

# Research on the Relationship between Information Technology Capabilities and Sustainable Competitive Advantages of Enterprises

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**Abstract:** *Information technology capabilities and the associated theory of sustainable competitive advantages of enterprises have been studied , respectively. From the resources which form the enterprise information technology capabilities , four factors that affect sustainable competitive advantages: information technology infrastructure , human resources , intangible resources and information technology resources associated have been isolated and their mechanisms have been analyzed.*

**Key words:** information technology resources; information technology capabilities; sustainable competitive advantages

## 1 Introduction

Scholars' studies on the competitive advantages of enterprises experienced a process of evolution from a static perspective view to a dynamic one. In the research process from the dynamic perspective , the resource-based theory of resources school has been formed as well as the enterprise ability theory of ability school. Although studies have been taken from different perspectives , these two perspectives both focus on the process of enterprises obtaining and maintaining competitive advantages and the process of the dissipation of competitive advantages in the market competition.

Information technology's role in the enterprise is increasing. It not only changes the organization's internal structure , operations and management modes , but also gradually becomes an essential factor in the development process. Information technology can improve efficiency of business , and bring with it competitive advantages. But with the rapid development of information technology , as it is easily to be imitated and mastered by competitors , it is difficult to form long-term technical barriers. So it's hard for enterprises to gain a sustainable competitive business advantage

by simply relying on information technology.

Therefore , some scholars have proposed the concept of information technology capabilities. They think that the information technology capabilities formed by the coordination and matching of the information technology resources and other resources can create sustainable competitive advantages for enterprises. How the sustainable competitive advantages is obtained during the construction of information is the practical problem needed to be resolved under the premise of China's new industrialization development road. However , studies through the literature have found that the number of research on the relationship between the information technology capability and sustainable competitive advantages is still relatively small. Therefore , to explore the relationship between the information technology capability and sustainable competitive advantages has a practical significance to the management practices of the information society.

## 2 Literature review

For sustainable competitive advantages of enterprises , different scholars have different interpretations. Hofer and Schendel defined the sustainable competitive advantage as the firm-specific ability for the competitors to explore , with which enterprises can continue to

outperform their competitors. The sustainable competitive advantage can be gained both endogenously and exogenously, determined by the internal core competencies, given by the external environmental conditions, thus forming a systematic comprehensive business ability that has a long-lasting vitality. Porter says as long as a business can maintain higher than average levels of operating performance in the industry for a long time, we can identify the company has a sustainable competitive advantage.

The American scholar William R. King thinks that the information technology (IT) capability is the combination of hardware, software, shared services, management practices and technical and management skills. In his study, the “soft” side and the “hard” side of the IT capability are of the same importance. Therefore, managers who invest in the new software and hardware should carefully consider the investment in the information technology planning and so on. King stresses the influence on the overall performance of enterprises by achieving the IT ability through business processes<sup>[1]</sup>.

Tippins and others understand the concept of the IT capability on the basis of the market, strategic management, information science and technology, and propose that the IT capability is the extent of knowledge that enterprises make effective use of information technology companies to manage enterprise information. They think the IT capability should contain three elements, namely information technology knowledge, operation and technology object<sup>[2]</sup>.

China scholars Zhang S and Huang L P<sup>[3]</sup> put forward the concept of information technology based on the definition of information technology resources and the understanding of the ability. They believe the information technology capability is a complex social practice to gain sustainable competitive advantages through calling and deployment of enterprise information technology resources. And strategic information

technology capabilities are classified at three levels: the static, dynamic and creative information technology capabilities, including the contents of information technology infrastructure capabilities, information technology culture capabilities, information technologist capabilities and complementary capabilities of information technology and intangible assets.

As the literature search shows, at this stage, little study on the relationship between the information technology capability and sustainable competitive advantages has been done. In domestic conditions, Zhi J has done a preliminary analysis on the influence of information technology resources and information technology capabilities on sustainable competitive advantages in the dynamic environment. Scholar Li Z F did further research, introducing the key variable of the core competitiveness, analyzing the decisive role of the core competitiveness on the competitive advantage, and the method by which the competitive advantage formed based on information technology resources and capabilities shift to a sustainable competitive advantage. However, since the formation of sustainable competitive advantage of enterprises has more than one factor, to analyze the composition of information technology capabilities and explore its relationship with these factors no doubt has a practical significance for the enterprise to gain sustainable competitive advantages.

### 3 Access to sustainable competitive advantage

Barney thinks that when a company implements a strategy that can create values for the enterprise while other existing businesses and potential competitors can not implement, the company has a competitive advantage. However, the sustainable competitive advantage in addition to meeting these conditions should also include the condition<sup>[5]</sup> that competitors can not copy the strategic advantage. This is the commonly used standard by scholars in defining the sustainable com-

petitive advantage currently.

Jiang X W thinks that in a turbulent environment , sustainable competitive advantage comes from three basic areas , namely industrial environment in which enterprises are located , the strategic resources owned or controlled by enterprises and continuous innovation<sup>[6]</sup>. External environment in which business is located can often be divided into macro environment and industry environment. Because the macro-environment generally has indirect effects or plays a role through industrial environment , the industry environment compared with the macro-environment has a greater and more direct influence on individual enterprises. This effect is not only reflected in the uncertainty risk in the political , economic , social and technological environment of development of enterprises , but also is reflected in the company's own change of the perception of the same environment. For companies to establish a sustainable competitive advantage of its own must adapt to and rationally use the industrial environment of an enterprise.

Assuming the environmental impact on different businesses be the same or similar , in this case more sustainable competitive advantages come from the quantity , quality and operational efficiency of resources owned or controlled by the company.

Because not all the resources owned or controlled by enterprises are able to produce an effect on the sustainable competitive advantage , only the strategic resources are able to make a significant contribution to the sustainable competitive advantage.

Wang N X thinks that competitive advantage can be sustained , and continuous improvement in business performance<sup>[7]</sup> and can be gained only through the constant creating , deepening , optimizing or changing its core competencies. Core competence is a kind of corporate strategic capabilities , including the company's core capabilities , competitive strategy choices and entrepreneurship. Entrepreneurs have a unique

position in the enterprise. Companies need to consider all the internal and external factors to achieve sustained competitive advantages. And this integrated process is embodied in the unique resource element of entrepreneurial spirit. Technical information is ultimately embedded in products and services , and entrepreneurship is a mechanism through which society can transfer the technical information to these products and services. Through the entrepreneurship mechanism the non-efficiency time and space in economic activity can be found and get relieved. In the different sources of promoting capitalist society to change , the entrepreneur of products and processes is the most important driving force<sup>[8]</sup> applying entrepreneurship to integrate the company's existing resources , the ability to form new scarce resources or unique capabilities , and thus can provide a competitive advantage.

Wang J Z thinks that corporate culture can make a special appeal with a strong enterprise strength<sup>[9]</sup>. Culture affects the performance and strategic development of enterprises through three basic functions: orientation , motivation , and coordination. These features can affect employees , particularly the strategic choice of business executives , and thus the choice of strategic resources of the enterprise , building of the business ability and integration of a variety of assets , skills , resources and capabilities. Therefore , the corporate culture is an effective means to obtain the sustainable development of the competitive advantage.

In a relatively long time , enterprises do not exist in so-called "irreplaceable strategic resources and capabilities" <sup>[10]</sup>. In the turbulent business environment , if enterprises want to gain sustainable competitive advantage , they can't just rely on strategic resources and core competencies to passively adapt to the environment , but need to make a fast enough response according to changes in the environment.

Through continuous innovation , and continuing to surpass themselves , their existing competitive advantages

are quickly converted to the new competitive advantages over rival companies, and they gain sustainable competitive advantage based on their overall development. The real competitive advantage is that there is no competitive advantage. The best way to avoid competition is to create an exclusive new area. So continuous innovation is an effective means to maintain a sustainable competitive advantage.

This paper argues that: the sustainable competitive advantage is mainly from the following five areas: industrial environment in which enterprises locate, strategic resources organizations can control and use, corporate culture, corporate strategic capacity, business continuous innovation.

#### 4 Formation of information technology capabilities

The information technology capability is a capability with a purpose to achieve the company's vision and mission, by using information technology resources, integrating other resources of enterprises, resulting in rational and effective allocation of resources. The formation of this capacity requires a certain carrier or elements, which is the information technology resources. Resource is the cornerstone to form the ability and plays a key role in the process of enterprises relying more on information technology capability to gain sustainable competitive advantages. The interaction in information technology resources promotes internal coordinated development and lays the foundation for generating further synergies and information technology capabilities. It needs to experience from low to high by three levels to form information technology capabilities, with different levels insurmountable. On the resources that form the enterprise information technology capabilities, different scholars discuss from different angles. Kaitinggeer et al<sup>[11]</sup> put forward two factors of enterprise technology and sustained capital by empirical analysis.

Scholars do the division of the information technology resources from their contents. However, the formation of abilities is not simple to form a pile of resources, only the key core resources gradually form the ability enterprises can control. From the time dimension point of view, enterprises from small to large, from weak to strong, the development of which must be accompanied by the passage of time. In the course of time, companies complete the structures of infrastructures, introduction of associated personnel and the first pile of other resources, which is the first enterprise information technology construction. Each firm's information construction is a one-time, unique activity. In this process, whether the development or procurement of equipment can meet the future needs will directly determine the enterprise's basic level of information technology capabilities in the future. In this process, communication and coordination between departments and personnel and the building of the relationship between resources associated with the coordination form the foundation for a company's future formation of information technology capabilities. After the completion of information technology construction is the use of information technology. In this process, the run-in among infrastructures, sectors, personnel and resources is deepening, like gears, resulting in the best working condition by running, not only forms the company's culture. What is more important is to make enterprise master information technology capabilities. According to this formation process, formed enterprise information technology capability resources can be divided into four categories, namely: information technology infrastructure, information technology human resources, information technology intangible resources, information technology related resources.

1) Information technology infrastructure. It includes hardware, software, communications technology, data and core applications, and also includes how those affect the infrastructure design and capacity factors of planning, management and control. Competitors are

likely through the purchase, copy, etc. to obtain tangible information technology equipment. Only by integrating tangible information technology equipment and other information technology assets (both tangible and intangible assets) can the ability which is difficult to be copied be formed.

2) Information technology human resources. It includes technical and management personnel. As creators of knowledge and the subject of mastering skills, human resources is the main carrier and elements of IT capabilities, and their technical knowledge, business knowledge, strategic knowledge, relationship knowledge and management skills to a large extent led the level of enterprise IT ability. Information technology management skills are the same with information technology skills needed for long-term experience. As information technology spread throughout the community, access to information technology and business and technical personnel is not a difficult task. On this basis enterprises need to rely on management skills and it takes a long time for organizations to get information technology capabilities.

3) Information technology intangible resources. It includes customer-orientation, knowledge (information) reservation, enabling capacity, complementary of information technology and organizational learning, complementary of information technology and organizational knowledge of complementary and so on. Among them, the corporate culture is based on core values, knowledge-based, for the common pursuit of the cause, professional ethics, law, institution and policy-oriented long-term consensus of all employees; customer-orientation requires organization to timely track and forecast changes in customer demand preferences, as well as the ability to track and predict customer behavior changes; knowledge exists in the employees' job skills and business experiences among the various processes that exist in the organization, policies and information libraries; information technology has a strong enable ability, which is shown

through people can obtain and share other types of organizational resources more easily by information technology applications; the complementary of information technology and organizational learning refers to organizational learning that can promote mastery and application of information technology, while information technology can facilitate organizational learning, improve learning efficiency, and better achieve the effect of organizational learning; the complementary information technology and organizational knowledge shows on the interaction of the two. To share knowledge and information among business units, not only can it improve the operational efficiency of the organization, but also can increase the organization's flexibility to respond quickly to market demand.

4) Information technology related resources. Application of information technology is a systematic project, involving aspects of the enterprise side; internal and external coordination of resources is possible to play the best effect; these resources are seen as enterprise information technology related resources. The information technology related resources which have the greatest impact on the formation of enterprise information technology capabilities includes several categories of indicators: the organizational structure, business processes, management systems and standards, strategic match and so on.

## 5 Relationships between information technology capabilities and business sustainable competitive advantages

The formation of enterprise information technology capabilities requires the support of information technology resources, and the information technology capability is through these resources to achieve the influence on the sustainable competitive advantage.

Enterprise information technology infrastructure is the basis for enterprises to obtain the information technology ability. On this basis, it's needed to achieve the

coordination of system design , implementation and coordination business needs according to the specific requirements , choose components and achieve efficient uses of the system. Enterprises acquire experience of using and improving information technology in the construction and process of usage of information technologies. And this experience will transfer into business strategic resources when the accumulation is full , and provide power for continuous innovation of enterprises. The lack of fitness between information technology and the task will affect the efficiency , when information technology with appropriate features needed to complete tasks to improve performance , and to establish the adaptation need to do their own accumulation of experience. This process of accumulation just enhances the business strategic ability.

Technical skills enable companies to effectively manage technical risks of information technology investments. However , due to the strong replicability of information technology skill , under normal circumstances it is difficult to become a source of sustainable competitive advantage. Besides the technical skills of employees , other business knowledge , strategic knowledge , relationship knowledge and management skills are formed in special situations , over time , by the gradual accumulation of run-ins. These factors usually are difficult to copy. The business knowledge of employees can directly impact on the continuous innovation of enterprises and the solid business knowledge is the cornerstone of innovation. Employees with strategic knowledge have a global view , not only can comprehend the company's strategic intent and strategic direction , but also in certain circumstances can become the proponents of the company's future strategic direction; such employees must be a strategic business resource. Managers planning business goals , integrating enterprise resources , coordinating relations through the management skills , not only have developed a unique corporate culture , but also make enterprises obtain a strategic capability through the accu-

mulation of experience in the process.

Customer orientation requires companies to track and predict customer needs , that is , through customer-oriented business to build up a bridge with an industry environment. Reservation of knowledge and formation of the enable ability is the internal accumulation process of enterprises , whose output results will form the enterprise's strategic resources. The complement of information technology , organizational learning and organizational knowledge essentially are the interdependent and mutually reinforcing of resources , after continuous running with companies finally forms the corporate strategic capacity.

The organizational structure , business processes , management systems and standards , strategic match , all these types of indicators in the business development process will gradually affect the formation of corporate culture. Among them , the management systems and standard is an important factor affecting the continuous innovation of enterprises , for an enterprise encouraging innovation from systems is inevitably full of vitality of innovation. Strategy matching closely related to the external environment of enterprises requires companies to grasp the changes in the external environment with the tide , so that the objective of corporate strategy will coordinate with external conditions.

## 6 Conclusions

With the new economic era , the role of information technology in the enterprise is increasing. It is not only changing the organization's internal structure , mode of operation and management , but also becomes an indispensable strategy "necessity" in business development. Information technologies not only improve business efficiency , but also bring competitive advantages. Companies invest heavily in information technology , expecting to deliver a competitive advantage for businesses and generate sufficient profits to the enterprise. Continuity of profit is from sustainable com-

petitive advantages of businesses, which requires companies to transfer information technology investment into a sustainable competitive advantage. Through research, it can be found that among the resources which form enterprise information technology, only some of them can ultimately bring about a sustainable competitive business advantage. An enterprise's resources are limited, only with the priority resources rationally allocated, information technology infrastructure better built, the information technology human resources grasped, information technology intangible resources and information technology related resources mastered, and with the information technology capabilities formed and held in the development process, can the sustainable competitive advantage be ultimately achieved by enterprises.

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