Research on Innovation Path of Enterprise Dynamic Management Mode in Big Data Era

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Abstract. Based on the traditional management theory, combined with the evolution and development trend of management theory, this paper constructs a management conceptual model by analyzing the elements of modern management, and puts forward that management is an activity that both insiders and outsiders participate in under the background of big data era. The modern enterprise management mode has gradually evolved from the traditional mode of top-down, inside-out to the diversified management mode of outside-in, bottom-up. This paper analyzes the characteristics and differences of the management modes of enterprises in different countries from the aspects of management objects, management decisions, management methods and organizational structures. Finally, the conceptual model of enterprise dynamic management mode is constructed, and the innovation path of dynamic management mode is discussed from three aspects: perception, action and transformation, and the characteristics, structure and basic functions of dynamic management conceptual model are summarized.

Keywords: Big Data Era, Management Mode, Dynamic Management Mode

1. Introduction
Management originates from the practice of human production activities. In practice, people constantly observe and sum up experience and develop management theory, which in turn guides and develops management practice. In the 20th century, "modern management" appeared, and "management research" came into being. However, different countries have different definitions of management, and the meaning of management varies greatly due to different cultural backgrounds. As clausewitz thinks, management theory should not tell a person how to manage, but should change from "planning" to "thinking" to help people make scientific judgments. Some models are formed in previous experiences, and some are formed immediately when faced with phenomena. Whether the pattern is consistent with the essence of the phenomenon must be constantly tested and modified in the process of cognition in order to get a correct understanding. Therefore, the model should be a theory...
summarized from the production experience through abstraction and sublimation, a methodology to solve a certain kind of problem, and a guide to help achieve the goal and solve the problem. It has three meanings: it has universal applicability, is a highly refined methodology, and can have an impact on the essence of things. Although there are thousands of "modes" of enterprise management, the mode that can really change the essence of management is the one that is really worth learning from. The traditional contingency management theory emphasizes the influence of uncertainty and rapid change of the enterprise's environment on the internal characteristics of the organization. It advocates the idea of expediency to deal with the complex and changeable external environment such as society, politics, economy, science and technology, which has strong guiding significance for management practice. However, the deficiency of this theory is that it overemphasizes the particularity of management in specific situations and neglects the universality and regularity of the theory. Under the background of globalization and informationization, new economic formats such as the Internet, cloud computing and big data are constantly emerging, posing new challenges and opportunities for the innovation of modern enterprise management mode. Based on the development status of management mode at home and abroad, this paper discusses the environmental changes and various uncertain factors faced by enterprise management practice, constructs a management conceptual model and puts forward a dynamic management mode of enterprises in the era of big data [1].

2. Conceptual Model of Management

From the history of management thought, the development of management theory has shifted from the research focus of work and material objects to the research of human management, and this trend will continue. The essence of management mode is a series of organizational activities to realize enterprise value increment and enhance enterprise social status through the management of people, things and things. Management activity is a process of allocating and optimizing the internal resources of an organization system. The management mode should be a behavior mode, which defines the objectives and integrates a series of management elements on the basis of management theory, establishes a management system in line with the actual situation of enterprises according to management theory, standardizes the formation mechanism of management behavior in the system, and realizes the management objectives of enterprises. Management not only needs to control internal resources, but also responds to changes in external economic and social environment [2]. The changes in economic environment mainly include changes in market demand, changes in consumer preferences and changes in the status of relevant stakeholders (shareholders, suppliers, etc.). The change of social environment is mainly manifested in the change of social values, which directly affects the factor of enterprise resource allocation—the change of people. Qian Yanwen once put forward a management conceptual model with people, property, information and technology as its elements:

$$f = f(h, m, i, t)$$

Above, h: human resources; m: Property, both tangible and intangible; i: big data and information; t: technology.

In the era of big data, as the carrier of information, knowledge and key technologies, people are the direct embodiment of the core competitiveness of enterprises. People here not only include employees but also imply consumers. The penetration and influence of big data has brought about profound changes in enterprise management. At first, it gradually changed from simple information transmission tools to management elements. Successful enterprises basically realized online business activities, and consumers themselves carried consumption big data and consumption market information and gradually became a part of enterprise management.

Companies with strong sustainable development ability are usually people-centered, and pay attention to employees with innovative ability and strong adaptability to changes. These enterprises have built a constantly developing ecosystem and can constantly propose new "life forms" (management mode and business mode). Human factors determine the role and influence of other elements in the management model. In the process of talent management, in addition to recruiting and
hiring talents suitable for corporate culture, it is more important for enterprises to create their own roles and positions within the enterprise and give full play to people's subjective initiative. In the era of highly developed information and surplus capital, if the management of talents is neglected, the management of knowledge, information and technology will become nonsense [3]. On the one hand, people have the ability to recreate and innovate knowledge, information and technology; on the other hand, in the rapidly changing economic environment, the replacement and iteration speed of knowledge, information and technology are very fast. In addition, the instant transmission of big data reduces the difficulty of acquiring knowledge, information and technology. Therefore, talents are the most important influencing factor and the most important asset of an enterprise. If employees can't process the knowledge, information and technology owned by the enterprise, even if the enterprise has excess knowledge, information and technology, it can't become the capital of sustainable development. From the external environment of information transmission, customers continue to organize activities online and offline around the enterprise. As an important carrier of market information, consumers in the traditional sense have gradually become big data "new" employees of enterprises. Enterprise management gradually changes from top-down hierarchical management to bottom-up flat management, as shown in Figure 1. In this paper, the following management conceptual model is established: management in the big data economy environment is the function of enterprise insiders and outsiders (consumers), namely

\[ f = f(h, c, m) \]  
\[ h = f(i, t) \]  
\[ c = f(i, t) \]

Among them, h: human resources; c: consumers; m: means of production, resources or tools that workers need to use in production; i: big data and knowledge; t: technology.

![Fig 1. Changes in the old and new management models](source: Painted by the author)

3. Analysis of the Current Situation of Enterprise Management Mode

3.1. Foreign Enterprise Management Mode

As the center of the world's electronics industry and the cradle of startups, the vigorous development of Silicon Valley companies in the United States has promoted the progress of global information technology. The management innovation models of Silicon Valley companies include attracting innovative talents, informal decentralized management, and flat organizational structure. These management characteristics enable them to cope with the ever-changing and developing economic and social environment [4].
Viewing the change of management mode from the management object. Top innovators in Silicon Valley always insist that all management activities are people-centered, and companies such as Google, Facebook, Tesla and PayPal are committed to hiring people who are entrepreneurial, adaptable, passionate, constantly questioning the status quo and willing to cooperate. Enterprise managers think that having suitable talents is the main factor of success, and many company executives are directly involved in talent recruitment to seek the best candidates. Greg Linden and David Teece of Berkeley, California, once said, "Our goal is to continuously improve the quality of the workforce by hiring better employees than ourselves. Once new people join, they will pay great attention to them and provide the necessary working environment so that they can achieve good results in their work."

Viewing the change of management mode from management objective. In the early 1960s, Alfred Chandler and others put forward that enterprise management is to choose a series of action plans to allocate resources for the realization of goals by formulating enterprise objectives and long-term goals, emphasizing the importance of managers to set goals first and implement plans after goals. Different from traditional strategic thinking, it is a necessary condition for innovation to express anti-traditional ideas clearly. Google co-founders Larry Page and Sergey Brin issued a warning that "Google is not a traditional company" in the initial public offering letter, stating that Google's initial success was based on "creativity and challenges". Encourage all employees of the company to offer suggestions and suggestions to the management directly. More and more enterprises' strategic decision is no longer a certain manager's decision. From the case study of Silicon Valley companies, it is found that the focus of top leaders has gradually changed from the management concept of high-level internal participation in corporate decision-making to the mode of full participation in corporate decision-making [5].

Viewing the change of management mode from management mode. In the traditional management mode, the autonomy assigned to employees is very limited, and the scope of work that employees can control is also narrow. Leaders' management of employees mainly focuses on control and command, while the modern management mode of American enterprises mainly focuses on automation and broad management, and manages employees through training, counseling, encouragement and promotion. Traditional management theory pursues absolute control or relative control over production and operation, with production efficiency and production scale as its main management objectives. The management model of Silicon Valley companies in the United States pays more attention to the innovation and speed of production and operation, as well as the adaptability and rapid learning ability of companies [6].

Viewing the change of management mode from organizational structure. At the level of enterprise organizational structure, the traditional enterprise organizational structure is mainly hierarchical vertical management, with more layers (high) and higher bureaucratic degree, emphasizing the structure of enterprise organizational management, with a high degree of centralization, little horizontal communication between functional departments or even isolation from each other, and the whole management system is relatively closed [7]. AnnaLee Saxenian summed up HP's decentralized enterprise structure and informal management style, which is referred to as "HP mode" for short, emphasizing teamwork, sharing responsibility and entrepreneurial spirit, and became the symbol of American Silicon Valley companies. Bahrami pointed out some common points among these companies, such as replacing the fixed hierarchical structure and top-down management, and arranging the structure and organizing management with smoother distributed steps [8]. The organizational structure of these companies is mostly flat, which prevents the bureaucratic atmosphere of enterprises. Projects are more flexible, and most of them are small units. Enterprises can choose to allocate the decision-making power of companies, and then companies have more optional strategies to cope with the changing market environment, and the whole management system is more open and flexible.

3.2. Analysis of Chinese Enterprise Management Mode
Viewing the change of management mode from the management object. As mentioned above, the resources that can be effectively allocated are the management objects of enterprises, and the
management of modern enterprises focuses on people, things, knowledge, big data and technology. Since the implementation of market economy, Chinese enterprises have been pursuing increment and low cost for a long time. Chinese enterprises can deeply understand consumers' needs and are willing to work hard and change them. Compared with foreign companies, Chinese enterprises' user-centered management concept is more prominent. At the same time, Chinese enterprises have gradually strengthened the management of consumers' consumption behavior and potential demand, and big data has become an important resource and strategic asset of enterprises. In order to dig deep into potential demand and obtain timely and accurate consumption big data, the development of enterprises is increasingly dependent on big data, and big data competition has become the core of enterprises' competitiveness. This intangible means of production has gradually become the main management object of enterprises [9]. For example, for Didi taxi company, platform, driving contract and brand are its main management objects, not cars. In the future, with the continuous development of artificial intelligence technology, workers will no longer only refer to human beings, but the management objects of enterprises will exist in a formless and abnormal form. With the vigorous development of big data economy and sharing economy, more and more industrial enterprises in China have adopted the management mode of "light assets", which has realized the effective use of capital and greatly reduced costs [10].

Viewing the change of management mode from organizational structure. From the perspective of enterprise organizational structure, the management form has gradually changed to networked and virtual platform management. The high penetration of information technology promotes the standardization and modularization of complex systems of enterprises. If the whole enterprise always depends on the management's decision-making, the adaptability and adaptability to the economic environment will be reduced, and the market and opportunities will be lost. The internal management of Chinese enterprises has gradually formed a "decentralized" and "platform-based" management mechanism, and various functional units are widely operated in the form of independent management, independent decision-making and independent monitoring, and are no longer supervised and controlled by management. However, compared with foreign companies such as Google and Facebook, the employees of Chinese enterprises directly participate in decision-making and guide their operations to a relatively low degree [11].

Viewing the change of management mode from the whole management system. With the situation that traditional management monopolizes information broken by big data, enterprise management loses its advantage from monopolizing information to monopolizing decision-making, and the bureaucratic management system changes to flat organizational structure. In the flat and distributed organizational structure, enterprises' perception of changes in social environment, economic environment and industrial environment is constantly improving. More and more enterprises realize that strategic decisions are not planned, but summarized in the implementation stage. From the traditional strategic management of investigation and analysis, setting goals and making plans to the strategic management of all employees participating in response and response; The production organization structure involved in management is more miniaturized, intelligent and specialized. For example, in Haier's operation management system, the management mode that 2233 business entities jointly manage the company's assets has been realized by formulating strategic profit and loss statement, Nissin statement and individual pay statement, and an "ecological management system" with all employees undertaking strategic results, self-innovation, self-driving and self-running has been created.

4. Dynamic Management Mode of Enterprises in the Era of Big Data
The so-called dynamic ability is the ability of managers to create, expand and adjust the company's production and operation mode, which is used to help enterprises realize the coordination and unity among management decision-making, management activities, strategic change and enterprise performance under the constantly developing and changing state. Later, Harris and Herrfahrerd extended the meaning of the term, indicating that dynamic management capability can not only affect
the internal attributes of an organization, but also affect its environment, thus broadening the meaning of dynamic capability. In the rapidly changing market environment, most American companies do not have five-year strategic plans, only quarterly plans and semi-annual plans. Eric Schmidt once said that Google has no two-year plan, only next week’s plan and next quarter’s plan. Most of Google’s products are the product of small teams responding to market changes quickly. Like Facebook, Apple and Twitter, many foreign companies realize that they should have a high sense of market changes within their organizations and keep a high degree of flexibility in organizational structure. This paper holds that dynamic capability is the basic requirement of dynamic management mode, and the strength of dynamic capability of a company determines the speed and degree of adjusting its resources, including its business mode and customer needs and expectations. To achieve this goal, the organization must be able to constantly perceive and seize opportunities, and regularly change all aspects of the organization and culture, so as to be able to reposition itself actively, so as to respond to new threats and opportunities. "Strong dynamic capability" usually means that it is strong in all related fields of perception, detection and transformation (compared with competitors). Enterprises with strong dynamic capabilities will be able to build and update resources, assets and common functions, and reconfigure them as needed to innovate and respond to (or cause) market changes.

In most cases, the key factor of a company's dynamic ability to seize new opportunities will be the management ability to design and improve business models. Management ability has developed into a sub-field of dynamic management ability [2], which is difficult for competitors to copy because they are based on the characteristics of entrepreneurial managers and the conventions and cultures of organizational history. Dynamic ability is mainly reflected in the following three aspects: ① Perception ability. Perception requires enterprises to get close contact with the external environment with flat or informal organizational structure, and every functional unit or team in the organization keeps high sensitivity and alertness to the management objects such as users’ needs and ideas and various means of production like every cell in the skin. ② action Seize. According to the management practice of "faster, less formal process" and "quick trial and error", Yip and McKern think that Chinese companies implement it faster than foreign companies. Chinese enterprises often adopt the strategy of "simultaneous and parallel development". For example, Tencent's core product development cycle is less than three months. Enterprises encourage employees to try and make mistakes constantly, and have a high tolerance for failure. In western countries, when companies talk about the management idea of "quick trial and error", many companies in China have practiced it for many years [3], and the ability to seize and act is manifested in many aspects such as market positioning, cross-border integration, and resource allocation. ③ transformation ability. The transformation ability of an enterprise is the key to build its core competitiveness. If the production of products depends on the perception and action of enterprises, then the formulation, improvement, implementation and transformation of management mode is the output of high-order capability and dynamic capability [4]. Perception ability and capture ability are first-order dynamic ability, which can make any organization more or less engaged in production planning and basic management, and have strong operability; Transformation ability is a high-level dynamic ability, including new product development, new market development, distribution of property rights among departments of large companies, and making correct management decisions in dynamic changes.
Dynamic management mode is a management mode in which the whole management system of an enterprise has three basic conditions of dynamic capability. Combined with the development status of modern enterprise management mode at home and abroad, this paper calls this kind of management more suitable for dynamic environment "dynamic management mode". The reactive behavior of enterprise strategic behavior is a kind of "point decision", including the design of vision, intention, purpose, orientation, policy, principle, way and means. In the process, managers can make some dynamic adjustments to their management according to the reaction of competitors and the changes of internal and external environment. Effective managers must be able to maintain dynamic consistency in the management process, so that "point decision" and the management process can maintain dynamic continuity. Dynamic management mode should focus on innovative talents and consumers, and should be combined with internal and external environment to establish a systematic, forward-looking management mode that is in line with enterprise development. Enterprise management gradually changes from the management of things to the management of people and consumers. The dynamic management model includes three specific elements: enterprise resources (material, technology, knowledge and information, big data), human resources (talents, consumers) and organizational design. And three abstract elements: perception, action and transformation (as shown in fig. 3).Figure 3 is used to test the effectiveness of enterprise dynamic management mode, correctly measure the ability level of each factor management, help managers make better "point decision", integrate the three basic points of dynamic ability with basic management factors as the core, and supervise and adjust the whole process of planning, arrangement, implementation and feedback in the enterprise management process. Dynamic management mode emphasizes improving the adaptability of managers in the process of strategy formulation, and supports managers to correctly judge the dynamic ability of enterprise management mode and make correct decisions by observing the management objects in the management process. Emphasize innovation-driven, encourage managers and all employees to innovate, and help managers discover and adjust the problems and main focus in enterprise management in time.

Fig 2. Dynamic capability hierarchy analysis

Source: Painted by the author
5. Future Research Direction and Prospect

The dynamic management model proposed in this paper mainly summarizes the management ability level from three abstract elements: perception, action and transformation. In the future research, we can further carry out specific analysis and empirical research on the three management abilities at the micro level. The development of enterprise management model in the future can be described as: based on the change of market demand, taking information technology as the core, taking user big data as the means of production, the planned and organized control and decision-making throughout the design, procurement, production, sales, service and other management links in the management process of the enterprise are the re-development and innovation of the management organization and process. Therefore, the study of the management ability of enterprise management from three aspects provides a starting point for the discussion of the development trend of enterprise management model which has not been introduced. Like any technological innovation and development, the introduction-digestion-absorption-innovation is also the law of modern enterprise management technology development and model innovation. For example, Japanese enterprises combined with their own situation to create a just-in-time production system, lean production and operation units and other production management model, China also needs to be combined with the actual situation of Chinese enterprises, and actively explore the enterprise management model with Chinese characteristics, the formation of its own core competitiveness. In order to facilitate data extraction and measurement, Chinese enterprises should improve the level of management information. In recent years, the innovation achievements of national enterprise information management modernization accounted for a very low proportion of the innovation achievements of management information. The management information problem has been given due attention. As of 2019, 251 achievements have been approved as "national enterprise management modernization innovation achievements" in the 26th China Enterprise Management Modernization Innovation Achievement Award, For Chinese enterprises to deepen the state-owned assets reform of state-owned enterprises, strengthen the basic management and standardization construction, accelerate the digital application and intelligent manufacturing, promote the core technology localization and intellectual property management, the development of service-oriented manufacturing and reshaping the industrial value chain, management and control of "the belt and road initiative" construction of investment and operational risk and other aspects of the latest practice, reflects the new characteristics of Chinese enterprise management, new trends, new models, improve the level of enterprise management information to cultivate enterprise competitive advantage and enhance competitiveness is of great significance. Finally, whether to improve the level of enterprise management information or to explore and innovate enterprise management model, all need public support supporting environment. Therefore, in the network infrastructure, product and service
coding, technical standards and norms, engineering supervision, safety certification, online payment, logistics and distribution of enterprise information public support supporting environment, Chinese enterprises have further optimization space. The construction of information public support environment lags behind the construction and development of application system, which hinders the promotion and success of management information construction. There is an urgent need for Chinese enterprises to establish a unified business exchange standards and technical support system between inter-city, inter-provincial or regional scope, which can greatly reduce the cost caused by different time and space in the whole business process, promote Chinese enterprises to actively participate in the global value chain division of labor, and help enterprises to accelerate the pace of internationalization.

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