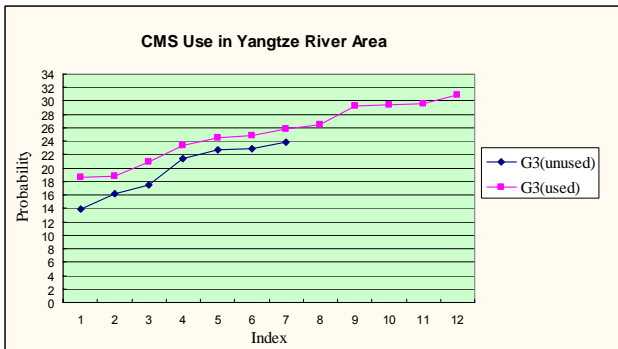
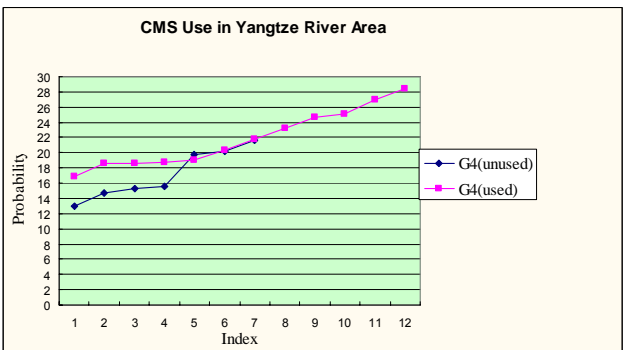
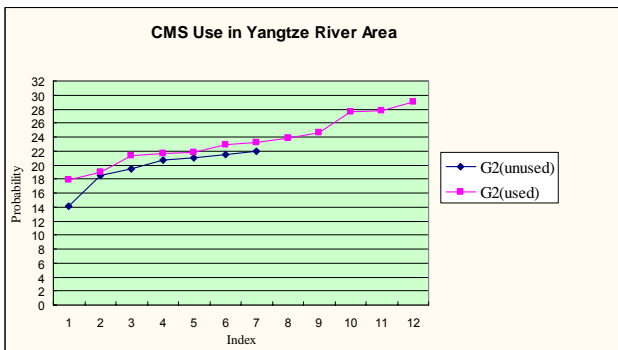
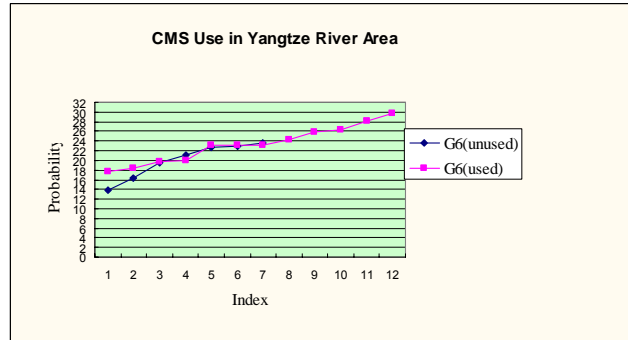
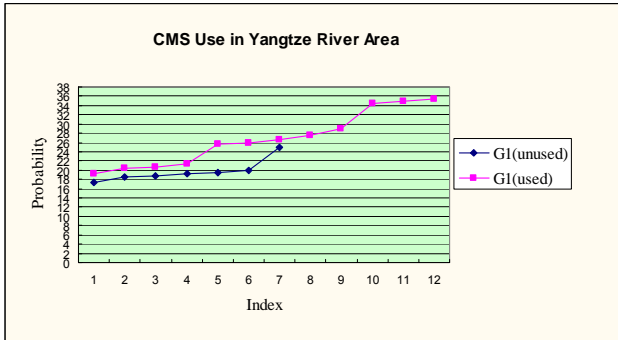
Xuefang Wang is a September 2006 graduate with a Master of Engineering in School of Printing and Packaging, Wuhan University. She has completed her Bachelor of Printing Engineering in College of Graphic Arts, Qufu Normal University, Qufu City, Shandong Province, China.

## Appendix A: Statistical Charts

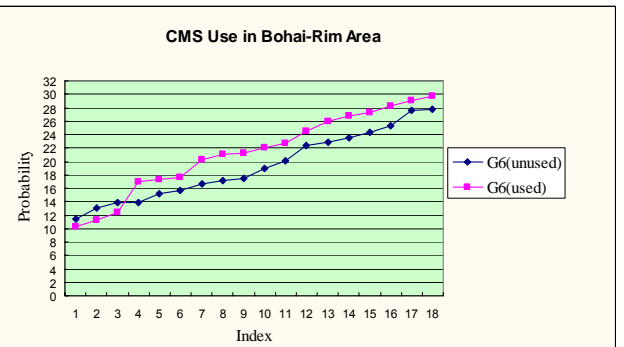
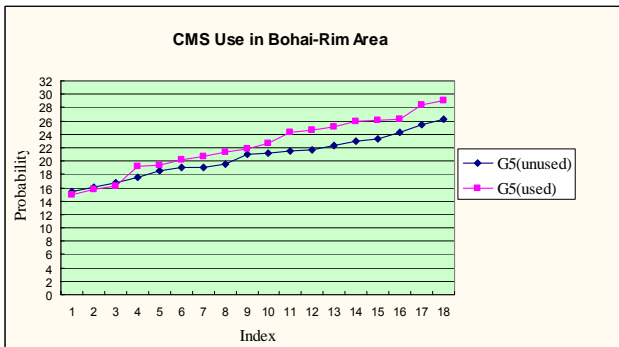
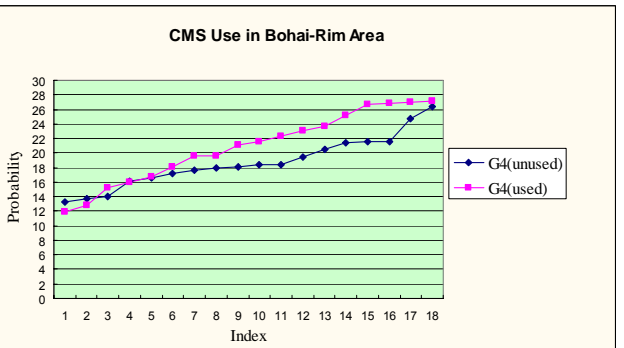
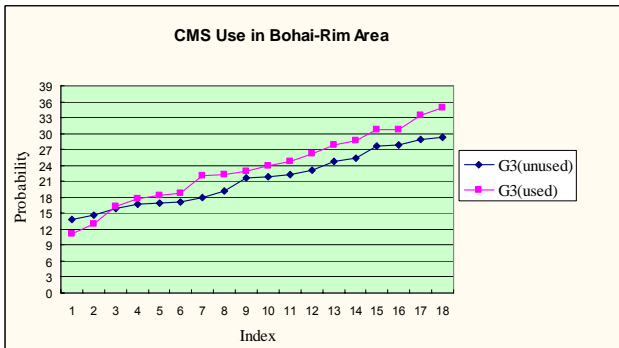
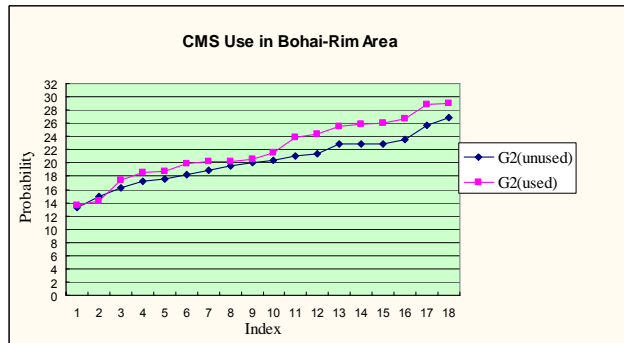
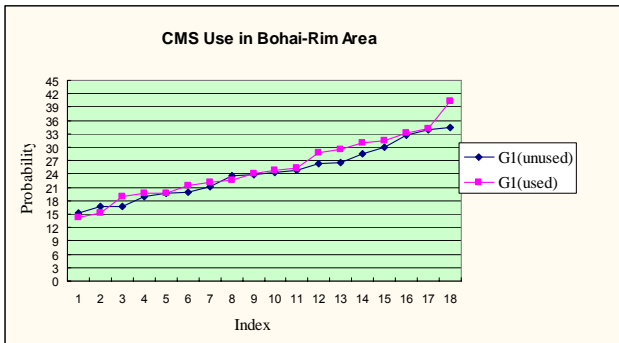
### Pearl River Delta Area



**Yangtze River Delta Area**



**Bohai-Rim Area**



## Appendix B: Survey Questionnaires

### Research of CMS Users

Publish enterprise content management system is the system including the informational collection, publishing ,management and content collection, page disposal, distribution and information-reuse of ERPDigital Assets management system(DAM). It is a key technology of building core-compete-power and software-power for the publish product chain. This research is organized by the Department of Printing and Package, Wu Han University, the purpose knows about the situation and requirement of the Enterprise Content Management (ECM) application of Chinese Publish Enterprise, for the base of the new technology application of Chinese Publish Enterprise. Anticipate acquiring your support, Thanks very much for your help!

#### 1. Basic information of research object

Company Name: \_\_\_\_\_ Address: \_\_\_\_\_

Writer: \_\_\_\_\_ Tel: \_\_\_\_\_

Department and Title: \_\_\_\_\_

#### Enterprise type

- |                 |                  |
|-----------------|------------------|
| A. State-owned  | D. Joint venture |
| B. Stork system | E. Private       |
| C. Exclusive    | F. Others        |

#### Number of workers

- |            |             |
|------------|-------------|
| A. < 50    | D. 500~1000 |
| B. 50~100  | E. >1000    |
| C. 100~500 |             |

#### Output per year (million Yuan)

- |              |               |
|--------------|---------------|
| A. <500      | D. 5000~10000 |
| B. 500~1000  | E. >10000     |
| C. 1000~5000 |               |

#### Main Business

- |                      |                      |
|----------------------|----------------------|
| A. Book and Magazine | D. Business printing |
| B. Newspaper         | E. Tag               |
| C. Package           | F. Others            |

#### Management System on hand (multi-choices)

- |                               |   |
|-------------------------------|---|
| A. ERP                        | F. Fund Management System               |
| B. DAM                        | G. Guest-relationship Management System |
| C. Document Management System | H. Adopt Management System              |
| D. Ware Management System     | I. Others_____                          |
| E. Product Management System  |   |

2. Application situation of CMS

System Name: \_\_\_\_\_ System Agent: \_\_\_\_\_

System Cost (RMB): \_\_\_\_\_ Begin time of System: \_\_\_\_\_

How did you know DAM?

- A. Media
- B. Exhibition
- C. Agent
- D. Introduction of friends
- E. Other \_\_\_\_\_

Main reasons of adopt CMS

- A. Document content management
- B. Cross-media publish
- C. Availability improve
- D. Others \_\_\_\_\_

How long have you used CMS?

- A. building
- B. 1 year
- C. 2~3 years
- D. 3~5 years
- E. more than 5 years

Whether CMS achieve the anticipated result

- A. Yes
- B. No
- C. not takes effect

After deploying the news adopts plait system, how long is the time used reduced as make a layout

- A. <20%
- B. 20% ~30%
- C. 30% ~40%
- D. 40% ~50%
- E. >50%

How do the workers evaluate ERP?

- A. Very good
- B. Good
- C. General
- D. Have it or not
- E. not good as last

The advantage of CMS

- A. Content search-speed improve
- B. Content search-accuracy improve
- C. Conveniently layout design
- D. Conveniently adopted news publish information
- E. Others \_\_\_\_\_

Which aspect of CMS needs to improve in your company?

- A. System speed
- B. System interface
- C. Stability
- D. Search-accuracy
- E. Compatibility with other software
- F. System cross-platform (PC and Mac)
- G. Output diversity
- H. Other \_\_\_\_\_

From the efficiency and effectiveness of abstracting information, is CMS satisfied

- A. Satisfied, high efficiency and the information abstracted valuable
- B. General, high efficiency but the information abstracted not accuracy
- C. General, the information abstracted valuable but low efficiency
- D. Dissatisfied, low efficiency and the information abstracted not accuracy

Will you go on investing on DAM?

- A. Yes
- B. No
- C. Not clear

If no, what is the main reason?

- A. Cost too high
- B. Improving efficiency not obvious
- C. System already sufficient, without necessary
- D. System not convenient, not improve efficiency
- E. Others\_\_\_\_\_

If yes, what way will you select?

- A. Update the system
- B. Buy new system
- C. Self-develop

What do you think about the future of CMS application?

- A. Very good the market has already been mature
- B. Good the market needs expanded
- C. General Input and output is imbalance

In the following 5~10 years, the development of CMS in China is

- A. Rapid develop
- B. Steadily develop
- C. Some descend

Will you introduce ERP to other enterprise?

- A. Yes
- B. No

What talent needs the Printing Enterprise?

- A. Software design
- B. Product management
- C. Actuality operation
- D. New craft develop
- E. Manpower Management
- F. Others\_\_\_\_\_

What ability should the talent have?

- A. Special ability
- B. Learning power
- C. Actuality operation power
- D. Communication power
- E. Others\_\_\_\_\_

What training could the workers need?

- A. Enterprise culture training
- B. Specialty ability training
- C. Enterprise management training
- D. Publish theory training
- E. New technology application training

If the workers are trained, which method can be adopted?

- A. Concentration training by especial training person in especial time
- B. Training in work by experienced workers
- C. Learning in especial training base (e.g. University)
- D. Others \_\_\_\_\_

3. Suggestion and Comment to us

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### Research of CMS Providers

1. Basic information of research object

Name: \_\_\_\_\_ Address: \_\_\_\_\_

Writer: \_\_\_\_\_ Tel: \_\_\_\_\_

Department and Duty: \_\_\_\_\_

Name of CMS: \_\_\_\_\_

Proportion of CMS in all of your operation: \_\_\_\_\_

How long have you exploited CMS?

- A. about 15 years
- B. about 10 years
- C. about 5 years

2. Exploited status of CMS

What does your CMS INCLUDE?

- A. ERP
- B. Document Management System
- C. Digital Assets Management System
- D. Website content management System
- E. Publishing management System
- F. Production Management System
- G. Finance Management System
- H. Client Relation Management System
- I. News collecting and compiling System

Which departments use your CMS?

- A. Government
- B. Education
- C. Enterprise
- D. Website
- E. Others \_\_\_\_\_

Which kind of enterprise use CMS in publishing and printing enterprise?

- A. Newspaper office
- B. Magazine office
- C. Publishing company
- D. Printing factory

Which area do you think is the most popularization of CMS?

- A. Bohai-Rim
- B. Yangtze River delta
- C. Pearl River delta

What does it cost to deploy CMS in publishing enterprise?

- A. Less than 50 thousand Yuan  
 B. Between 50 and 100thousand Yuan  
 C. Between 100 and 200thousand Yuan  
 D. Between 200 and 300thousand Yuan  
 E. About 500 thousand

What does it cost to deploy CMS (ERP) in printing enterprise?

- A. Less than 50 thousand Yuan  
 B. Between 50 and 100thousand Yuan  
 C. Between 100 and 200thousand Yuan  
 D. Between 200 and 300thousand Yuan  
 E. About 500 thousand

How long does it to construct CMS completely in publishing enterprise less than 2 months?

- A. Between 3 and 6 months  
 B. Between 7 and 12 months  
 C. Between 1 and 2 years  
 D. More than 2 years

How long does it to construct CMS completely in printing enterprise less than 2 months?

- A. Less than 2 months  
 B. Between 3 and 6 months  
 C. Between 7 and 12 months  
 D. Between 1 and 2 years  
 E. More than 2 years

Which phase need more time when deploy CMS in enterprise?

- A. Research and plan phase  
 B. Structure module actualize phase  
 C. Preparing phase(keep in the archives, integrate testing, preparation for production and so on)  
 D. Production phase(system optimize ,BPR and so on)  
 E. Whole project phase(training, project controlling and risk management)

Do you think how many of your clients are satisfy with your production?

- A. More 90%  
 B. 70-90%  
 C. 50-70%  
 D. 30-50%  
 E. Less than 30%

Which do you think is main profit of the enterprise that using CMS

Please arrange form the important to hypo-important\_\_\_\_\_

- A. Improve product efficiency  
 B. Decrease the cost of labor  
 C. Upgrade product quality  
 D. Strength management  
 E. Advance image of enterprise  
 F. Others

What do you think is the hinge of construct CMS

- A. Developing requirement  
 B. Staff training  
 C. Communication between developer and users  
 D. Fund devotion  
 E. Enforce degree  
 F. Others \_\_\_\_\_

What do you think does the application situation of CMS in printing and publishing enterprise?

- A. Technique and market are mature  
 B. Technique is mature but the market needs exploit.

- C. The technique need improve, but the market is great
- D. The technique need improve and the market needs exploit.

What do you think are the difficulties in the expedition of CMS in publishing and printing enterprise?

- A. Enterprise's idea is fall behind
- B. The requirement is not intensive
- C. The function of system cannot meet requirements
- D. Short on funds
- E. Talented person is shortage
- F. Others \_\_\_\_\_

Which aspects of your CMS products need improve?

- A. Operation speed
- B. System interface
- C. System stability
- D. Retrieval accurately
- E. Compatibility
- F. System's Cross-platform property(PC and Mac)
- G. Diversity output
- H. Others

Which kind of enterprise prefer to use CMS in publishing and printing industry

- A. News publishing industry
- B. Website
- C. Printing house
- D. Video and graphic data storage
- E. Advertisement designing
- F. Others

How to avoid the risk of deploying CMS in enterprise

- A. Supply moral support
- B. Send staffs to help them
- C. Train
- D. Give consultant
- E. Strengthen the communicate with clients

What is the dominance of your CMS system price?

- A. Function
- B. After-sale service
- C. technical
- D. Experience
- E. Brand
- F. Others



What is the definition in your opinion?

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What is the relationship between CMS and ERP?

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3. Suggestion and opinion to us

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