Technology Purchase, Absorption and Integration - A Resource Orchestration and Data Information Processing Perspective

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Abstract—Enterprises form competitive advantage through technology purchase, absorption and integration. Based on the perspective of resource orchestration and data information processing perspective, this study discusses the role of active resource management in this process. This study first summarizes the development context of resource theories, and then summarizes the mechanism of resource orchestration. Resource structuring helps enterprises identify the current situation of technology and purchase the required technology based on data information processing. Resource bundling helps enterprises absorb new technology and form new capabilities. Resource leveraging helps enterprises process internal and external data information, integrate technology and form competitive advantage. This study introduces a new perspective for the research on the innovation mechanism of external technology purchase, and deepens the resource orchestration theory and data information processing theory.

Keywords-technology purchase; technology absorption; technology integration; resource orchestration; data information processing; competitive advantage

1 INTRODUCTION

Creating and maintaining competitive advantage is the basic principle of enterprise management[1]. Resource-based theory holds that enterprises gain competitive advantage by owning a large number of valuable rare resources. Therefore, many enterprises hope to obtain competitive advantage by purchasing external technical resources. When these resources are difficult to be imitated or replaced, the competitive advantage will be maintained. However, more and more entrepreneurs and scholars found that even if enterprises have similar resources, their competitiveness often has obvious differences. Sirmon et al.[2] believed that resources would not create enterprise value directly, but the resource management is the real reason, resource orchestration theory is put forward.

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According to resource orchestration theory, enterprises form the competitive advantage through active resource management actions, including structuring, bundling and leveraging external technology resources. This explains the reasons why enterprises with similar strategies and resources have different performance.

After resource orchestration theory is used to analyze the impact of technology purchase on enterprise competitive advantage, a large number of scholars have carried out researches on it, trying to reveal a new paradigm for the realization of enterprise resource value. However, due to the late start of resource orchestration, the existing researches mainly focus on the concept interpretation and application scenarios of resource orchestration, while there are not many studies on how resource orchestration influence enterprise technology purchase. On the basis of reviewing the development context of resource theories, this study combs the evolution logic of resource theories from three stages. It is hoped that through the in-depth interpretation of resource orchestration theory, this study combs out the mechanism of resource orchestration on technology purchase, so as to promote the further development and improvement of external technology purchase.

2 DEVELOPMENT CONTEXT OF RESOURCE THEORIES AND THEIR APPLICATION IN TECHNOLOGY PURCHASE

Technology resource is one of the key factors affecting the competitive performance of enterprises. Reviewing the existing literatures, it is found that the academic community has experienced a deepening process of understanding the importance of enterprise resources in the process of obtaining competitive advantage. This study divides the development context of resource theories into three stages: cognition of the relationship between resources and environment, resource endowment identification, active resource management.

2.1 Cognition of the relationship between resources and environment stage

Early scholars studied the role of enterprise resources in competition and development from the relationship between enterprises and external environment. Coase[3] put forward the transaction cost theory in on the nature of enterprise, based on the assumption of enterprise resource homogeneity. He believed that enterprises should strive to improve the governance level, focus on the business they are good at, and reduce the transaction cost through professional division of labor, so as to survive. At that time, he believed that external technology purchase will lead to an increase in transaction costs. Then, resource dependence theory holds that the survival of enterprises depends on obtaining resources from the external environment, and enterprises should try to find alternative resources to reduce resource dependence[4], external technology purchase is encouraged. From the perspective of transaction cost theory and resource dependence theory, they pay attention to the interaction between the enterprise and the external environment, and believe that the enterprise needs to exchange resources with the external environment to maximize resource efficiency. However, the perspective does not consider the heterogeneity of resources and ignores the subjective initiative of resource managers. The efficiency difference between enterprises is not necessarily determined by the ability of

enterprises, but also related to other factors of enterprises, such as the resource attribute of enterprises heterogeneous resources.

2.2 Resource endowment identification stage

Penrose[5] first paid attention to the resource attributes of enterprises, regarded enterprises as a collection of various resources, and constructed an analysis framework of enterprise resources, capabilities and growth. He believed that internal resources were the driving force of enterprise growth. From then on, he shifted the focus of organizational research from the external environment to the internal resources of enterprises. Wernerfelt[6] put forward resource-based theory (RBT) and believed that the heterogeneous resources owned by enterprises determine the differences of enterprise competitiveness. Managers should pay attention to enterprise resources rather than products. At this stage, external technology purchase is not promoted. However, the RBT ignores the impact of the external environment on the construction of competitive advantage. Based on this, Hart[7] put forward natural resource-based theory (NRBT) and believed enterprises should avoid the adverse factors that may damage their long-term competitive advantage through interaction with the natural environment. However, although NRBT can help enterprises reduce their competitive disadvantage, it does not specify the way to obtain competitive advantage. At the same time, Grant[8] put forward knowledge-based theory, which emphasizes the difference between knowledge and general resources, and regards knowledge as the most important resource of the enterprise. The fundamental purpose of enterprise operation is to create and use knowledge. Knowledge-based theory regards knowledge as the most important source of enterprise competitive advantage. When scholars deeply analyzed the impact mechanism of resources on enterprise competitive advantage, they found that the resource development and management ability is the deep source of competitive advantage, so they turned to the research perspective of enterprise capability[9]. Teece et al.[10] believe that if enterprises want to win in a dynamic environment, they must effectively coordinate and allocate resources to deal with environmental changes, thus external technology purchase is needed. This capability is dynamic capability. Dynamic capability theory focuses on the capability that brings sustainable competitive advantage to enterprises, and believes that this dynamic capability is also an enterprise resource. However, the dynamic capability theory pays too much attention to the change of environment, thinks that there is no core capability that can play a lasting role, and ignores the unique competitive advantage brought by the non-imitation of heterogeneous resources.

2.3 Active resource management stage

Sirmon et al.[2] integrated the analytical framework of resource management and asset orchestration, put forward the concept of resource orchestration. They believed that resource orchestration is a process of structuring, bundling and leveraging enterprise resources. This resource management process continues to act on all dimensions of enterprise management in terms of enterprise breadth, depth, life cycle, and can affect the competitive advantage of enterprises. As a new research perspective, resource orchestration theory pays attention to the management behavior of managers on enterprise resources and studies the process of how enterprise resources are transformed into competitive advantage, which helps managers formulate management strategies and obtain competitive advantage according to the situation

of enterprise resources. From this perspective, technology purchase requires managers to actively manage technology resources in order to form the competitive advantage of enterprises.

3 EVOLUTION OF RESOURCE ORCHESTRATION THEORY IN TECHNOLOGY PURCHASE

Resource orchestration refers to the resource management actions of managers to form competitive advantage by structuring, bundling and leveraging enterprise technology resources. The generation process of resource orchestration concept is shown in Table 1:

Helfat[15] put forward the asset orchestration theory, which holds that the enterprise's dynamic capability includes resource search / selection, configuration / deployment, and turns the research focus to the specific operation perspective of resource management. However, the asset orchestration theory ignores the research on the stripping action of non-essential resources, such as technology resource. At the same time, starting from the RBT, Sirmon et al.[14] believe that only owning resources cannot create value for enterprises, and the effective management of resources is the real source of enterprise competitive advantage. Therefore, they put forward the resource management theory, which summarizes the action of resource management as building resource combination, binding resources to build capacity, leveraging ability to provide value for customers, obtaining competitive advantage and create wealth for owners, this puts forward the view of connecting enterprise resource management action with value creation. Furthermore, Sirmon et al.[16], Sirmon and Hitt[17] pointed out that the management must effectively bundle and deploy the organization resources to obtain competitive advantage, such as technology purchase. Maritan and Peteraf[18] combined the strategic factor market with the resource accumulation process and found that enterprises need to reasonably allocate and bundle resources to obtain heterogeneous resources. Nambisan and Sawhney[19] summarized the specific steps of enterprise resource management as follows: formulating key objectives, decomposing basic tasks, managing innovation leverage, managing innovation coherence, and managing innovation specificity. However, resource management theory ignores the interaction between enterprise resources and external environment, and has poor applicability for resource interaction between enterprises and cross departmental resource management within enterprises.

TABLE 1. THE PRODUCTION PROCESS OF RESOURCE ORCHESTRATI

Scholar and year	Main contribution
Montealegre[11]	Leadership, organizational culture, data information, long-term orientation, social network and other resources help enterprises develop new capabilities and ultimately generate competitive advantages through cumulative and expanded management methods.
Sirmon & Hitt[12]	Resources must be effectively managed to build competitive advantage, including evaluating existing resources, adding new resources, stripping unnecessary resources, bundling resources and leveraging resources.
Baker & Nelson[13]	Resource bricolage helps resource constrained enterprises to recombine existing resources to achieve their goals.

Sirmon et al.[14]	Link the value creation in the dynamic environment with enterprise resource management, including insufficient dynamics, insufficient interpretation of emergencies, unclear role of managers.
Helfat et al.[15]	The asset orchestration actions include search and selection, configuration and deployment.
Sirmon et al.[16]	Resource management action is the key to generate and maintain enterprise competitive advantage. The management must effectively bundle and deploy the organization's resources.
Sirmon & Hitt[17]	Enterprises manage resources through asset orchestration, which is very important to improve enterprise performance.
Maritan & Peteraf[18]	Combining the strategic factor market with the resource accumulation process, it is found that enterprises need to reasonably allocate and bundle resources to obtain heterogeneous resources.
Nambisan & Sawhney[19]	Summarize the orchestration actions of enterprises in the social network: formulating key objectives, decomposing basic tasks, levering management innovation, coherence management innovation.
Sirmon et al.[2]	Integrate the research framework of resource management and asset orchestration, and put forward the framework of resource orchestration.

After Sirmon et al.[2] formally proposed the concept of resource orchestration, although Hit[20] thought it was only a synonym for resource management, Sirmon et al.[2] and Ndofor et al.[21] repeatedly proved that the research framework of resource orchestration is different from resource management and asset orchestration. More and more scholars begin to agree with the resource orchestration theory, and start with the structuring, bundling and leveraging technology resource, study the function mechanism of resource orchestration in the process of enterprise resource management.

4 THE MECHANISM OF RESOURCE ORCHESTRATION AND DATA INFORMATION PROCESSING IN TECHNOLOGY PURCHASE

As more and more scholars begin to accept the concept of resource orchestration and recognize the important role of resource orchestration and data information processing in the process of building performance through resource management actions, scholars begin to study the specific mechanism of resource orchestration in technology purchase. In order to clarify the function mechanism of resource orchestration, it is necessary to clarify the specific resource management actions of resource orchestration. When proposing the concept of resource orchestration, Sirmon et al. (2011) pointed out that the actions of resource orchestration include structuring, bundling and leveraging (Figure 1):

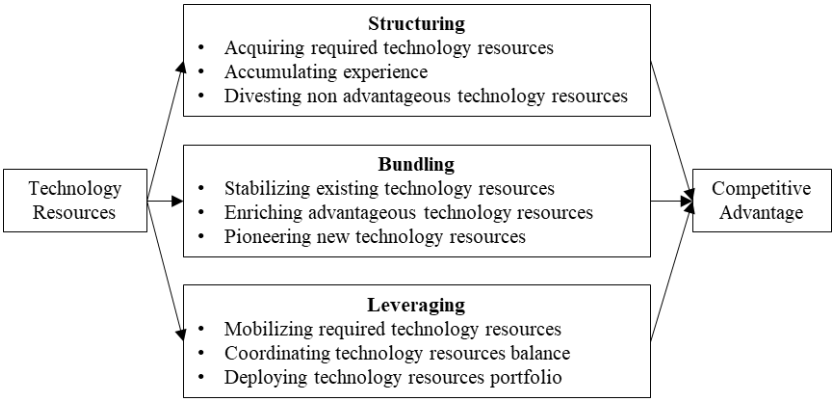

Figure 1. Mechanism of resource orchestration

4.1 Resource structuring

The first resource orchestration action and data information processing is structuring. That is, reorganizing the existing resources of the enterprise to form a resource portfolio, such as purchase external technology. Managers structure the existing resources of the enterprise through the structure of resources to form an effective resource portfolio. Resource structuring includes three processes: acquiring, accumulating and divesting. Among them, acquiring means that enterprises directly obtain the required resources from strategic factor markets (SFMs), including government support, R&D, natural resources, technology resource, etc. These resources are the necessary elements to support enterprises to implement strategic decisions (Maritan and petersaf, 2011). Accumulating means in addition to directly obtaining resources from the outside, enterprises also need to carry out internal resource development and experience accumulation to help enterprises continuously enrich resources, such as external technology purchase. The accumulating needs to establish a perfect internal management and operation mechanism to ensure the integrity, inheritance and sustainable development of the enterprise's internal knowledge system. Divesting means enterprises need to divest low value resources according to their own conditions, so as to ensure that managers focus on high-value resources, improve resource utilization, and make the implementation of enterprise strategy simpler and more efficient.

4.2 Resource Buldling

The second resource orchestration action and data information processing is bundling, which is to absorb the structured resources to form the company's specific capabilities. Resource bundling includes three processes: stabilizing, enriching and pioneering. Stabilizing is to ensure the stability and timeliness of enterprise technology resource. Enterprises regularly sort out technology resources to ensure that enterprise resources remain stable. At the same time, it is necessary to ensure that resources can be updated at any time. For example, enterprises technology resources need to remain stable, and the increased technology resources need to be updated in time. Enriching is to enhance the ability of existing technology resources, timely apply new technology resource through learning and training, expanding the scope of

technology resources, and continuously enriching the enterprise resources. Pioneering is enterprises' ability to integrate and develop new resources. By stabilizing, enriching and pioneering resources, enterprises can not only consolidate and expand their existing capabilities, but also integrate new technology resource to form new capabilities.

4.3 Resource Leveraging

The third resource orchestration and data information processing action is leveraging. When the enterprise's technology resources are structured and bounded, these resources cannot directly create value for the enterprise, but need to be effectively utilized to form the competitive advantage of the enterprise. Resource leveraging includes three processes: mobilizing, coordinating and deploying. Mobilizing is to determine the strategy of resource utilization. Enterprise managers identify the capabilities needed to obtain competitive advantage by analyzing market opportunities, and then find ways to obtain these capabilities. Coordinating is the integration of enterprise managers' ability through effective and efficient mobilization ability in a way that competitors cannot easily imitate. Deploying refers to the practical application of the enterprise's ability by making use of the enterprise's technology resource combination advantages, market opportunities and strategies to create value for the enterprise in order to achieve strategic objectives. In this way, resource leveraging integrates enterprise external technology.

5 CONCLUSION AND FUTURE RESEARCH

Resource orchestration and data information processing explains the reasons why enterprises with similar technology resources have different performance, and makes up for the defect that resource-based theory ignores resource management behavior. It also provides operational guidance for enterprises to purchase, absorb and integrate technology resources. However, there are some deficiencies in the existing literature on the mechanism of resource orchestration, which points out the direction for the future researches on it.

Firstly, the applicable situation of the mechanism of resource orchestration remains to be clarified. In the future, it is necessary to further clarify the conceptual differences between resource orchestration and other resource management action, which will not only help to improve the specific actions of resource orchestration, but also help clarify the importance of resource management in the process of transforming enterprise resources into competitive advantage.

Secondly, the specific mechanism of technology resource orchestration still needs to be deeply excavated. Future researches need to deeply explore the specific mechanism of technology resource orchestration and clarify the specific resource management process, figure out how technology resource orchestration transforms into competitive advantage.

Finally, the empirical study of technology resource orchestration needs to be further promoted. Because the technology resource orchestration results of different enterprises are different, there are still many fuzzy places in the measurement of technology resource orchestration. Therefore, it is necessary for future researches to take the measurement of technology resource

orchestration in different resource management situations as an important research direction, so as to promote the relevant empirical research of resource orchestration theory.

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