Investigation of Knowledge Management Maturity and Benchmarking Practices in Chinese Enterprises

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Abstract—Knowledge Management (KM) has become widely employed as a new but promising management tool for optimizing business management and operations in China. In order for enterprises to develop a mature KM process capable of demonstrable benefits, they must assess their adoption of KM with regard to certain benchmarking practices. This paper, using a systematic approach, attempts to design and build a novel KM maturity (KMM) evaluation mechanism that combines and adapts existing models developed in the context of western management practices with new features from China’s unique culture and social background. First, the key criteria are extracted via empirical analysis of the results of an extensive questionnaire, completed and returned by hundreds of Chinese enterprises in 2012. Next, based on a quantitative assessment of KMM, we further analyze the KM benchmarking practices in China. Finally, we demonstrate that KM practice in China is in a transitional stage from a content-oriented approach to a community-practice-oriented and employee-growth-oriented approach; we also observe that the Chinese enterprises with better management practices and more advanced information technology infrastructure are experimenting with integrated application-oriented KM approaches that can better foster technology and management innovations in enterprises.

I. INTRODUCTION

Research on knowledge management (KM) and its applications in enterprise management can be traced back to the early 1960s [7]. However, it is generally recognized that knowledge management as a well-established discipline commenced only after the mid-1980s [11]. Management guru Peter F. Drucker proposed that knowledge is a key aspect of modern enterprise development and a critical resource in the globalized economic environment [6]. Obviously, in a knowledge economy, knowledge has become an important asset in any organization [3]. However, various survey results indicate that, for most enterprises, only 20% of corporate experience and knowledge is recorded explicitly [18]. Internal and external observations of many organizations show that a large amount of knowledge related to corporate core competencies and competitiveness becomes largely tacit knowledge, i.e., the knowledge is basically hidden and undocumented, and sometimes even unrecognized. With the arrival of KM, it is believed that by optimizing the implementation of KM tools, enterprises can often capture a majority of the missing 80% of knowledge, systematically improving the competitiveness of these enterprises through improved use of KM as a critical weapon in a knowledge-based economy.

In China, it has just been over a decade or so since the introduction of knowledge management (KM) as a major tool for sustainable enterprise competitiveness; retrospectively, a dramatically increasing interest in the study of KM and its applications, both in academia and industry, has been observed. Currently, KM has become widely employed as a new but promising management tool for optimizing business management and operations in China. But to be more objective, the standards and methodology of knowledge management in China are still in their infancy. In order for Chinese enterprises to develop a mature and reliable KM process capable of providing demonstrable benefits, they must assess their adoption of KM with regard to certain benchmarking practices. Fortunately, we can employ the idea of knowledge management maturity (KMM), a key concept for evaluating KM, to help Chinese enterprises better apply KM in their businesses.

While most existing research has focused on theoretically developed descriptive models of KMM in China, there are only a very few studies based on realistic empirical data. To close this research gap in describing realistic KMM for Chinese enterprises and to promote more empirical studies of the success and failure of KM applications for them, we attempt to design and build a novel KMM evaluation mechanism that combines and adapts existing models developed in the context of western management practices with new features from China’s unique culture and social background. We hope that through this paper on KMM surveys and benchmarking studies, which uses a more systematic approach, we can shed light on the best practices for adopting KM within Chinese enterprises and provide a reference on experience and criteria for KM applications, mapping out a path that Chinese enterprises can follow.

II. CONSTRUCTING CHINESE KMM MODEL (KMMM)

A. Literature Review

In recent years, KM has gradually become a hot topic in academia for management research and also in the business community. Various scholars and professional institutions put forth their views and understanding of KM. For example, Ponelis and Fair-Wessels assert that KM is a new dimension of strategic information management [16]. Davenport and Prusak claim that Knowledge Management is the process of capturing, distributing, and effectively using knowledge [5]. Skyrme suggests that Knowledge Management is the explicit and systematic management of vital knowledge along with its
associated processes of creating, gathering, organizing, diffusing, using, and exploiting that knowledge [17]. Charnell Havens and Ellen Knapp advocate that knowledge is rooted in human experience and social context, and managing it well means paying attention to people, culture, organization structure, as well as to information technology [8].

Through different perspective studies, one can observe that there are some similarities in the personalized comprehension of knowledge management. These similarities can be mainly summarized from two aspects: the knowledge process and knowledge management factors. From a practical viewpoint, knowledge management frameworks from the American Productivity & Quality Center (APQC) and McKinsey & Company, which represent state-of-the-art thinking on KM, provide a more comprehensive description of the concepts of knowledge process and knowledge management factors.

APQC developed a Road Map to Knowledge Management Results [1]. It includes two rings: knowledge processes and support factors. The Road Map to Knowledge Management Results includes four essential support factors: leadership and strategy, corporate culture, information technology and infrastructure, and performance evaluation. Only an optimized combination of these factors may contribute to the achievement of better knowledge management. Meanwhile, the knowledge process is composed of collection, organization, transformation, use, creation, identification, sharing process, etc., for various types of knowledge. The inner ring represents the value-added process of knowledge circulating within the organization, while the outer ring is the support factors that ensure knowledge sharing within the organization. The two rings complement each other.

As a consulting leader and knowledge management pioneer, McKinsey & Company establishes a complete framework for Knowledge Management [10]. Its Knowledge Management framework consists of three levels: knowledge asset level - including individual and organizational knowledge assets; knowledge cycle level - including the initial accumulation and consolidation, integration, sharing, learning, use, innovation, feedback, etc. of knowledge; and critical success factors - including leadership and goals, organizational structure, organizational culture, and systems and infrastructure of information technologies.

B. Chinese KMM Model Construction

Although there are a number of KMM studies, the research on how to design a KMM model that is suitable for Chinese enterprises is still largely missing. Therefore, this article focuses on analyzing the two dimensions of the knowledge process and knowledge management support elements for Chinese enterprises. Through its unique methodologies, this paper develops a roadmap model for knowledge management maturity that integrates a model of knowledge processes called "Wheel of Knowledge" [2] to better deal with complex KMM contexts.

In order to make a KMM model suitable for representing and analyzing China’s scenarios, this study interviewed 10 well-known knowledge management experts and scholars using the Degree Centrality method of network analysis to define and analyze the specific content contained on two key dimensions of the knowledge process and the knowledge management support elements. The Degree Centrality refers to the number of direct links to the nodes in the network. The number of links indicates the influence and importance of the node [13] [14].

In the dimension of the knowledge process, this study sorts and codes the key links based on the Degree Centrality method, then it establishes a relationship network matrix, processes the data using social network analysis software Ucinet 6, and finally uses the NetDraw function to draw a network diagram (see Figure 1). In Figure 1, circles represent the key links in the knowledge process and blocks represent the choices of the 10 experts. It can be seen that there are five major network nodes (shown as the circles) in the entire network center: they are knowledge precipitation, knowledge sharing, knowledge learning, knowledge application, and knowledge innovation.

Correspondingly, this reveals that Culture, Management, and Technology constitute the three key elements of knowledge management support in China. In this paper, Culture refers to the trust and sharing knowledge culture in China; Management refers to management tools of standardized behaviors, knowledge assessment, motivation systems and others; Technology refers to the means of IT support.

Based on these two dimensions, this paper analyzes the level of Knowledge Management in Chinese enterprises. Enterprise Knowledge Management Maturity can be set in five levels. From low to high, there are Level One (Initial Level), Level Two (Awareness Level), Level Three (Basic Level), Level Four (Optimal Level), and Level Five (Innovative Level). On the basis of long-term research and practice of enterprise knowledge management, this paper summarizes some of the salient features of each level in TABLE 1.
C. KMM Questionnaire Design

Based on the five aspects consisting of precipitation, sharing, learning, application, and innovation, and the three support elements of technology, management, and culture, this study designed the questionnaire and analyzed the level of knowledge management to measure an enterprise's knowledge management. To distinguish between "good businesses" and "general businesses," this research collected a large amount of reliable data from many enterprises by repeated screenings and constant revisions. It finalized 15 major questions to design the questionnaire. These 15 questions constitute the basis of the Knowledge Management Maturity questionnaire, and use a Linkert 5-point scale [12] and forward scoring method design.

TABLE 2 QUESTIONNAIRE DESIGN

<table>
<thead>
<tr>
<th>Knowledge Process</th>
<th>Support Elements</th>
<th>Five aspects</th>
<th>Culture</th>
<th>Management</th>
<th>Technology</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge Precipitation</td>
<td>Q1</td>
<td>Q6</td>
<td>Q11</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Sharing</td>
<td>Q2</td>
<td>Q7</td>
<td>Q12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Learning</td>
<td>Q3</td>
<td>Q8</td>
<td>Q13</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Application</td>
<td>Q4</td>
<td>Q9</td>
<td>Q14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Knowledge Innovation</td>
<td>Q5</td>
<td>Q10</td>
<td>Q15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Q1: Staffs develop the habit of timely summarizing and reporting the experiences and lessons learned.
Q2: Staffs are willing to share experiences and knowledge with other colleagues.
Q3: Staffs learn and act with high spirits.

TABLE 1 RELEVANT FEATURES OF KMM LEVEL

<table>
<thead>
<tr>
<th>KMM Level</th>
<th>Relevant Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial Level</td>
<td>15-30 points • Relatively closed, conservative, resistant to new things, lack of awareness of management knowledge</td>
</tr>
<tr>
<td></td>
<td>• Lack of knowledge precipitation and sharing mechanisms and disordered knowledge production and use</td>
</tr>
<tr>
<td></td>
<td>• Lack the necessary technical tools</td>
</tr>
<tr>
<td>Awareness Level</td>
<td>31-45 points • Aware of the need for knowledge sharing, executives actively promote Knowledge Management</td>
</tr>
<tr>
<td></td>
<td>• Consciously precipitate knowledge and prepare the appropriate documentation respective of the various categories of business</td>
</tr>
<tr>
<td></td>
<td>• Establish document management and office automation systems</td>
</tr>
<tr>
<td>Basic Level</td>
<td>46-60 points • Mutual trust between members of the organization, good communication and knowledge can be shared</td>
</tr>
<tr>
<td></td>
<td>• Precipitation of knowledge can be applied to all business practices</td>
</tr>
<tr>
<td></td>
<td>• Have a basic Knowledge Management system, which is not effectively integrated in the enterprise business</td>
</tr>
<tr>
<td>Optimal Level</td>
<td>61-70 points • Members of the organization work closely to seek progress and innovation, contributions to knowledge become a habit</td>
</tr>
<tr>
<td></td>
<td>• Formed a continuously self-learning organization, best practice guides business efficient execution</td>
</tr>
<tr>
<td></td>
<td>• Building knowledge portals, and effective integration throughout the business</td>
</tr>
<tr>
<td>Innovative Level</td>
<td>71-75 points • The enterprise has become an efficient learning organization, each member works efficiently and lives happily</td>
</tr>
<tr>
<td></td>
<td>• Continuous innovation, application of knowledge constantly optimizes business operations</td>
</tr>
<tr>
<td></td>
<td>• Advanced IT System with knowledge mining and intelligent decision support</td>
</tr>
</tbody>
</table>
Q4: Staffs take full advantage of past experience and knowledge in work
Q5: Staffs often actively put forward innovative solutions to solve the problems encountered in work
Q6: Have appropriate management mechanisms and organizational models to ensure effective accumulation of knowledge
Q7: Have the appropriate management mechanisms to ensure that staff to use a variety of formal and informal methods to share their experiences and knowledge
Q8: Often organize staff to participate in internal training, book clubs, and other activities, and establish a mentoring mechanism
Q9: Have the appropriate processes and systems to ensure that the accumulation of knowledge is fully utilized
Q10: Have the appropriate processes and systems to ensure knowledge innovation
Q11: Have (or be able to use) IT systems to effectively accumulate knowledge
Q12: Have (or be able to use) IT systems to effectively share knowledge
Q13: Have (or be able to use) IT systems to effectively support staff learning
Q14: Have (or be able to use) IT systems to retrieve, access knowledge, and work together
Q15: Have (or be able to use) IT systems to effectively support innovation

D. Data collection and validation

This survey started in the first half of 2012 and lasted for half a year and involved more than a hundred domestic enterprises. The questionnaires were mainly distributed in provinces of higher informatization and developed economies in China, such as Beijing, Guangdong, Shanghai, Jiangsu, Zhejiang, and Shandong. A total of 385 questionnaires were distributed and 318 valid questionnaires were collected; valid questionnaires accounted for 82.5% of the distributed questionnaires. We believe that the survey can meet the needs of the study and the final research presents the current situation and development trends of knowledge management in Chinese enterprises. This questionnaire has three parts: basic information, KMM evaluation, and knowledge management trend survey. The industry distribution of this research is shown in Figure 3. IT, Manufacturing, Construction & Real Estate, and Finance are the top four industries. The positions of staff completed the survey are depicted in Figure 4.

To assess the reliability of the KMM evaluation part of the questionnaire, this study uses Cronbach's alpha approach (see Table 3). Since the Cronbach α coefficients of three single facets and total scales are greater than 0.8, the KMM evaluation part has attained a high level of reliability. In addition, the questionnaire had been pre-tested and amended several times before the final release. Therefore we believe the validity of the questionnaire is relatively high.
### III. STATUS AND CHALLENGES OF KMM IN CHINA

**A. The Overall Status of KMM in China**

1. The overall survey score of Knowledge Management Maturity is 50.4 points, which falls in the initial phase of Level Three.

   The overall survey score of organizational Knowledge Management Maturity is 50.4 points, which is in the middle stage of Level Three (Basic Level). Due to a certain degree of bias for the application of KM in the investigated organizations, we believe that the general Knowledge Management Maturity in China is not as optimistic as the survey indicates. The KMM may actually be in the initial stages of Level Three.

2. Within the five aspects of knowledge process (precipitation, sharing, learning, application, and innovation), knowledge precipitation gets the highest score, and the lowest score is for knowledge innovation.

   Among these five aspects of knowledge process, knowledge precipitation gets the highest score, an average of 3.49 points. This indicates that Chinese companies have generally recognized the importance of knowledge precipitation and more are concerned about how to precipitate the organization’s core knowledge to reduce the risk to business. In contrast, in innovation, organizations get the lowest score, an average of 3.14 points. Therefore, Chinese enterprises need to strengthen the focus and practices in this area. Regarding the order of the five links’ scores, we find that the level for precipitation is higher than for application, application is higher than sharing, sharing is higher than learning, and learning is higher than innovation.

3. In the three support factors of knowledge management (culture, management, and technology), technology is at the lowest level, which in turn affects the facilitation of the culture of the management and the implementation of the management mechanism.

   In the three support factors of knowledge management (culture, management and technology), organizations get the highest score in the culture dimension, an average of 3.42 points, which illustrates Chinese organizations generally recognize the dynamic role of the advocacy of "culture" for the construction of knowledge management. In comparison, in management, organizations get the second highest score, an average of 3.38 points, indicating that organizations fully intend to support implementation of knowledge management systems. Organizations get the lowest score in the technical dimension, an average of 3.27 points. There is knowledge management and the low level of technology, in turn, will affect the facilitation culture of knowledge management and implementation of the management mechanism.

**B. The Important Findings of the KM Survey**

1. K_S_Asset and KM_Input are the main factors for improving KM, although there is no correlation between KM_SP and KMM.

   The knowledge management trend survey portion of the questionnaire contained 12 questions. On the basis of a descriptive analysis of all the questions, this study conducts an exploratory analysis of some of the questions, and obtains...
the following findings. The questions included in the exploratory analysis are listed as follows:

1. What changes in your enterprise regarding knowledge management concerns and input have been made during the past 2-3 years? The response can be "the concerns and input have increased," "the concerns and input have not changed," "the concerns and input are decreasing," or "do not know."

2. Does your enterprise regard knowledge as a strategic asset? The response can be "Yes," "No," "Unclear," or "Other."

3. Has your enterprise developed knowledge management strategic planning? The response can be "Yes," "No," or "Unclear."

To simplify the description, here KMM represents enterprise Knowledge Management Maturity; KM_Input represents enterprise knowledge management input; K_S_Asset represents an enterprise regarding knowledge as a strategic asset; KM_SP represents an enterprise developing KM strategy planning. In this study, it uses these three questions’ response results to analyze the correlation of KMM and KM_Input, KMM and K_S_Asset, and KMM and KM_SP. This study applies the two-tailed significant test by Pearson simple correlation coefficient through SPSS18.0. The verification results are shown in Table 4.

To further validate the causal relationship of KMM and KM_Input, and KMM and K_S_Asset, respectively, this study performs a regression analysis on them. The regression results are shown in Table 5. As it can be observed, K_S_Asset and KM_Input are the significant effects of predictor variables in KMM. In contrast, K_S_Asset has greater impact on the effect of KMM (Beta = 0.332, p < 0.001), followed by KM_Input (Beta = 0.170, p = 0.024), and the constant term also enters the regression equation. R² value is not high, due to the fact that the KMM is influenced by many factors not included in this regression analysis. In addition, we find F=15.189 and p <0.001, indicating that the associated explanatory variables have strong interpretation powers, and the significance levels are acceptable.

It can be concluded that there are causal relationships between K_S_Asset and KMM, and also with KM_Input and KMM. If an enterprise considers knowledge a strategic asset, its KMM can be improved by an impressive score of 8.486. If an enterprise knowledge management input has been increased, its KMM can be improved by a score of 4.259. The result also shows that there is no correlation between KMM and KM_SP. The reason may be due to knowledge management already being embedded into the business processes of the enterprises and so it is already reflected in the overall strategic planning of the enterprises.

(2) In the question: "If your enterprise has or deems it necessary to formulate a knowledge management strategy, which department is responsible for the formulation process?” From the response analysis, it finds that: enterprises which establish KM departments to promote knowledge management gained the highest average score of KMM; enterprises which develop knowledge management strategies via the general manager or CEO gain the second-highest average score; the cross-sector decision-making committee gains a higher score than the information technology department.

### Table 4: Correlation Coefficient of Variable

<table>
<thead>
<tr>
<th>Variables</th>
<th>KM_Input</th>
<th>K_S_Asset</th>
<th>KM_SP</th>
</tr>
</thead>
<tbody>
<tr>
<td>KMM</td>
<td>Pearson Correlation: .237*</td>
<td>.367**</td>
<td>-.027</td>
</tr>
<tr>
<td></td>
<td>Sig. (2-tailed): .003</td>
<td>.000</td>
<td>.738</td>
</tr>
</tbody>
</table>

*Correlation is significant at the 0.01 level (2-tailed).

### Table 5: Regressive Analysis Results

<table>
<thead>
<tr>
<th>Variables</th>
<th>Unstandardized Coefficients</th>
<th>Standardized Coefficients</th>
<th>t</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>B</td>
<td>Std. Error</td>
<td>Beta</td>
<td></td>
</tr>
<tr>
<td>Constant</td>
<td>41.982</td>
<td>1.785</td>
<td></td>
<td>23.522</td>
</tr>
<tr>
<td>KM_Input</td>
<td>4.259</td>
<td>1.875</td>
<td>.170</td>
<td>2.272</td>
</tr>
<tr>
<td>K_S_Asset</td>
<td>8.486</td>
<td>1.906</td>
<td>.332</td>
<td>4.452</td>
</tr>
</tbody>
</table>

R² = .162, Adj. R² = .151, F = 15.189, Sig. = 0.000
TABLE 6 DIFFERENT RESPONSIBLE DEPARTMENTS GAIN DIFFERENT AVERAGE SCORES

<table>
<thead>
<tr>
<th>Responsible Department</th>
<th>Average Score of KMM</th>
</tr>
</thead>
<tbody>
<tr>
<td>KM Department</td>
<td>53.60</td>
</tr>
<tr>
<td>General Manager or CEO</td>
<td>48.71</td>
</tr>
<tr>
<td>Cross-sector Decision-making Committee</td>
<td>47.16</td>
</tr>
<tr>
<td>Information Technology Department</td>
<td>46.86</td>
</tr>
<tr>
<td>Other</td>
<td>45.33</td>
</tr>
</tbody>
</table>

C. The Major Challenges of KM in China

Currently, domestic industry in China does not have a unified standard definition of Knowledge Management. Different organizations vary on basic comprehension of knowledge management and positioning. This reality causes some obstacles in the promotion of knowledge management throughout China. This investigation finds that: 78.75% of the respondents believe that Knowledge Management is closely related to "knowledge-based corporate culture;" 75.63% of the respondents think that Knowledge Management is to "share excellent practice experience;" 73.75% of the respondents deem that Knowledge Management and "learning organization" are closely associated; in addition, 64.38% of the respondents believe that Knowledge Management and "innovation management" are very related. This indicates that more enterprises understand Knowledge Management from the perspective of management and culture, expecting that knowledge management can shape the culture of knowledge-based enterprises, strengthen enterprises' sharing capabilities, develop learning organizations, and enhance their ability to innovate. A few years ago most people in China still considered Knowledge Management to be document management and IT systems, but results of this study reveal that the common understanding of KM has changed greatly just after a few years. However, there are still 51.25% of respondents who consider KM an IT tool, indicating that half of Chinese enterprises still lack a fundamental understanding of the critical role of KM.

In addition to the non-uniform comprehension of Knowledge Management found in this survey, this research also finds that in the implementation of knowledge management, there are four major challenges that deserve special attention: (1) Lack of understanding and promotion by senior leadership; (2) Lack of incentives to encourage knowledge sharing; (3) knowledge management is not prioritized; (4) Due to time constraints, project participation by staff is insufficient. However, there are still 51.25% of respondents who consider KM an IT tool, indicating that half of Chinese enterprises still lack a fundamental understanding of the critical role of KM.

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priority, employees will not allocate time for knowledge management when they are busy with other work assignments. Therefore, how to integrate knowledge management into business processes rather than viewing it as a separate and additional task is the challenge for enterprises that want to design KM-enabled efficient and optimized business processes.

IV. BENCHMARKING RESEARCH OF KM IN CHINA

In the 1996 report of "The knowledge-based economy," OECD clearly stated that distinctions can be made between different kinds of knowledge which are important in the knowledge-based economy: know-what, know-why, know-how, and know-who [15]. Based on this classification, this research categorized the realistic knowledge management practices of Chinese enterprises, or the Chinese enterprise "knowledge capital," into the following categories:

- **Information Capital (know-what):** Electronic management practices including structured information such as business data and unstructured information such as documents, records, messages, and others.
- **Human Capital (know-who):** People-oriented practices including staff skills, expert resources, relationships, etc..
- **Process Capital (know-how):** Process-centric practices, including processes, systems, and methods on strategy, business, and functions.
- **Strategy Capital (know-why):** The core competitiveness of enterprise practices including proprietary technology, methodology, and business model, as well as issue-specific innovation mechanisms.

The companies surveyed believe that the essence of Knowledge Management is "knowledge capital." That means improved information capital, human capital, process capital, and strategic capital in the organizations, making this capital precipitate, share, learn, apply, and innovate in the organizations and create value for the enterprises. Based on the concept of knowledge capital and by combining the best practices of knowledge management in China, this paper summarizes the typical scenarios of knowledge management practice in Chinese enterprises as six different types of KM practice. They are knowledge content-oriented, community practice-oriented, employee growth-oriented, business process-oriented, integrated application-oriented, and innovation driven-oriented.
And it defines the main features of the six typical practice modes of KM for Chinese enterprises as follows:

- **Knowledge Content-oriented**: Content-oriented KM that mainly employs scientific classification systems to build knowledge warehouses, to realize information capital effective precipitation and management. It may also achieve the goals of avoiding intellectual capital loss and the accumulation of the core competencies.

- **Community Practice-oriented**: Community practice-oriented KM that emphasizes sharing knowledge between people. It is based on the idea of virtual organizations and social networks, building platforms for knowledge exchange and interaction within the enterprise, mining and precipitating the tacit knowledge of the core staff, and shaping the open and innovative knowledge-sharing culture.

- **Employee Growth-oriented**: Employee growth-oriented KM is concerned with effective integration of the knowledge management mechanism and human capital management system. It is designed to help employees continue enhancing their abilities to work. Combined with key positions to establish a complete system of scientific training to accelerate the upgrading of staff capacity, this is an important application of knowledge management in the field of human resource development.

- **Business Process-oriented**: Process-oriented KM is the application of knowledge in business processes. By identifying the company's core processes and effectively streamlining these core processes related to input, output, and knowledge support, it can realize the perfect combination of processes and knowledge to improve the efficiency of the implementation of the process and the quality of results.

- **Integrated Application-oriented**: Integrated application-oriented KM is an approach that integrates multiple information systems to build a unified knowledge portal with unified search functionality across systems. It may also establish associated channels for ready-to-use on-demand knowledge resources so that it puts the right person at the right place at the right time to get the right knowledge.

- **Innovation Driven-oriented**: Innovation driven-oriented knowledge management aims to help enterprises to explicate their own needs for achieving core competencies when necessary. It can identify, build, maintain, and create the core intellectual assets, and form a continuously optimized operational management mechanism for the enterprise.

Based on the above six models, and with an analysis of the Most Admired Knowledge Enterprises (MAKE) award-winning enterprises of China in 2011 and 2012, this study sums up the main activities of the Chinese KM benchmarking enterprises in TABLE 7. Based on this summary, this paper draws the following conclusions on Chinese knowledge management characteristics:

1. For the MAKE award-winning enterprises, most of the domestic enterprises have completed knowledge content-oriented practice. Half of the enterprises are in the KM process of promoting communities of practice, employee growth, and business process-orientation. Some industry leaders with better management and information technology infrastructure are trying to practice integrated application-oriented and innovation driven-oriented KM.

2. As for the current situation of Chinese enterprises’ knowledge management practices, most of the Chinese enterprises’ knowledge management are still in the KM1.0 stage, mainly embodied in practice keywords including document management, content management, knowledge classification, knowledge warehouse, and knowledge map. Some enterprises’ knowledge management practices have entered KM2.0 stage. Its core idea for KM2.0 is that to fulfill the KM2.0 scenarios, the KM system will need the help of Web2.0, Communities of Practice, SNS, Mobile Network, knowledge push systems and other means to strengthen the level of knowledge application. Forward-looking enterprises have been trying to practice KM3.0. The core requirements of the practice is that in the fields of knowledge intelligence and on-demand data, knowledge mining, Semantic Web, knowledge cloud and open innovation, they need to be ready for more real-life applications[4].

3. In conclusion, the next 3-5 years will be a rapid growth period of knowledge management in China. The field of knowledge management in China is in a transitional period from the start-up stage to the rapid growth stage. Knowledge management will become the choice of increasing numbers of enterprises to enhance their management practices and to guide their IT infrastructure optimization. During this process, more practical approaches of knowledge management will certainly emerge, making enterprise knowledge management more pragmatic and efficient.
TABLE 7 CHINESE KM ACTIVITIES: MAKE AWARD-WINNING ENTERPRISES IN 2011 AND 2012

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Content-oriented</th>
<th>Communities practice-oriented</th>
<th>Employee growth-oriented</th>
<th>Business process-oriented</th>
<th>Integrated application-oriented</th>
<th>Innovation driven-oriented</th>
</tr>
</thead>
<tbody>
<tr>
<td>China Merchants Securities</td>
<td>Knowledge center, Knowledge maps, Classic case</td>
<td>Experts network, Lecture room</td>
<td>Knowledge push system</td>
<td>CSR integrated with the knowledge warehouse</td>
<td></td>
<td></td>
</tr>
<tr>
<td>China Asset</td>
<td>Si Ku QuanShu (customer service library, service script library, training &amp; learning library, office document library)</td>
<td></td>
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<tr>
<td>Kingdee</td>
<td>Industry solutions think tank, Enterprise management think tank</td>
<td>Kingdee Communities, Staff Microblog</td>
<td></td>
<td></td>
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<tr>
<td>Ctrip</td>
<td>Knowledge warehouse, Knowledge map</td>
<td>Expert pool, Knowledge associations</td>
<td>Knowledge service center</td>
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<tr>
<td>China Merchants Property</td>
<td>Management assets library, Product assets library, Project assets library</td>
<td>Post knowledge map</td>
<td>Working knowledge map</td>
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<tr>
<td>Baosteel Group</td>
<td>Technology sharing platform</td>
<td>Expert pool, Knowledge associations</td>
<td>Baosteel technology transfer system</td>
<td>Innovative studio, Baosteel professors</td>
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<td>China Merchants Bank</td>
<td>Digital library</td>
<td>Staff knowledge map, Case management, University of CMB</td>
<td>95555 System, RoadShow platform integration</td>
<td></td>
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</tr>
<tr>
<td>Siemens China</td>
<td>Knowledge center</td>
<td>Knowledge associations, Expert pool, Wikipedia</td>
<td>Online training system</td>
<td>Portal integration, Knowledge mining</td>
<td>&quot;3i&quot; Innovation Management, Semantic Web</td>
<td></td>
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<tr>
<td>NetDragon</td>
<td>Study system</td>
<td>Work circles</td>
<td>Mobile learning platform, NetDragon University</td>
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<tr>
<td>Tsingtao Brewery</td>
<td>Knowledge warehouse</td>
<td>Online virtual university</td>
<td>Marketing activities of KM</td>
<td></td>
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</tr>
</tbody>
</table>

V. CONCLUSION

With the continuous application of the maturity model in the field of knowledge management, how to build a Knowledge Management Maturity Model for Chinese enterprises has caused widespread concern in academia and industry. This article first analyzes and summarizes the theory and practice of knowledge management at home and abroad. Then, through a comprehensive application of two methods using expert interviews and social network analysis, it constructs a Knowledge Management Maturity Model from the two dimensions of knowledge process and knowledge management support elements, which reveals the basic structure and operational mechanism of Chinese knowledge management.

Based on the questionnaire survey of 318 enterprises, it finds that overall, the Chinese enterprise KMM is at the initial phase of Basic Level. Through linear regression analysis, it is determined that "continued investment in knowledge management" and "regarding knowledge as a corporate strategic asset" will significantly enhance enterprises’ KMM, and enterprises which establish specialized departments to promote knowledge management have gained the highest average score for KMM. From the questionnaire survey, it also finds that Chinese enterprises’ knowledge management in general is facing these challenges: "want or not want," "willing or not willing," and "able or not able."

On the basis of quantitative analysis of the questionnaires, this paper analyzes the MAKE award-winning enterprises’ knowledge management practices in China in 2011 and 2012, and constructs six modes for knowledge management in Chinese enterprises. Through analyzing the award-winning enterprises’ knowledge management practices, this paper has established Chinese enterprises’ progressive development path from KM1.0, KM2.0, to KM3.0. It finds most of the Chinese enterprises’ knowledge management practices are
still in the KM1.0 stage, some have entered the KM2.0 stage, and forward-looking enterprises have been trying to practice the KM3.0. It provides benchmarking practices and maps a path for other Chinese enterprises to promote knowledge management.

REFERENCES


