Research Of E-Commerce Enterprises Capability Maturity Theory And Initial Model Construction

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RESEARCH OF E-COMMERCE ENTERPRISES CAPABILITY MATURITY THEORY AND INITIAL MODEL CONSTRUCTION

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ABSTRACT

With the constant development and evolution of "Internet+" strategic thinking, the electronic commerce enterprises have obtained the unprecedented growth, but also faced with great survival pressure and challenges. This research is based on the review and combing the historical development of capability maturity and in the light of the characteristics of e-commerce enterprises building a capability maturity model which contains five levels: the initial level, the repeatable level, the standard level, the managed level and the optimal level and five dimensions: strategy, organization, process, personnel and technical support. The capability maturity initial model of e-commerce enterprises establishes basic demand are obtained earnings, controlling risk and optimizing resources and with different stages of target the capabilities the electronic commerce enterprises should owned, at last this model generalizes a clear direction and standard for the e-commerce enterprises management.

Keywords: Internet+, e-commerce, capability maturity model, initial model.

INTRODUCTION

The goal of putting forward "Internet +"Strategy thought is based on the industry and the enterprises, with the help of the internet concept and technology, better integrating resources, reducing waste and improving efficiency. This thought applies to immediately need to be set up an internet platform or relying on the public platform of traditional enterprises, be more suitable for e-commerce enterprises. After years of exploration and practice, e-commerce enterprises have transitted from fuzzy defination, simple internal framework, basic business, strategic positioning of chaos, chaotic management, low personnel quality, lack of innovation and so on to the clear defination, reasonable internal architecture, business diversification, long-term strategic positioning, orderly management, personnel professional and owning sustainable innovation capability. However, behind a series of brilliant data, we can still find following pressure and crisis. Large number of e-commerce enterprises live in China, however, only a small own international competitive advantage , most of the electronic commerce enterprises although are supported by e-commerce systems to make online purchasing and online trading, they face of embarrassment of backward technology level, trading co., LTD., low market share and income and high cost, so this part of e-commerce enterprises need to think about how to develop to improve the competition capability and to continue to keep competition capability and many other problems. This study will focus on China's e-commerce enterprises survival present situation and adopt literature analysis and exploratory case study method, study from the perspective of enterprises core competence and build up the electronic commerce enterprises initial capability maturity model, in order to guide the development direction and planning of e-commerce enterprises.

ELECTRONIC COMMERCE ENTERPRISES CAPABILITY CONNOTATION

E-Commerce Enterprise

At present, there is no consensus of definition of the e-commerce enterprise concept. This study argues that e-commerce enterprise refers to an enterprise which completes key or the whole business process of enterprise through the electronic commerce activity [43]. Internet e-commerce activities here include trading and business activities through the internet, electronic trading and services through the value added network and transactions and services by connecting computer networks of enterprises or organizations [21], whose goal is to provide trade information and trade platform for public service and improve the efficiency of trading between the main of exchange. Electronic commerce enterprise is an important part in the global supply chain network, which deals product (service) to the traditional business with information process and reforms traditional process with the help of information technology and gets rid of time and space constraints for the traditional enterprises trading and service.

Core Competence of E-Commerce Enterprises

Enterprise competence refers to the capabilities to adapt to, coordinate and manage the enterprise internal and external environment and successfully be engaged in business activities. Enterprise competence includes many aspects, such as technical capability, innovation capability, management capability, marketing capability, etc. Some capabilities own high value because of making the enterprises keep sustained competitiveness and play an important role to enterprise's survival and development, and many kinds of capabilities play a role of comprehensive to form enterprises' unique characteristic called enterprises core competence. The core competence of enterprises is also called the core competitiveness, first put forward by C.K. Prahalad and Gary Hamel in 1990. Compared with traditional enterprises, e-commerce enterprises with the advantages of faster growth, stronger innovation capability and bigger resources and market share, so drawing lessons from the traditional enterprise's core competence to summarize e-commerce enterprise's core competence is limited [53]. Combined with the

definition of e-commerce enterprises in this study as well as many scholars research results of enterprise core competence, this study will conclude eight capabilities to be elements of e-commerce enterprise core competence such as knowledge capability, enterprise culture form (soft resources both to the enterprise core competence) [55], innovation capability, marketing capability, management capability, safety capability, service capability and dynamic capability [50], [23], [37], [54].

Knowledge. Knowledge is one of most important strategy resources for e-commerce enterprises. Knowledge management includes acquisition, absorption, transformation, integration and application, the transformation and integration of knowledge are the core of knowledge management, and also the key factors to e-commerce enterprises' innovation capability [52]. Qiao, Zhang and Man (2010) [42] consider by means of improving innovation capacity of enterprises and the efficiency of knowledge innovation and enhance the conversion rate of innovation in the enterprise knowledge management process will help to diversify product innovation and multi-functional innovation. Knowledge is an important support for enterprises be full of vigor, which can effectively enhance their core competences, the role of knowledge innovation on promoting core competence is immeasurable [15]. At the atmosphere of "Internet +", knowledge is the e-commerce enterprises' key factor to achieve technology innovation, updating system, improving management, breaking through marketing and service innovation. It is also a revolutionary and ultimate power for organization revolution and management idea innovation of e-commerce enterprises.

Enterprise culture. Enterprise culture is an important spiritual support of core competence of enterprises, which determines the direction and pattern of enterprise development and also determines the choice and the degree of acceptance of different types and forms of knowledge. Enterprise culture owns static suffusion which is important for the development of the enterprise cohesion function, oriental function, incentive function and optimization function. The results of the survey by IBM consulting company for the global 500 enterprises showed that the fundamental reason for the success of the global 500 enterprises is their excellent enterprise culture, which is rooted in technology, products and management. Therefore, we can consider enterprise culture is core competence that cannot copy.

Innovation capability. Innovation is the enterprise impetus of progress and the core of economic competition. Continuous innovation is the most important source of sustainable competitive advantage. E-commerce enterprises must have the capability to continuous innovation, who want to stand out in the fierce market competition. And this continuous innovation needs internal joint efforts of enterprises from top to bottom. Zhong, Wu and Mei (2011) [58]who used the maximum likelihood estimation method considered that: (1) The top and mid-level managers should work hard and use the new management ideas and methods to keep thriving vigor and vitality of e-commerce enterprises, according to the development strategy of the e-commerce enterprises, who should combine the product properties with their own advantages and aim at the demand of the market to make clear market location, develop differentiated products and try best to satisfy customer purchase experience and after-sale service to promote customer satisfaction; (2)The enterprises should integrate resources in existing and complete supporting facility to maximize efficiency of core competitiveness specifically by means of using all kinds of internal and external resources to reduce cost, promote quality, increase efficiency, improve service, use competitiveness pricing and the other methods to achieve; (3)The enterprises should pay attention to protect the ecological environment of electronic commerce and urge other interdependency enterprises to make the corresponding development, so as to gain more customers and revenue.

Management capability. Management is the key to ensure the enterprises with orderly development, involving in personnel management, organization and coordination and many others aspects. Personnel management is an important part of the e-commerce enterprises management which promotes the core competitiveness of enterprises through the evaluation of employee qualification, the influence of employee behavior, improvement of employee knowledge and skill improvement. Organization and coordination covers the comprehensive capability of enterprise organization structure, organization motivation, cultural construction, coordinating mechanism and other aspects through the management process of institutionalization and rationalization to promote the transformation and upgrading of the core competence. Most of the e-commerce enterprises pay more attention to "electronic" which means improve and upgrade the IT technology, while ignoring the commerce achieved business transaction by means of management and thus lead to although enterprises have a competitive advantage technology, cannot support the enterprises to keep sustainable competitive capability.

Marketing capability. E-commerce enterprises provide consumers with products and services to meet their individual needs by improving the marketing strategy of the enterprises, the innovation of marketing technology and the construction of more advanced marketing network and expand market coverage and market share, form the barriers to prevent newcomers from entering the market in order to get higher profit for the enterprises to lay a solid foundation in quite a long time.

Security capability. E-commerce enterprises need to assess risk of the internal and external environment and make risk control measures. Currently most research on e-commerce security concentrates on credit risk or transaction risk, which focuses on network security risks such as data integrity and confidentiality, access control technology, security protocols, system security risk, legal security and so on，which is from the perspective of enterprises core competence and aims directly at e-commerce enterprise security capability is rare.

Service capability. As the electronic commerce enterprises' competition become more intense and enterprises network technology level and product differentiation degree becomes narrow, service competition among the enterprises is prominent.

Personalized products and services become important contents of enterprises core competence, which is the most main method to improve customer satisfaction and to attract new customers and the most main method to promote the image of the enterprises. With the product and service contents constantly enrich and perfect, the service capability is increasingly important for the long-term development of the e-commerce enterprises.

Dynamic capability. Dynamic capability is about enterprise integration, building and reconstruction of internal and external competence to respond to environmental changes [48]. Dynamic capability is defined as organizational processes which enterprises use resources to adapt to change and even create market [13]. Dynamic capability can improve competitive advantage of e-commerce enterprises in dynamic environment by updating, creating, integrating, and reconstructing the function such as customer management capacity, management skills and technical capability [54], [39], [47]. With dynamic environment changing rapidly, the dynamic capability enjoyed by e-commerce enterprises is the key source of enterprises to acquire sustainable competitive advantages.

Development of Capability Maturity
"Mature" refers to the management capability to reach a certain state of specified requirements, the state can ensure the organizational goals realize well. Maturity is a specific quantification for the developing degree of things, is an capability to measure and assess to achieve the expected goals of an organization [51], which can be assessed by the enterprise itself or a third party and then propose effective and continuous improvement for enterprises [38]. Maturity is considered to be a kind of prospective, typical, reasonable and expected evolution [5]. Maturity thought came from the famous quality maturity grid theory put forward by quality management master called [10]. The earliest capability maturity model (CMM) was put forward by the Carnegie Mellon software engineering institute (SEI) in 1987, which was mainly used to improve and evaluate for the process of software development and the capability of software development. CMM considered promoting capability was a gradual process. It divided the development of capability maturity into five levels, initial level, repeatable level, defined level, managed level and optimizing level and 18 key process areas which gave a framework from the chaos of individual process to the maturity of standardization process (Software Engineering Institute, 2002). Capability maturity was a life cycle model, which constituted by definition, model design, application, test, adjustment and improvement [15]. Since 2000, the concept of capability maturity has been widely used in research field and application at home and abroad, such as the IT capability maturity, project management capability maturity, quality management capability maturity, knowledge management capability maturity, supply chain management maturity and so on.

Klimko (2001) [24] considered that a maturity model described the progressing process of an entity with the development of time, the entity can be a person or an organizational function. In fact, a maturity model has the following characteristics: an entity is from immaturity to maturity, whose development of process can be divided into a limited number of maturity levels; each maturity level has special requirements; maturity levels are ordered from the initial level to the highest level that continues to increase; the maturity level of an entity needs to step by step, each level cannot be crossed. Based on the previous research of software capability maturity model, business process management capability maturity model, supply chain capability maturity model and business intelligence capability maturity model, this study comes to the conclusion that the capability maturity model usually has the following properties: (1) the external structure of capability maturity is usually divided into five level, such as software capability maturity model (CMM) contains the initial level, repeatable level, defined level, managed level, optimizing level. Project management capability maturity (PMCC) contains the initial process, structured process and standard, organizational standard and institutional process, managed process and optimized process and business process capability maturity five levels model by Michael hammer. (2) In the internal structure of the model, most of the models are based on the enterprises and business resources to define the dimensions of each model. The evaluation index system of PMMM comes from nine project management knowledge system, including human resources management, time management, cost management and communication management and the nine knowledge system covers all kinds of resources in project management. Rosemann and Brocke (2015) [44]summarized previous related process maturity models and proposed six part of core evaluation elements in business process management, which included strategy, personnel, governance of business process management, process method, culture and information technology, that the six aspects also meet the definition of enterprise competence and resource in the enterprise capacity theory and enterprise resources theory.

With the deepening of theoretical research on capability maturity and continuous development and expansion of capability maturity model, the research method of capability maturity model has shifted from qualitative to quantitative gradually. Development of e-commerce enterprises is a process of continuous improvement, perfect and innovation, which is in accordance with the connotation of the theory of capability maturity. Therefore it is feasible to construct and assess e-commerce enterprise model using the capability maturity theory.

THE E-COMMERCE ENTERPRISES CAPABILITY MATURITY INITIAL MODEL CONSTRUCTION
The Construction Methods of E-Commerce Enterprise Capability Maturity Initial Model
When constructs an e-commerce enterprise capability maturity initial model, this study references Lahrmann et al. (2011) [25] summarized the establishment of the general method of capability maturity model, which was divided into five steps: (1) Identify needs or new opportunities. When constructs a capability maturity model, we should find a new way to solve problems or the more effective way in the design process, which can be able to bring innovation or efficiency to the enterprise or organization to meet the needs and then be more conductive to the benign development of the enterprises. (2) Definition

scope. Selecting an appropriate range as an object to research and develop a capability maturity model with pertinence and practicability. (3) Design model. There are two design solutions. The first way adopts the design method from top to down that after selecting a design object, adopting the qualitative method through consulting literature and field research to obtain the main indicators and secondary indicators, according to the process to complete model design from top to bottom. Research of the capability maturity model construction for e-commerce enterprises mainly adopts this method. The other way mainly adopts the design method from down to top which typically extracts relevant indicators by means of quantitative, then summarizes these indicators and finally concludes the object model to be studied. (4) Evaluation design. Evaluating the efficiency, reliability, validity and suitability of the designed model through measurement software. (5) Improvement process reflection. Evaluation can reflect the shortage of the capability maturity model constructed then irrational structure should be adjusted or abandoned and reasonable structure should be left. See Table 1.

This research mainly adopts literature study of information extraction and expert interview. The initial model construction steps are as follows. First, for domestic database in CNKI data platform we search articles whose keywords contain "e-commerce enterprise" and "capability maturity" or "core competence" or "dynamic capability" or "capability assessment" or "capability model" or "evaluation model" or "division of level" or "dimension division" or "key process" or "key factor" or "influence factor", set the time from 2005 to 2015 and finally find more than 900 articles (See Table 2). Then we aim at the foreign database in ACM, EBSCO, ProQuest, ScienceDirect and Web of Science to use the keywords of "e-commerce enterprise" and "maturity model" or "level of assessment" or "dimension analysis" or "key success factor" or "evaluation model", set the time from 20050101to20150922 and eventually find more than 1900 articles (See Table 3). Finally, according to the quote frequency, subject classification and relevance to sort and eliminate these articles we get 131 articles to meet the requirements. According to research demand and integrity, we eventually filter out 77 articles with the most authoritative and the latest.

Table 1. The construction methods of capability maturity model

Construction steps	Construction methods	
1. Identify needs or new opportunities	■ Innovative approaches ■ Focus groups ■ Case study ■ Literature references ■ Field surveys	
2. Define scope	■ Provide information and data	■ Develop programmes
3. Design model	■ Designed from top to bottom ➢ Delphi ➢ Case study ➢ Literature references	■ Design from the bottom to the top ➢ Algorithm analysis ➢ Data provide ➢ Theory illustration
4. Evaluate design	■ Functional testing ■ Structural testing ■ Survey ■ Focus groups ■ Interview	
5. Reflect improvement process	■ Empirical study	■ Interview

Source: collating of data by authors.

Through studying and analyzing the 77 articles, this research determines preliminarily the dimensions and levels of the capability maturity model of e-commerce enterprises and concludes the key process areas of each dimension. On this basis, through three rounds of deepness interviews, we amends and confirms the concept model framework of e-commerce enterprise capability maturity finally. For the first round, we choose interview objects from the e-commerce major in colleges and universities included 3 Ph.D and 5 masters altogether 2 hours, which mainly concludes and extracts the dimensions sorted out by literature analysis. For the second round, we choose interview objects for 20 people of e-commerce enterprises' executives and technical staff, who come from Shenzhen, Guangzhou and Foshan. All the interviews carries out in 10 times and each time lasts 30 minutes to 2 hours, which mainly concludes and extracts the key process areas according to the dimensions contained in the first round and then determines the level boundaries. For the third round, we choose interview objects for 3 experts in the field of e-commerce respectively to obtain expert advice for the first two rounds of the extracted dimensions, key process areas and key process indicators. After the third round of interviews, we ultimately determine the initial model of this study.

Table 2. CNKI search result statistics (2005-2015)

Key words	Number of articles	Number of related articles	The proportion
E-commerce Enterprise + Capability maturity	3	1	33.3%
E-commerce Enterprise + Core competence	134	4	2.9%
E-commerce Enterprise + Dynamic capability	36	3	8.3%
E-commerce Enterprise + Capability assessment	24	2	8.3%
E-commerce Enterprise + Capability model	6	1	16.7%
E-commerce Enterprise + Evaluation model	91	7	7.7%
E-commerce Enterprise + Division of levels	51	2	3.9%
E-commerce Enterprise + Division of dimensions	33	2	6.1%
E-commerce Enterprise + Key process	11	1	9.1%
E-commerce Enterprise + Key factors	198	12	6.1%
E-commerce Enterprise + Influence factors	385	7	1.8%

Source: collating of data by authors.

Table 3. Foreign database search result statistics (20050101-20150922)

Database	Keywords (electronic commerce or e-commerce enterprices and)	Number of articles	Number of related articles	The proportion
ACM	maturity model	3	0	0%
	levels of measurement	374	6	1.6%
	dimension analysis	122	3	2.5%
	key success factor	74	7	9.5%
	evaluation model	221	3	1.4
EBSCO	maturity model	8	3	37.5%
	levels of measurement	57	4	7%
	dimension analysis	5	1	20%
	key success factor	18	3	16.7%
	evaluation model	126	3	2.4%
ProQuest	maturity model	4	2	50%
	levels of measurement	8	4	50%
	dimension analysis	5	1	20%
	key success factor	11	3	27.3%
	evaluation model	40	7	17.5%
Science Direct Online	maturity model	18	1	5.6%
	levels of measurement	50	1	2%
	dimension analysis	62	2	3.2%
	key success factor	97	7	7.2%
	evaluation model	274	5	1.8%
Web of Science	maturity model	19	4	21.1%
	levels of measurement	26	2	7.7%
	dimension analysis	12	3	25%
	key success factor	54	8	14.3%
	evaluation model	205	6	2.9%

Source: collating of data by authors.

The Initial Model of E-Commerce Enterprises Capability Maturity Construction
This study preliminary constructs the initial model of e-commerce enterprises capability maturity with five levels and five dimensions by using value of e-commerce model [4], [59], Cisco net ready model and capability maturity model for reference through the literature research and expert interviews. This model divides the capability maturity initial model of e-commerce enterprises into five levels include initial level, repeatable level, standardized level, managed level and optimized level and defines the evaluation standards at all levels of management capabilities of e-commerce enterprises from the five dimensions include strategy, organization, process, personnel and technical support.

The capability maturity dimensions and key process areas of e-commerce enterprises
Dimensions are capabilities we extracted from the enterprises core competence inclusion and intersection, which own stronger applicability and universal, higher general and degree of differentiation. The capabilities represents by each dimension contains a number of key factors or key process indicators.

Firstly, the strategy dimension of e-commerce enterprises. Strategy affects all aspects of the e-commerce enterprise decision, which includes drawing up management strategies, management structure, system processes, technology research and development and personnel training. It decides the enterprises how to successfully carrying out e-commerce in daily production activities. Strategy is planning for an enterprise target, integrity and long-term issue. Its essence is to obtain the enterprise's unique competitive advantages through affecting the rational allocation of the enterprise resources. It shows the cognition and attitude of the top managers to development planning of an enterprise. Thereby it affects the internal implementation of each work as well as the internal resources allocation. Therefore, the strategy capability has a signification impact for internal resources allocation and implementation of development planning of e-commerce enterprises.

Key process areas of strategy capability. To disassemble the strategy dimension, strategy capability includes strategic thinking capability, strategic resource management capability and the self-adaptability and renewable capability of organization. The strategic thinking capability is a kind of capability can make the strategic management process with feedback, predictability and innovation, which can make the enterprises strategy capability to constantly innovate and improve. It consists of strategic thinking capability of decision-making level and executive staff [1], [8], [33]. Strategic resource management capability reflects the capability of enterprise to integrate internal and external resources and the ability to manage strategic resources. It mainly measures enterprises capability to obtain and use strategic resources, which involves in key elements such as strategic resource acquisition capability and strategic resource using capability [3], [9], [14]. The self-adaptability and renewable capability of organization can reflect if the enterprises have the flexibility and adaptability, constantly revised and improved organizational functions to adapt to a constantly changing environment. It mainly measures the capability of adaption and updating, which involves in key elements such as learning, coordination, adaptability and the dynamic capability [26], [34], [36].

Secondly, the organization dimension of e-commerce enterprises. Organization dimension is the guarantee of enterprises that plan, implement, monitor and control. With the gradual diversification of functions and services of e-commerce enterprises, the precondition of management orderly is to establish and improve the organization structure. According to the development trend of e-commerce, enterprises should adjust and reform the organization structure, improve various rules and regulations, achieve the unification planning of management, well-defined right and responsibility of organization and personnel at all levels and ensure the operation of the enterprises effectively.

Key process areas of organization capability. In this study, we pay attention to three process indicators to analyse, including standardization, rights distribution and complex/specialized. Standardization refers to the degree of standardization of the rule, procedure, instruction, command and controlling system in organization. It can reduce individual differences to influence the organization, including the type and the degree of standardization [2], [18]. Rights distribution mainly refers to the centralization of enterprises. Decision right is the most important element in the rights distribution. If majority of decisions are made by managers at the highest level, the enterprise is centralized which includes decision-making and behavior evaluation [12], [17], [49]. Complex/specialized. Complex refers to the organization's activities or the number of subsystems. Specialized refers to division of labor, making the tasks of organization decompose into a single job to complete, including horizontal differentiation, vertical differentiation and ratio of professional and support staff [16], [19], [41].

Thirdly, the process capability of e-commerce enterprises. Process involves customers, suppliers and every detail of internal operations of enterprises. It is the mediation to connect different variable relations, which is one of the driving force of e-commerce enterprises. If an enterprise can realize its goal depends on completing the tasks of process on time and on quality or not largely. Effective process management is a guarantee of operational quality and efficiency to achieve.

Key process areas of process capability. We study key process areas of process capability focus on three key process indicators, which are rationalization, execution efficiency and flexibility. For rationalization, process design can help enterprises operate smoothly, relates to the match degree of the organizational structure, the improvement of the supervision mechanism and continuity of information transfer [6], [20], [32]. For execution efficiency，we consider the executive capability from top to bottom mainly which contains the decision support capability and target completion rate [22], [56]. For flexibility, which mainly refers to the responses of process to change, including strain capability and buffer capability [40], [45].

Fourthly, personnel capability of e-commerce enterprises. The talent demand of e-commerce enterprises is diverse and complex [27]. The personnel capability of e-commerce enterprises can be summarized as technology and business capability. Technology capability includes technical service and technical support capability. These people who own technology capability know the knowledge of e-commerce, computer network and international economic and trade are the main force to support enterprises to maintain technology leadership and competitive advantage. Business capability includes business services and business support capability. This kind of talent owns the knowledge of business management and so on, which is the core strength to maintain the normal operation of enterprises.

Key process area of personnel capability. We focus on three key indicators, which are personal quality, knowledge management and communication and coordination. Personal quality refers to the personal qualities and traits of technical staff and business staff within the enterprises, which includes innovation capability, technical capability, decision-making, in the

mind to bear capability, self-control capability, planning, execution and presentation capability [29], [31]. Knowledge management involves the capabilities of knowledge and learning of personnel, which includes vocational training, learning capability, summarizing experience and interactivity [7], [46], [57]. Communication and coordination involves not only the personal capability, but also perception and integration capability for enterprises and industry environment which includes the coordination, interpersonal skill, information communication, competition and cooperation and incentive and supervision [29].

Fifthly, IT capability of e-commerce enterprises. IT capability means the capabilities that an e-commerce enterprise to support and improve the business strategy and work process through acquisition, deployment, integration and deployment of IT resources [32]. E-commerce enterprises need to have a solid and standardized IT infrastructure and security and flexible system as its technical support, supporting for the rapid decision making and application of the strategy layer.

Key process areas of IT capability. We focus three key indicators on key process areas of IT capability, which are IT infrastructure, IT business across capability and IT business leading capability [28], [30]. IT infrastructure is mainly related to the software and hardware, networks and other infrastructure which includes the guarantee mechanism, early-warning mechanism, emergency mechanism and standardized to support IT operation. IT business across capability supports multi-sector cooperation, which includes collaboration and feedback mechanism. IT business leading capability means IT capability that can keep sustained competitive advantages of enterprises, which includes the agility and user demand guidance.

The capability maturity levels of e-commerce enterprises

Each level of the capability maturity model for e-commerce enterprises should have a series of distinguishable characteristics by empirical testing [35]. Maturity levels reflect the growth of e-commerce enterprises from start-ups to mature. The update of maturity represents the development and promotion of the management level of e-commerce enterprises.

According to CMM, the level of e-commerce enterprises capability maturity model is defined as five, including initial level, repeatable level, standardized level, managed level and optimized level. Enterprises can be improved by a series of small evolutionary steps forward to higher levels of maturity. Each maturity level and its characteristics like Table 4.

Table 4. E-commerce Enterprise capability maturity levels and their characteristics

Maturity level	Characteristics
Initial level (ⅰ)	Competitiveness of enterprises at the lowest level; nature clear; internal management of enterprises in the initial stage without being institutionalized; managers are responsible for all or most of business; most business conducts random; enterprises in the cooperation are in a passive state.
Repeatable level (ⅱ)	Enterprises internal management begin to take order; have set up the related system; fuzzy responsibilities distribution; have owned some fixed business partners; enterprisess can maintain operations by the earnings; no difference in technology and product and can be replaced any time; mainly by low prices and economics of scale for competitive strategy.
Standardized level (ⅲ)	Management level, products and services provided by equal to or greater than the industry average; can be used as a benchmark within the industry; with core competitiveness; can make sustainable improvements to achieve industry leader level.
Managed level (ⅳ)	Enterprises with clear strategy; focus on all aspects of enterprises management assessment; pay attention to details and actively improve; pay attention to objective management; correct any business which deviates from the objectives at any time; highly competitive in the industry; strong sense of crisis.
Optimized level (ⅴ)	A world class; have absolute competitive advantages; high efficiency; leading the industry development.

Source: collating of data by authors.

E-commerce enterprise capability maturity initial model

Based on analysis and elaboration for dimensions, key process areas and key process indicators and levels, we construct the e-commerce enterprises capability maturity initial model with five levels and five dimensions. See Table 5.

Table 5. E-commerce capability maturity model for enterprises

Level \ Dimension	Strategy capability	Organization capability
Initial level	Relying on decision makers will determine the strategy objectives.	No clear organization structure design; completely centralised; composition mainly by specialized personnel.
Repeatable level	Executive level strategy thinking capability to ascend; can obtain and use a small amount of strategy resources; strategy update capability increase.	Have a basic organizational structure which is usually flat; business personnel increase.
Standardized level	Both the decision making level and executive level have strategy thinking capability; better capability to obtain strategy resources; strong strategy adaptive capability	Organization standardization; responsibilities clear; a reasonable proportion of professional and support staff; standardization level is the industry benchmark.
Managed level	Decision making level with a high level strategy thinking capability; capability to utilizing strategy resources very strong; a better strategy update capability; with better coordination and dynamic	The type of organization structure and degree of standardization are suitable for enterprises form and development; decision making power is reasonabe; personnel evaluation criteria is reasonable; with higher match degree for horizontal and vertical management
Optimized level	Both decision making level and executive level with strong strategy thinking capability; the capability to obtain and use strategic resources is very strong; strategic adaptation and update capabilities are very strong.	Standardization level belongs to world class; reasonable degree of centralization; arrangement of responsibilities can effectively promote enterprises management; professional staff ratio significantly higher than proportion of support staff

Process capability	Personnel capability
Still has space for improvement, already belongs to world class; execution efficiency is very high; flexibility is strong; especially the flexibility is very strong.	With a super personal qualities; competence and constantly improving efficiency; knowledge management capability is very strong; can continue to absorb new knowledge and focus on a summary of past experience; communication barrier-free, good collaboration capability,strong sense of competition; be good at motivation
Higher degree of rationalization; higher efficiency of information transfer; high executing efficiency; strong decision making capability; high target completion rate; strong flexibility; higher buffering capacity	High personal quality; one or several of competencies requirements are very strong; with strong knowledge management capability, especially the self-learning capability; communication and coordination capability; be good at supervision.
Good match degree with the organization structure·· supervising mechanism mature; smooth information transfer; high efficiency of execution; some flexible.	Requirement of creativity; a certain mental capacity; higher executive capability·· paying attention to training and learning; can sum up experience; higher requirements on communication capability
Basic management process; pursue of target completion rate; poor adaptability; flexible is difficult to assess; limited buffering capability	Compared with business personnel quality, higher requirements for technical personnel; owning learning capability and communication capability.
Random business process; difficult to predict execution efficiency; poor flexibility	Uneven personal qualities, knowledge management and communication capability

IT capability

With essential support capability for business infrastructure; early warning and emergency response mechanism is poor;low standardization

Security and emergency response capacity significantly improving; making efforts to the standardization; owning some feedback mechanism.

Infrastructure to achieve standardization level; sound collaboration and feedback mechanism; be a certain degree of agility-oriented; owning some leadership capability.

Infrastructure capacity for early warning and response capacity is very strong; business across capability is very strong; collaboration and feedback mechanisms ensure IT operate well; with a good leadership capability; capagility be more oriented

Infrastructure configuration with the world advanced level; businesses across capability belongs to the world top ranking; leadship is very strong, oriented by user demands.

CONCLUSION

In view of the development trend of e-commerce and the uniqueness of the e-commerce enterprises, this study comprehensively applies the research results in the fields of innovation, strategy, organizational behavior, process reengineering, human resources and IT technology and finally proposes a basic frame of e-commerce enterprises capability maturity model. In the future, we will choose several representative e-commerce enterprises to study. On the base of recognition of e-commerce enterprises core competence we will evaluate the level of e-commerce enterprises capability maturity, further will modify and improve the e-commerce enterprises capability maturity model and give suggestions to how to improve the capability maturity level of e-commerce enterprises.

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