How do keystones govern their business ecosystems through resource orchestration?

Abstract

Purpose - Sharing resources with stakeholders is the key for keystones to govern business ecosystems successfully. However, existing research has not paid further attention to how keystones share resources under the condition of resource sufficiency and how keystones balance resource sharing with complementors when they lack resources. Therefore, this paper aims to explore how keystones govern their business ecosystems under the conditions of resource sufficiency and resource insufficiency.

Design/methodology/approach - This paper adopts the single case study method. First, by adopting Gioia coding to analyze the relevant data of the case sample, this paper obtains the key concepts of the business ecosystem governance process. Then, it establishes the relationship between the concepts by analyzing the governance process of the case sample.

Findings – Under the condition of resource sufficiency, keystones should make full use of resources to incubate more complementors, and further integrate the resources of the business ecosystem, to create more value for their business ecosystems. Under the condition of resource insufficiency, keystones should break the boundaries of business ecosystems and acquire external resources, to meet the resource needs of complementors. Subsequently, keystones should redeploy idle resources according to the actual needs of complementors, to meet the changing resource needs of complementors.

Originality/value - This study subdivides business ecosystem governance conditions and further constructs the business ecosystem governance process model, which provides a theoretical and practical reference for business ecosystem governance.

Keywords Business ecosystem governance, Resource condition, Resource orchestration

Paper type Research paper

1. Introduction

In recent years, the rapid development of information technology has prompted many firms to interconnect and form a business ecosystem. A business ecosystem is an economic community supported by a foundation of interacting organizations and individuals (Moore, 1996). It plays a critical role in helping stakeholders acquire complementary resources (Adner, 2006; Mukhopadhyay and Bouwman, 2019), maintain a stable value network (Peltola, et al., 2016; Xu, 2019), reduce transaction costs (Williamson and De Meyer, 2012), and gain competitive advantages (Williamson

and De Meyer, 2012; Rong, et al., 2013). A keystone, as the organizer of a business ecosystem, plays an important role in effectively governing the business ecosystem and helping stakeholders obtain the above benefits (Pomegbe et al., 2021). However, in practice, a large number of keystones, such as BlackBerry (Jacobides, 2013) and LeEco, encountered failure in the governance process. It was a challenge for them to balance resource sharing with complementors[1]. Meanwhile, it is also a dilemma for any keystone to share resources with complementors and keep resources within the organizational boundary to speed up its own development.

Keystones play a critical role in maintaining the health of the business ecosystem by effectively governing the balance of resource sharing between themselves and complementors. By sharing resources with others, keystones are capable of attracting and retaining complementary firms and resisting the aggression of other keystones (Wareham et al., 2014; Valkokari, 2015; Mukhopadhyay and Bouwman, 2019). However, in practice, the resource sharing of keystones is by no means an easy task, and two dilemmas will appear. First, when keystones possess sufficient resources, how should keystones share resources to help their business ecosystems create greater value? Second, when keystones lack resources, they should share more resources with complementors to maintain a competitive advantage or keep more resources to facilitate their own development (Mukhopadhyay and Bouwman, 2019). If the keystones fail to deal with resource constraints, it will directly lead to the disappearance of business ecosystems (Wareham et al., 2014). To solve these dilemmas, it is valuable to investigate how keystones govern business ecosystems when they lack resources or possess sufficient resources.

In recent years, existing studies have paid attention to the importance of resource sharing in business ecosystem governance (Huber et al., 2017; Colombo et al., 2019; Mukhopadhyay and Bouwman, 2019). Stakeholders within the business ecosystem collaborate with each other to obtain complementary resources (Moore, 1993), and keystones further promote collaboration among stakeholders through resource sharing (Wulf and Butel, 2017). Some scholars further pointed out in their research that resource sharing can support the development of complementors (Mukhopadhyay and Bouwman, 2019), attract complementors (Mukhopadhyay and Bouwman, 2019), acquire complementary innovation (Ander, 2006), and realize value co-creation (Babu et al., 2020; Huang et al., 2020). However, two issues remain unclear. The first is how keystones govern business ecosystems with sufficient resources. The second is to extend the studies exploring how to govern business ecosystems when keystones lack resources.

The resource orchestration perspective is suitable to examine how keystones govern

[1] The defining characteristic of complements is that if the levels of any subset of the activities are increased, then the marginal return to increases in any or all of the remaining activities rises. (Adner and Kapoor, 2010; Milgrom and Roberts, 1990)

their business ecosystems under the condition of resource sufficiency and resource insufficiency. The resource orchestration perspective is a dynamic resource perspective that emphasizes the role of managerial actions in utilizing resources to achieve strategic objectives (Sirmon et al., 2011; Baert et al., 2016). First, the dynamic nature of the resource orchestration perspective shows the dynamic process of business ecosystem governance. Then, the resource orchestration perspective emphasizes the role of resource actions and resource elements in gaining competitive advantages, which shows how keystones orchestrate the resources of multiple organizations to overcome resource constraints and gain competitive advantages. Therefore, we try to answer the question, "***How do keystones govern their business ecosystems through resource orchestration under the conditions of resource sufficiency and resource insufficiency?***".

To answer the research question, this study adopts a single case study strategy by analyzing the governance process of the Alpha Group (Alpha) business ecosystem. Meanwhile, this study benefits both academics and practitioners in business ecosystem governance. Theoretically, this paper subdivides the resource conditions of business ecosystem governance into resource sufficiency and resource insufficiency, and further constructs a process model of business ecosystem governance under the two resource conditions, which is the "governance strategy-resource orchestration-governance capability". Practically, this paper provides a reference for keystones to successfully govern the business ecosystem under the two resource conditions.

2. Theoretical background

2.1 Business ecosystem governance

Moore first proposed the concept of business ecosystem in 1993 (Moore, 1993). The business ecosystem is "an economic community supported by a foundation of interacting organizations and individuals" (Moore, 1996), and it is characterized by looseness (Pomegbe et al., 2021), diversity (Zhang and Liang, 2011), and dynamic (Rong et al., 2018). Moreover, the business ecosystem also contains diversified roles, such as keystone, dominator, and niche (Iansiti and Levien, 2004a). Among them, a keystone is the organizer of a business ecosystem, and its governance actions play a critical role in guaranteeing the healthy development of the business ecosystem (Iansiti and Levien, 2004b; Pomegbe et al., 2021).

Keystones can bring many benefits to the development of the business ecosystem through effective governance, such as improving the efficiency of resource utilization (Baars and Jansen, 2012), coordinating the internal cooperation relationship (Letellier, 2008), and resisting changes in the external environment (Chang and Uden, 2008). Vos (2006) described the business ecosystem governance as being able to provide network members with a common goal, motivation and vision to work together so that they could freely reach the goal on their own initiatives and their motivation would not be

hindered while using steering mechanisms to ensure that their activities reached this common goal, in an effort to improve the business ecosystem's capability of coping with exogenous changes and the internal pace of innovation.

Existing research on business ecosystem governance has mainly focused on the following governance patterns: resource governance, data governance, relationship governance, contractual governance, embedded governance, and ambidexterity governance (Table 1). Resource governance is not only concerned that keystones should invest significant resources to attract the best complementors and realize value co-creation (Mukhopadhyay and Bouwman, 2019) but also concerned that keystones evaluate the contribution value of the complementors to govern stakeholders who refuse to provide resources for their own benefits (Gueler and Schneider, 2021). Lee et al. (2017) identified seven data governance factors for the platform ecosystem through a literature review. The decisions related to the governance of inter-organizational relationships in the business ecosystem determine the success or failure of the ecosystem. Therefore, the business ecosystem needs to find a governance mechanism that can maintain a balance among stakeholders to ensure the health of the business ecosystem (Abdul-Rasheed et al., 2017). Furthermore, Pomegbe et al. (2021) pointed out that a keystone could adopt different governance strategies for different relationships because the interaction between the keystone and stakeholders is independent. Goldbach et al. (2017) emphasized that keystones could control stakeholders through contractual governance. Pomegbe et al. (2021) further pointed out that opportunistic behavior reduced the effect of contractual governance on the coordination development of the business ecosystem. Donada and Attias (2015) proposed that embedded governance promoted radical innovation in the business ecosystem by facilitating interaction among stakeholders. Governance mechanisms have been regarded as a balance of control in network exchanges (Pomegbe et al., 2021). Thus, scholars have focused on the balanced governance of ambidexterity. Huber et al. (2017), in their studies on governance practices in the ecosystem, revealed that ambidexterity between cocreated value and governance costs is more successfully addressed if practices are sensitive to ecosystem-wide values.

Existing studies have emphasized the importance of resource sharing (Huber et al., 2017; Colombo et al., 2019; Mukhopadhyay and Bouwman, 2019). When keystones have sufficient resources, they can attract complementors (Mukhopadhyay and Bouwman, 2019), obtain complementary innovation (Ander, 2006), and promote collaboration between complementors (Wulf and Butel, 2017) by fully sharing the resources. Ander (2006) pointed out that resource sharing can help keystones overcome their own critical bottlenecks. Huang et al. (2020) also proposed that resource sharing can promote the co-creation of value within the ecosystem. Resource sharing is not only beneficial to keystones but also helps niches to obtain keystones' resources (Suh and Sohn, 2015) to influence the emergence of new markets and integration types (vertical

or horizontal) (Galateanu and Avasilcai, 2016). However, how keystones share resources has not yet been answered.

Table 1. Governance pattern of business ecosystem governance

Governance pattern	Finding
Resource governance	● Investing significant resources to attract the best complements and realize value co-creation (Mukhopadhyay and Bouwman, 2019). ● Evaluating the contribution value of the complements to govern stakeholders' refusal to provide resources for their own benefits (Gueler and Schneider, 2021).
Data governance	● Seven factors: data ownership and access definition, definition criteria, contribution estimation, data use case, conformance, monitoring, data provenance (Lee et al., 2017)
Relationship governance	● Building a governance mechanism to keep balance among stakeholders to ensure the health of the business ecosystem (Abdul-Rasheed et al., 2017). ● Making different governance strategies to be adopted for the diverse relationships (Pomegbe et al., 2021).
Contractual governance	● Contractual governance can control stakeholders (Goldbach et al., 2017). ● Opportunistic behavior can reduce the effect of contractual governance (Pomegbe et al., 2021).
Embedded governance	● Facilitating interaction among stakeholders to promote radical innovation (Donada and Attias, 2015).
Ambidexterity governance	● Balancing ambidexterity between cocreated value and governance costs by being sensitive to ecosystem-wide values (Huber et al., 2017).

As the market environment is uncertain, keystones may also encounter resource insufficiency. In the case of resource insufficiency, although the keystones fully share the resource with complementors that can strengthen complementors links, the remaining resources to support their core businesses are extremely limited (Mukhopadhyay and Bouwman, 2019). In contrast, if more resources are reserved to satisfy its own development, it will inevitably reduce the resources shared with complementors, weaken the links with complementors (Kapoor and Furr, 2015), and further threaten the stability of the business ecosystem. However, existing research has not paid attention to how keystones govern business ecosystems under the condition of resource insufficiency.

2.2 From the resource-based theory to the resource orchestration theory

Resources play an important role in the healthy development of the business ecosystem (Gueler and Schneider, 2021). Therefore, some scholars adopt the resource-based theory (RBT) to carry out relevant research on business ecosystems (Gueler and Schneider, 2021). The RBT emphasizes that the sustainable competitive advantages of a firm come from its valuable, rare, imperfectly imitable, and non-substitutable resource endowments (Barney, 1991). However, some scholars have recently noticed that the theory cannot explain why firms possessing similar initial resource endowments produce different performances (Kraaijenbrink et al., 2010). Therefore, in their studies, several scholars reveal that the mere possession of valuable, rare, imperfectly imitable,

and non-substitutable resources do not guarantee the development of competitive advantages (Sirmon et al., 2011). Based on the results of empirical research, Hansen et al. (2004) found that "what a firm does with its resources is at least as important as which resources it possesses". Along this line, Sirmon et al. (2011) combined resource management and asset orchestration to put forward the resource orchestration theory. The theory focuses on resource-focused actions and points out that resource-focused actions are closely related to achieving competitive advantages and value creation (Sirmon et al., 2007).

The resource orchestration theory emphasizes the role of managerial action in mobilizing and leveraging firm resources to achieve strategic objectives (Hansen et al., 2004; Sirmon et al., 2011; Baert et al., 2016). Sirmon et al. (2011), in their study, proposed a framework to describe resource orchestration actions: structuring, bundling and leveraging. Structuring is a resource portfolio that is formed by acquiring, accumulating and divesting. Bundling refers to developing capability through the effective utilization of resources, including stabilizing, enriching, and pioneering. Leveraging encompasses leveraging capabilities to achieve value creation, including mobilizing, coordinating, and deploying. In recent years, the resource orchestration theory has been widely applied in many research fields, such as innovation (Andersén and Ljungkvist, 2021), entrepreneurship (Baert et al., 2016), information behavior (Pan et al., 2020), supply chains (Wong et al., 2018), and alliances (Zhao et al., 2021). These studies mainly focus on the important role of resource-focused actions in enterprise capability building and performance improvement.

After the resource orchestration theory was put forward, scholars carried out a series of empirical studies based on the theory, which mainly focused on analyzing the antecedent variables and outcome variables of resource orchestration. In the study of antecedent variables, strategy has received widespread attention from scholars. Strategy is an important prerequisite to realize resource orchestration (Cui et al., 2017; Chirico et al., 2011). To promote the long-term development of organizations, resource-focused actions must be aligned with organizational strategies (Sirmon and Hitt, 2009; Cui et al., 2017), and these strategies need to guide resources to gain competitive advantages over competitors (Sirmon and Hitt, 2009). For example, Du et al. (2018) pointed out that Haier and Supor adopted an integration strategy and segmentation strategy, respectively, to guide matching resource-focused actions to resolve channel conflicts.

Capability is one of the important outcome variables in resource orchestration research. In the resource orchestration theory, Sirmon et al. (2011) pointed out that enterprises need to build and leverage capabilities to create value through resource-focused actions. Therefore, capability has been widely used as the outcome variable of relevant research on resource orchestration. For example, Zhang et al. (2021) proposed generating strong artificial intelligence capabilities by coordinating, leveraging, and deploying resources and then creating business value by interacting and coevolving

with human capabilities. Cui et al. (2021) analyzed the important role of resource-focused actions in the formation of traditional organizational digital transformation capabilities (i.e., the capability for response to the market, the capability for agile reaction, and the capability for adjustment).

Although some scholars did not explicitly mention the conception of resource orchestration, they have implicitly shed light on it in the relevant research of business ecosystem governance. For example, sharing, mobilizing, incubating, identifying and integrating. Sharing resources can motivate potential entrants to enter the ecosystem (Borgh et al., 2012) and improve the health of the business ecosystem (Den Hartigh et al., 2006). Mobilizing diversified knowledge resources can accelerate innovation and improve service levels (Williamson and De Meyer, 2012). Incubating complementary partners, identifying leading partners, and integrating ecosystem partners are critical steps to nurture business ecosystems in foreign markets (Rong et al., 2015).

By reviewing the literature on business ecosystem governance and resource orchestration, first, it is found that existing research mainly focuses on the roles (Iansiti and Levien, 2004b), patterns (Lee et al.,2017; Pomegbe et al., 2021), and benefits (Baars and Jansen, 2012) of business ecosystem governance (i.e., the "what" problem), but not pay further attention to how keystones should govern business ecosystems (i.e., the "how" question). Second, existing research has a common default premise when emphasizing the benefits of resource sharing (Huber et al., 2017; Colombo et al., 2019); that is, the keystones have sufficient resources. In fact, keystones will also encounter resource insufficiency. However, the research has not paid attention to the condition of resource insufficiency and how to govern business ecosystems under the conditions of resource sufficiency and resource insufficiency. Therefore, it is necessary to carry out relevant research to explore how keystones govern their business ecosystems under the conditions of resource sufficiency and resource insufficiency. Furthermore, business ecosystem governance is a dynamic process (Huber et al., 2017). Therefore, the dynamic nature of the resource orchestration perspective is suitable for this study to reveal how keystones play the important role of resource elements in the business ecosystem governance through resource-focused actions under the conditions of resource sufficiency and resource insufficiency.

3. Research Methodology

The single case study method is particularly appropriate for this study for three reasons. First, this paper aims to answer the "how" question (i.e., "***How do keystones govern their business ecosystems through resource orchestration under the conditions of resource sufficiency and resource insufficiency?***") (Yin, 2009), and the case study method is particularly useful for addressing such a question (Baxter and Jack, 2008; Cochet and Garg, 2008). Second, the single case study method provides a more precise and deep understanding of the circumstance in which the phenomena occurred and then

it makes the conclusion more reliable (Mariotto et al., 2014). Third, the availability of case samples of keystones that can successfully govern the condition of resource sufficiency and resource insufficiency is low; thus, adopting the single case study method is suitable.

Given the research question, three criteria form the basis for case selection. First, the case sample, as a keystone, must have established its business ecosystem. Second, the case sample encountered the condition of resource sufficiency and resource insufficiency in the business ecosystem governance process. Third, the case sample successfully governed the two resource conditions. The case of Alpha is particularly appropriate for our purpose because, first, the Alpha business ecosystem was established in 2015. Second, during the large e-commerce promotion festival (i.e., November 11th), Alpha faced a shortage of customer service resources and IT resources due to a surge in brand sales within the Alpha business ecosystem. Alpha has sufficient online operation resources (i.e., brand operation, marketing plan design, and page design) during the non-large e-commerce promotion festival. Third, Alpha has become an influential internet brand ecological operation group in China, and its successful governance process can provide detailed case material support for this paper.

3.1 Organization background of the case sample

Alpha, headquartered in Jinan, China, was established in 2008. During the initial stage of the establishment, Alpha was merely a small-scale overseas purchasing agent. Over the next ten years, the company successively transformed into a single brand owner, a multiple-brand owner, and a keystone of a business ecosystem. Alpha has become the largest internet fashion brand development, operation, and management company in China (Figure 1).

In 2008, Mr. Zhao returned to China from South Korea. With the connections, resources and experience accumulated in South Korea, he founded Alpha and began to engage in the overseas purchasing agent business. Every day, Alpha's staff selected 200 clothes from 1000 Korean women's clothing brands and sold them on Taobao (an e-commerce platform). Because the Korean Wave was very popular at that time, the clothes of Alpha were loved by young Chinese women. At the end of 2008, Alpha made a profit of 3 million RMB (US$ 471,000).

In 2009, Alpha accumulated some online operation experiences. At the same time, the overseas purchasing agent business became increasingly competitive and less profitable. Therefore, Mr. Zhao decided to set up its first women's clothing brand, the H brand. The company followed Zara's "fast fashion sales model", featured by multi-style, small-lot, and multi-batch. By the end of 2011, the H brand had achieved sales of 280 million RMB (US$ 44,000,000).

Since a single brand could only cover young female consumers and the sales met the ceiling after a three-year operation, Alpha began to develop multiple brands in 2012 to cover more consumers. Based on the successful operation experience of the H brand,

Alpha adopted a fast fashion sales model to incubate new brands. By the end of 2014, Alpha had established 20 self-owned brands (including four joint-venture brands), such as A (a men's clothing brand) and M (a child clothing brand). To support the development of self-own brands, Alpha constantly improved its online operation system, such as brand positioning, page design, photography, customer service.

Alpha established Alpha business ecosystem in mid-2015 (Table 2). At that time, the competition in the internet brand industry intensified, and the development trend of the multiple brands in Alpha became flat. To develop the Alpha business ecosystem and maximize the role of the systems, professional operation talents, and operation resources within the ecosystem, Alpha decided to fully open its online operation system, including Alpha Intelligence (provide digital and information services), Alpha Media (provide brand planning and promotion services), Alpha Operation (provide professional online brand operation), Alpha Imaging (provide visual imaging services), Alpha Manufacturing (provide production services), Alpha University (provide practical operation and training services for brands), Alpha Storage and Transportation (possess 60,000 square meters of automated storage), Alpha Customer Service (provide high-quality customer service), and Alpha Finance (provide finance services). The online operation system could provide start-up brands, traditional brands, and international brands with one-stop online operation services.

In addition, the Alpha business ecosystem also had rich e-commerce platform resources, customer resources, logistics resources, supplier resources, and social resources. First, Alpha established a good cooperative relationship with e-commerce platforms, such as Taobao, Tmall, JD, Xiaohongshu, and Vipshop. Second, the brands under Alpha Group won the favor of Chinese consumers with their advantages of various styles and high-cost performance. For example, in 2020, the H brand became the first brand with more than 24 million fans in the Tmall women's clothing category. Third, Alpha has established a cooperative relationship with many logistics enterprises, such as ZTO. Express, YTO. Express, and Express Mail Service. Meanwhile, the Alpha intelligence system can match cheap and fast logistics enterprises based on where customers receive goods. Fourth, Alpha had 240 high-quality suppliers with advanced production equipment and technology, low customer return rate, high delivery rate, etc. Fifth, Alpha has established cooperative relationships with local universities to recruit talent.

As of the end of 2020, the Alpha business ecosystem had more than 3,000 employees and nearly 200 brands, including self-owned brands and agency operation brands. Among them, self-owned brands mainly focus on the clothing industry, including the H brand (Korean fast fashion women's clothing), N brand (European and American fast fashion women's clothing), A brand (Korean fast-fashion men's clothing), M brand (Korean style fast fashion children's clothing), D brand (Korean style fashion mother clothing), etc. The agency operation brands cover a variety of industries, such

as YM (agriculture), TI brand (jewelry industry), Y brand (education industry), DG brand (catering industry), TN brand (automobile industry), Z brand (chemical industry), MS brand (clothing industry).

Table 2. The role in the Alpha business ecosystem

Serial number	Role	Role in Alpha business ecosystem
1	Alpha	● Alpha governs Alpha's business ecosystem to maintain and promote the development of the business ecosystem
2	Self-owned brand	● Self-owned brands can increase the brand diversity and profit of Alpha's business ecosystem. ● Alpha provides online operation services for self-owned brands.
3	Agency operation brand	● Agency operation brands can increase the brand diversity and profit of Alpha's business ecosystem. ● Alpha provides online operation services based on the needs of agency operation brands.
4	E-commerce platform	● E-commerce platforms provide sales platform and promotion suggestions for brands of the Alpha business ecosystem. ● Alpha helps e-commerce platforms obtain more brands.
5	Customer	● Customers purchase products and services of the brands of Alpha business ecosystem and provide feedback to promote brands development. ● Alpha helps customers enjoy more cost-effective products and services.
6	Logistics enterprise	● Logistics enterprises provide logistics services to the Alpha business ecosystem. ● Alpha helps logistics enterprises obtain more orders.
7	Supplier	● Suppliers provide production services to the Alpha business ecosystem. ● Alpha promotes the development of suppliers through regular comprehensive evaluation and reward and punishment mechanisms.
8	Local university	● Local universities provide online operation talent to the Alpha's business ecosystem. ● Alpha helps local universities increase employment rates.

3.2 Data collection

The data of this study mainly came from two aspects: secondary data and interview data. Multiple data sources can triangulate all data to avoid errors, inaccuracy, and data ambiguity in the research and improve the reliability and validity of the research conclusions (Yin, 2017).

(1) Secondary data

Secondary data are an important data source in the data collection process. It can help researchers have a preliminary understanding of the case sample before the formal interview and can help formulate the formal interview outline based on the business ecosystem background and the resource orchestration perspective. The secondary data of the case sample came from the following three aspects: the official website of the

case sample, the public speeches of the leaders, and the books of the case sample (Table 3).

Table 3. The secondary data of Alpha

Categories	Title and source	Descriptions
The official website	https://baike.so.com/doc/2951627-3114021.html	Alpha's official website helped us understand the development history, main business, key events, and operation brands of Alpha.
The public speech of the leaders	http://finance.sina.com.cn/focus/hdys/ http://www.chinasspp.com/News/Detail/2018-3-2/405988.htm https://v.youku.com/v_show/id_XMTI2NTY1Nzc5Mg%3D%3D.html	These articles and videos helped us understand the contents and methods of brand operation, sales fluctuation and brand development strategy, etc.
Book	《Mr. Zhao said Alpha: an e-commerce growth review and future prospects》	This book gave a detailed description of Alpha and other brands.

(2) Interview data

Alpha's formal interview data were mainly collected in two stages: comprehensive data collection (March 12 to 15, 2017) and supplementary data collection (July 20, 2017). In the first stage, we interviewed 13 interviewees and developed a matching interview outline for each interviewee (Table 4), and the interview time of each interviewee was approximately 40-120 minutes. To supplement the data, we conducted a supplementary interview with the manager of the agency operation department by WeChat.

3.3 Data analysis

We adopted the Gioia coding method for data analysis (Gioia et al., 2013). First, we carried out first-order coding of the raw data and obtained dozens of first-order concepts. For example, "serving new brands to gain profits", "providing resources for new brands" and "providing services for more brands". Second, we analyzed the first-order concepts and further obtained eight second-order theorizing-centered themes that can describe and explain phenomena (Gioia et al., 2013), including keystone strategy, adapting strategy, incubating, integrating, acquiring, redeploying, efficiency capability, and flexibility capability. Third, the second-order themes were classified into three aggregate dimensions, including "governance strategy", "resource orchestration," and "governance capability". The governance strategy and governance capability were newly developed by the second-order theme coding. This paper defines the governance strategy as a goal and direction for a keystone to defend its dominance within the ecosystem and balance the competition and cooperation among stakeholders. Governance capability refers to the keystones that facilitate the development of business ecosystems by orchestrating resources among stakeholders. We constructed the data structures shown in Figure 1 and Figure 2.

Table 4. Interviewees and interview questions

Position of interviewees	Duration of the interview	Questions
CEO	120 mins	▪ Could you please introduce the development history of Alpha? ▪ Why did you want to build a business ecosystem? how did you do it? ▪ What role did you think Alpha played in the development of the business ecosystem? ▪ What impressed you most? Could you give an example? ▪ Was there any difference in resource allocation between Alpha's own brands and other brands? ▪ When resources were limited, how did Alpha allocate resources between its own brands and agency operation brands?
Manager of production department	90 mins	▪ Could you please introduce the development condition and main business of production department? ▪ What impressed you most? Could you give an example? ▪ As more and more brands were incubated by Alpha business ecosystem, what new challenges did the production department faced? How to solve it? ▪ When the suppliers of production department was limited? How did you deal with the needs of Alpha's own brands and agency operation brands?
Manager of planning department	60 mins	▪ Could you please introduce the development condition and main business of planning department? ▪ What impressed you most? Could you give an example? ▪ As more and more brands were incubated by Alpha business ecosystem, what new challenges did the planning department faced? How to solve it? ▪ Please share with us about Alpha's resource allocation plan for Alpha's own brands and agency operation brands?
Manager of agency operation department	220 mins (two times)	▪ Could you please introduce the development condition and main business of agency operation department? ▪ What impressed you most? Could you give an example? ▪ Could you please share with us the details of serving agency operation brands? We hope you could give us some example. ▪ As more and more brands were incubated by Alpha business ecosystem, what new challenges did the agency operation department? How to solve it? ▪ Why brands chose to cooperate with Alpha? What competitive advantages did Alpha have? ▪ Is there any difference between Alpha's brands and agency operation brands in obtaining online operation resources? ▪ When online operation resources were limited, how did you coordinate the resource allocation between Alpha's brands and agency operation brands?
Manager of information technology department	60 mins	▪ Could you please introduce the development condition and main business of information technology department? ▪ What impressed you most? Could you give an example? ▪ As more and more brands were incubated by Alpha business ecosystem, what new challenges did the information technology department faced? How to solve it? ▪ When the staff of information technology department was limited? How did you deal with the IT needs of Alpha's own brands and agency operation brands?
Manager of customer service department	40 mins	▪ Could you please introduce the development conditon and main business of customer service department? ▪ What impressed you most? Could you give an example? ▪ As more and more brands were incubated by Alpha business ecosystem, what new challenges did the customer service department faced? How to solve it? ▪ When the staff of customer service department was limited? How did you deal with the needs of Alpha's own brands and agency operation brands?
Suppliers	60 mins	▪ When did you start cooperation with Alpha? Why choose to cooperate with Alpha? ▪ What did you mainly provide for Alpha? ▪ Since Alpha established the business ecosystem, what changes had taken place in cooperation? ▪ In the process of cooperating with Alpha, what challenges did you encounter? How to solve it?
Representative of three people group	60 mins	▪ Please introduce your group, such as the establishment time, brand, division of labor within group. ▪ What were the main advantages of group structure? ▪ What impressed you most? Could you give an example?
Representative of agency operation brands	60 mins	▪ When did you start cooperation with Alpha? Why choose to cooperate with Alpha? ▪ What impressed you most? Could you give an example? ▪ In the process of cooperating with Alpha, could Alpha respond to your needs timely? ▪ Have you encountered any difficulties in the process of cooperating with Alpha, how did you solve them? Could you give an example?

To ensure credibility and validity, we primarily utilized the triangulation strategy during the data collection and analysis phase. The data used in the narrative and analysis were all triangulated by at least two sources and agreed upon by at least two interviewers. After finishing the narrative and analysis, we sent the description and the model to interviewers for checking (Cui et al.,2017).

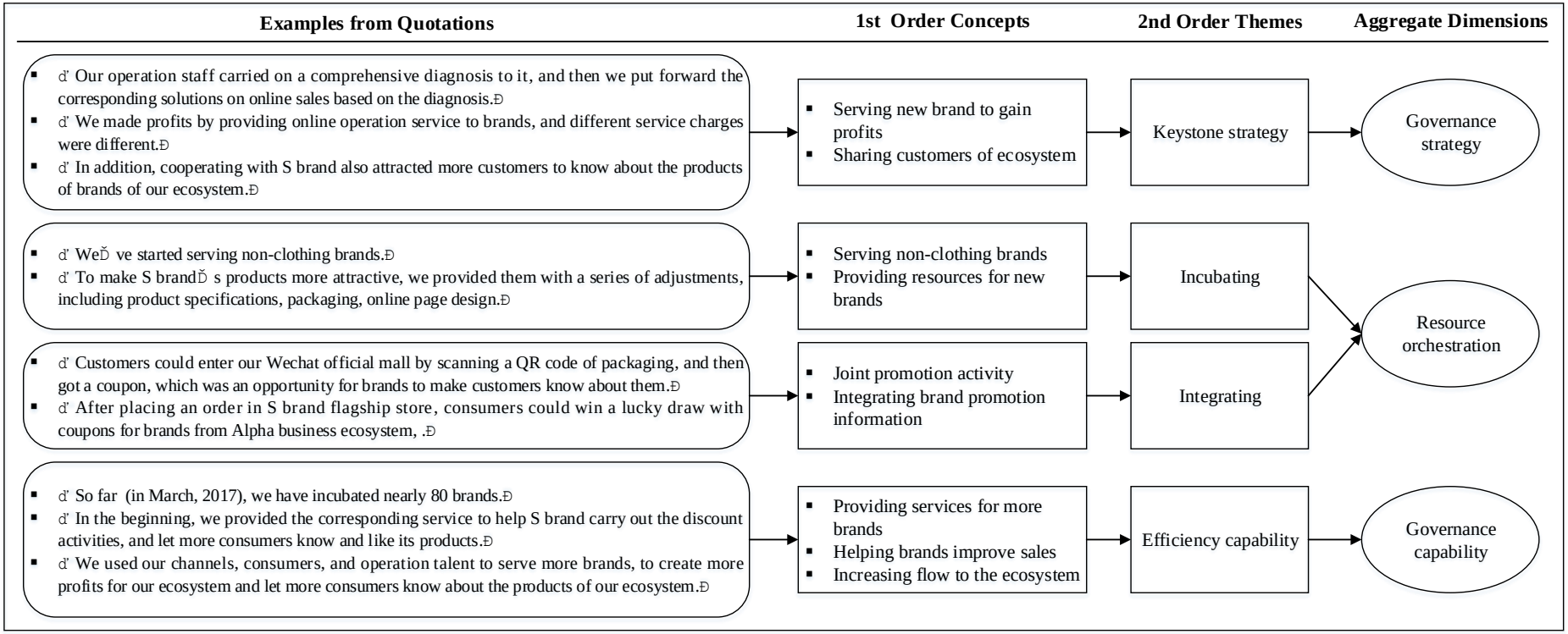

Figure 1. Data structure of the condition of resource sufficiency

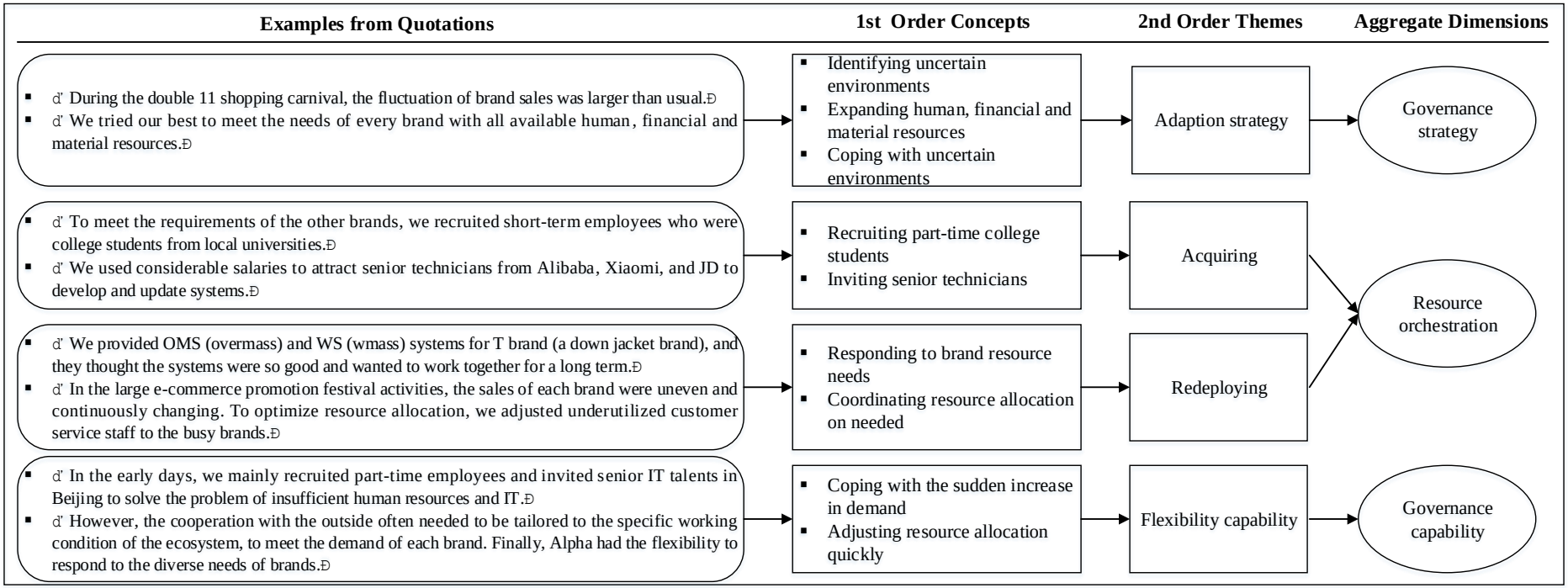

Figure 2. Data structure of the condition of resource insufficiency

4. Results

4.1 Business ecosystem governance with sufficient resources

(1) Governance strategy

The sales of each brand of Alpha business ecosystem were usually maintained at a certain level. Alpha's online operation staff, suppliers and information technology systems could support Alpha to provide operational service for each brand and even support Alpha to serve some new brands. Under these circumstances, Alpha started trying to serve non-clothing brands, such as the YM brand, TI brand, Y brand, D brand, TN brand,

and S brand to help its business ecosystem achieve diversified development.

In March 2017, Alpha began to serve S brand, a tissue brand. In 2016, S brand's offline sales were 5 billion RMB (US$ 785,000,000), and online sales were 200 million RMB (US$ 31,000,000). The unsatisfactory online sales performance was due to the lack of talent and experience in online operation. Therefore, S brand decided to join the Alpha business ecosystem, which had rich experience and resources in online operations. Cooperation with the S brand also brought benefits to the Alpha business ecosystem. On the one hand, Alpha could create more profits for the business ecosystem by using sufficient online operation resources to serve new brands. On the other hand, the participation of new brands could bring new customers and new operation modes to the business ecosystem, as well as new opportunities for the brand development of the Alpha business ecosystem. As the CEO of Alpha said,

> *In 2015, we established the Alpha business ecosystem...S brand entered our ecosystem in March 2017, and our operation staff carried on a comprehensive diagnosis of it. Then, we put forward the corresponding solutions on online sales based on the diagnosis. In addition, cooperating with the S brand also attracted more customers to know about the products of brands of our ecosystem...*

As a manager of the agency operation department said,

> *We wanted to help them (agency operation brands) grow from 1 to N…Since they had the characteristics of "pan-regional, pan-platform, and pan-category", it further promoted the rapid growth of our operational talents…*

The analysis of Alpha's strategy practice under the condition of resource sufficiency shows that **Alpha adopts the keystone strategy**. A keystone strategy means that a keystone could not only create value within the business ecosystem but also share the value with other participants in the ecosystem (Iansiti and Levien, 2004b). Under the condition of resource sufficiency, on the one hand, Alpha utilizes sufficient online operation resources to serve new brands and create more value for the business ecosystem, such as profits and talent growth. On the other hand, Alpha shares value for the business ecosystem through cooperation with new brands, such as bringing new customer flow to the ecosystem and building new channels for brand promotion.

(2) Resource orchestration

In the initial stage of cooperation, the operation staff of Alpha collected relevant data of the agency operation brands, such as web page visits, collection volume, sales performance, etc. Then, the operation staff arranged the required operation services for brands based on the data analysis results. The data analysis results of the S brand showed that the product discount promotion was not strong enough, the packaging was unattractive, and the brand influence was low. First, Alpha invited the head in charge of the Tmall tissue department to assist the S brand in designing various promotion programs (Tmall is a comprehensive shopping website). Second, the operation staff of

Alpha designed different content marketing schemes for the packaging of the S brand according to different consumer groups. For example, the packaging content for office workers was “our products can wipe sweat for you, but do not allow tears to soak”. Third, the low brand influence was a huge obstacle to the development of the S brand. Therefore, Alpha decided to use its own consumers to help the S brand enhance brand influence. Alpha employees sent the S brand’s discount information to Alpha’s consumers through WeChat (WeChat is an app that provides instant messaging service) and attracted consumers’ attention to the S brand with products of high quality and low price. Alpha employees found a craftsman to design a handicraft with the tissues of S brand and made it into a short video. Then, they put the video on Tou Tiao (with more than 700 million active users and more than 200 million daily active users) and Weibo (with 246 million daily active users) to increase the exposure of the S brand. As a manager of the agency operation department said,

> *To make the S brand’s products more attractive, we provided them with a series of adjustments, including product specifications, packaging, online page design... Although the product of the S brand was a little more expensive than other brands, consumers were more willing to buy the S brand’s products due to their unique packaging content. In addition, we also helped the S brand organize a purchase activity among Alpha’s old customers through WeChat to let more customers know about the S brand and its products. The sales on the day of the activity reached 400,000 RMB (US$ 63,000), and a set of combination product values was 79.8 RMB (US$ 12.5) ...*
>
> *Similarly, we also incubated YM brand (a sweet potato brand). We found a Weibo celebrity (with more than 10 million fans) to promote the YM brand, and the monthly sales successfully broke through from 100,000 RMB (US$ 16,000) to 300,000 RMB (US$ 48,000) ...*
>
> *With the development of our ecosystem, we could also provide financial support for brands… We just invested 10 million RMB (US$ 1,600,000) in a start-up cross-border e-commerce enterprise (BMKJ).*

To further deepen the cooperation between agency operation brands and the Alpha business ecosystem, Alpha designed a series of joint activity plans. For example, Alpha put a pack of tissue into the package of every customer (from brands of Alpha business ecosystem), and the packaging of the tissue had the logo of Alpha and the S brand, as well as a WeChat QR code. By scanning the QR code, consumers could enter the official WeChat mall of the Alpha business ecosystem and obtain a free delivery voucher for the S brand flagship store in Tmall. Moreover, it made more customers know about the S brand. On the other hand, the free delivery could attract customers to scan the QR code, which could increase the customer flow in the mall and make more customers know about the brands and products of the Alpha business ecosystem. As a manager of the agency operation department said,

Customers could enter our WeChat official mall by scanning a QR code of packaging and then get a coupon, which was an opportunity for brands to make customers know about them ... We had great confidence in our products. As long as consumers gave us the opportunity, we were bound to make them willing to know and purchase our products.

In the process of incubation, we focused on the construction of the internal ecology, formed a self-ecological system, strengthened the connection between internal brands and solved some supply and demand…On May 5, 2017, we established an "Internet + Food" alliance, including 13 brands. On the same day, YM brand established a cooperation intention with HD brand (a fast-food brand); that is, YM brand provided HD brand with high-quality agricultural products, such as sweet potatoes and pumpkins…

The analysis of Alpha's resource orchestration practice under the condition of resource sufficiency shows that **Alpha adopts the resource-focused actions of incubating and integrating**. Incubating refers to the process of supporting and testing heterogeneous resources from across the portfolios to explore opportunities (Baert et al., 2016). By providing online operation resources for agency operation brands, Alpha incubates the S brand, YM brand and other brands, helping Alpha business ecosystem extend non-clothing brands. Integrating refers to the process of integrating scattered resources to form a capability (Cui and Pan, 2015). Alpha integrates the customer resources of its business ecosystem and the products resources of the S brand to enhance the brand influence of the S brand and the customer flow of the ecosystem. Alpha integrates the resources of food brands within the Alpha business ecosystem to increase the sales of the YM brand and strengthen cooperation within the ecosystem. Under the guidance of the keystone strategy, keystones should increase stakeholder diversity to create more value for business ecosystems (Iansiti and Levien, 2004b). For example, Alpha incubated more brands by utilizing online operation resources. Then, keystones should integrate scattered resources to optimize the value sharing of the business ecosystems (Rong et al., 2015). For example, Alpha integrated product and customer resources of brands to increase the customer flow of the Alpha business ecosystem.

Alpha first incubates non-clothing brands to provide a new source of value creation for the Alpha business ecosystem. Alpha helps brands improve performance, and the ecosystem obtains more customer flow by integrating the resources of the ecosystem and new brands and later promotes the common development of the Alpha business ecosystem by sharing resources within the ecosystem.

(3) Governance capability

Since the agency operation brands joined the Alpha business ecosystem, their sales have achieved a new breakthrough. On November 11, 2018 (a large e-commerce promotion festival), the S brand sales reached 160 million RMB (US$ 25,000,000). In 2018, the YM brand sales exceeded 15 million RMB (US$ 2,400,000). Alpha created more profits

and customer flow for the ecosystem by utilizing online operation staff and experience to serve agency operation brands. For example, after placing an order at the S brand flagship store, consumers could win a lucky draw with coupons for brands from the Alpha business ecosystem. As a manager of the agency operation department said,

> *In the beginning, we provided the corresponding service to help the S brand carry out the discount activities and let more consumers know and like its products. Meanwhile, we used our channels, consumers, and operation talent to serve more brands, to create more profits for our ecosystem and to let more consumers know about the products of our ecosystem.*

The analysis of Alpha's capability practice under the condition of resource sufficiency shows that **Alpha forms the efficiency capability** by utilizing resources effectively. Efficiency capability is the ability of a keystone to growing by continuously pursuing opportunities for the better exploitation of the resource of the ecosystem (Kor and Mahoney, 2000; Ning H, 2016). Efficiency capability has always been an essential source for keystones to obtain competitive advantages (Abuga and Deya, 2019), and it can help keystones achieve the effect of one plus one greater than two. For example, first, Alpha incubates more brands by providing online operation resources, which could not only help new brands increase sales but also help the ecosystem achieve diversified development and provide new sources of value. Second, by integrating the customer resources of the ecosystem and the product resources of agency operation brands, Alpha helps the ecosystem gain more customer flow and strengthen the cooperation among the brands and then enables the products of the business ecosystem to be known and sold (Table 5).

Table 5. Concepts, the definition of the condition of resource sufficiency

Resource condition	Theory	Key concepts	The definition of concepts
Resource sufficiency	Governance strategy	Keystone strategy	Keystone strategy refers to that a keystone could not only create value within the business ecosystem but also share the value with other participants in the ecosystem (Iansiti and Levien, 2004b)
	Resource orchestration	Incubating	Incubating refers to the process of supporting and testing heterogeneous resources from across the portfolios to explore opportunities (Baert et al., 2016).
		Integrating	Integrating refers to the process of integrating scattered resources to form capability (Cui and Pan, 2015).
	Governance capability	Efficiency capability	Efficiency capability is the ability of a keystone to growing by continuously pursuing opportunities for the better exploitation of the resource of the ecosystem (Kor and Mahoney, 2000; Ning H, 2016)

4.2 Business ecosystem governance with insufficient resources

(1) Governance strategy

During the large e-commerce promotion festival (Double 11 shopping carnival), Alpha's human resources and IT systems faced huge challenges due to a significant increase in the brand sales of the Alpha business ecosystem. Since 2009, e-commerce platforms such as Taobao, Tmall, and JD have launched large-scale discount promotion activities on November 11th each year. In 2015, the sales of the Alpha business ecosystem reached 284 million RMB (US$ 45,000,000) on November 11th, 82 times the average daily sales (annual sales of 1.26 billion RMB, US$ 198,000,000). The sharp increase in sales meant that the number of goods consultations and shipments increased significantly. In addition, the number of brands within the Alpha business ecosystem increased from 20 at the end of 2014 to 52 at the end of 2015, further exacerbating the challenge.

During the Double 11 shopping carnival, the sales of each brand were unable to be predicted accurately. The sudden increase in sales of most brands placed higher demands on the number of customer service staff and the carrying capacity of IT systems. If the customer service staff cannot reply to customers in time, they might miss orders. Suppose brands failed to deliver goods on time, which not only affected the credit and scoring of the brands' flagship store but also further affected the reputation of the Alpha business ecosystem. Therefore, Alpha needed to increase customer service staff and upgrade IT systems quickly to cope with the challenges during large e-commerce promotion festivals. As the CEO of Alpha said,

> *During the Double 11 shopping carnival, the fluctuation of brand sales was larger than usual. To ensure that every brand could successfully complete its orders, we tried our best to meet the needs of every brand with all available human, financial and material resources.*

The analysis of Alpha's strategy practice under the condition of resource insufficiency shows that **Alpha adopts the adapting strategy**. Adapting strategy emphasizes the strategic flexibility of an enterprise and focuses on enhancing flexibility through the accumulation and extension of available resources to rapidly respond to uncertain changes in the external environment (Hoffmann, 2007). During the large e-commerce promotion festival, the sales of most brands increased suddenly, and the increasing number of brands made Alpha face resource insufficiency. If Alpha fails to meet the needs of brands, the brands will choose to leave the ecosystem, which will reduce the value of the Alpha business ecosystem. Therefore, Alpha chooses to expand all available human resources and IT resources to respond to the brands' growing resource needs.

(2) Resource orchestration

First, to cope with the rapid increase in customer inquiries during the large e-commerce promotion festival, Alpha quickly recruited college students in Jinan to ensure that

customer inquiries could be answered by customer service staff immediately. Alpha provided short-term training to help college students start work quickly and established a piece-rate assessment system to improve work efficiency. Second, during the large e-commerce promotion festival, the e-commerce platform requires Alpha to deliver goods within 72 hours. To ensure that a large number of orders could be shipped on time, Alpha hired technicians with high salaries to fully upgrade the IT systems, including optimizing the picking route of the warehouse, matching suitable courier service companies, and improving delivery efficiency (from 500 orders per minute to 15,000 orders per minute). Furthermore, since 2015, Alpha has invested nearly 20 million RMB (US$ 3,000,000) annually to recruit senior technicians and introduce advanced equipment. As a manager of the customer service department said,

> *The external support team (local college students) became our reserve force to prepare for Double 11… Even so, we still needed three shifts to deal with the sudden increase in consultation during Double 11.*

As a manager of the IT department said,

> *Due to geographical reasons, IT talent was reluctant to develop in Jinan. Therefore, we needed to give a considerable salary to hire senior technicians from Alibaba, Xiaomi, and JD to join Alpha or provide technical guidance…*

During the Double 11 shopping carnival, Alpha matched the number of customer service staff for each brand in advance according to the number of customers who had paid a deposit and added goods to the shopping cart. However, during the large e-commerce promotion festival, the sales of various brands were about to fluctuate, leading to the sales of some brands being better or worse than expected, which resulted in a shortage of customer service staff. In addition, with the rapid growth of brands, they also put forward new requirements for Alpha. They wanted Alpha to provide them with independent IT systems, which again challenged Alpha's IT department.

Facing the new resource dilemma, Alpha first chose to adjust the allocation of customer service staff within the ecosystem to improve the efficiency of personnel utilization and ensure that all brands could complete promotional activities with the lowest cost and an appropriate number of customer service staff. Second, Alpha always insisted that the ecosystem was a large family that needed mutual support and coordinated development. Therefore, Alpha reconfigured IT technicians to develop and debug IT systems exclusively for brands. As the manager of the customer service department said,

> *In the large e-commerce promotion festival activities, the sales of each brand were uneven and continuously changing. To optimize resource allocation, we adjusted underutilized customer service staff to the busy brands.*

As the manager of the IT department said,

> *Previously, we had to rely on outsourcing to provide IT services for ecosystem operations. Now, we could develop our own systems to support the ecosystem*

operation...For example, we provided OMS (overmass) and WS (wmass) systems for T brand (a down jacket brand), and they thought the systems were so good and wanted to work together for the long term.

The analysis of Alpha's resource orchestration practice under the condition of resource insufficiency shows that **Alpha adopts the resource-focused actions of acquiring and redeploying**. Acquiring refers to the process of purchasing resources from strategic factor markets (Baert et al., 2016). Alpha acquires external university students and IT resources by breaking the boundary of the business ecosystem to meet the needs of brands. Redeploying refers to the process of reallocating a specific resource or capability from one venture to another (Baert et al., 2016). According to the actual needs of brands, Alpha redeploys customer service staff and IT department resources. Under the guidance of the adapting strategy, external resources can help keystones quickly meet resource demand (Freire, 2014). For example, Alpha acquired external human resources and IT resources. Then, facing the uncertain condition, keystone should pay attention to increasing strategic flexibility without making a high and irreversible investment (Hoffmann, 2007). For example, Alpha redeployed idle resources.

(3) Governance capability

Alpha effectively solved the challenges of the ecosystem by obtaining the support of external college students and senior technicians and readjusting customer service staff and IT systems. Finally, all brands successfully carried out festival activities. Although there were many setbacks along the way, Alpha was able to deal with similar situations flexibly afterward. A senior manager of Alpha explained as follows,

In the early days, we mainly recruited part-time employees and invited senior IT talent in Beijing to solve the problem of insufficient human resources and IT. However, cooperation with the outside often needs to be tailored to the specific working conditions of the ecosystem to meet the demand of each brand. Finally, Alpha had the flexibility to respond to the diverse needs of brands...

The analysis of Alpha's capability practice under the condition of resource insufficiency shows that **Alpha forms the flexibility capability** through the flexible deployment of resources. Flexibility capability means that a keystone can meet the needs of stakeholders in the business ecosystem through the dynamic composition of resources, which enables the whole business ecosystem to operate smoothly in the changing market (Hearn and Pace, 2006; Zhang and Fan, 2010). The core of flexibility capability is mainly reflected in the coordination of resources by keystones (Jack and Raturi, 2002). For example, first, Alpha met the resource needs of brands by acquiring external resources of the ecosystem. Second, Alpha coordinated resource needs by redeploying idle resources within the ecosystem to form the flexibility capability (Table 6).

Table 6. Concepts, the definition of the condition of resource insufficiency

Resource condition	Theory	Key concepts	The definition of concepts
Resource insufficiency	Governance strategy	Adaption strategy	Adaption strategy emphasizes the strategic flexibility of an enterprise and pays attention to enhancing the flexibility through accumulation and extension of available resources to rapid response to uncertain changes of the external environment (Hoffmann, 2007).
	Resource orchestration	Acquiring	Acquiring refers to the process of purchasing resources from strategic factor markets (Baert et al., 2016).
		Redeploying	Redeploying refers to the process of reallocating a specific resource or capability from one venture to another (Baert et al., 2016).
	Governance capability	Flexibility capability	Flexibility capability refers to that a keystone can meet the needs of stakeholders in the business ecosystem through the dynamic composition of resources, which enables the whole business ecosystem to operate smoothly in the changing market (Hearn and Pace, 2006; Zhang and Fan, 2010).

5. Discussion

This paper studies Alpha business ecosystem governance under the conditions of resource sufficiency and resource insufficiency and reveals the relationship among business ecosystem governance strategy, resource orchestration, and governance capability. The results demonstrate that to successfully govern the business ecosystem, it is necessary to achieve the matching of governance strategy, resource orchestration, and governance capability. In addition, this article has theoretical and practical implications for business ecosystem governance (Figure 3).

5.1 Theoretical implications

First, this study answers "how" keystones should govern their business ecosystems. Existing research on business ecosystem governance mainly focuses on the definitions (Vos, 2006), roles (Iansiti and Levien, 2004b), benefits (Mukhopadhyay and Bouwman, 2019), and patterns (Pomegbe et al., 2021) of business ecosystem governance. These studies only answered the "what" question without further exploring the "how" question. By studying the case sample of the Alpha business ecosystem governance, this study constructs a business ecosystem governance model of "governance strategy-resource orchestration-governance capability" to answer the "how" question. Prior studies have pointed out that resource governance is important (Mukhopadhyay and Bouwman, 2019). This study found that resource governance alone is not enough, but

also needs the guidance of governance strategy and the formation of governance capability. Because governance strategy can provide a goal and direction for a keystone to govern its business ecosystem, and governance capability can help a keystone to solve similar governance issues and facilitate the healthy development of business ecosystem. "Keystone strategy" guides the resource-focused actions of "incubating and integrating" to form "efficiency capability", which can help keystones orchestrate resources more efficiently in future governance. "Adapting strategy" guides the resource-focused actions of "acquiring and redeploying" to form "flexibility capability", which can help keystones solve resource constraints more flexibly in future governance.

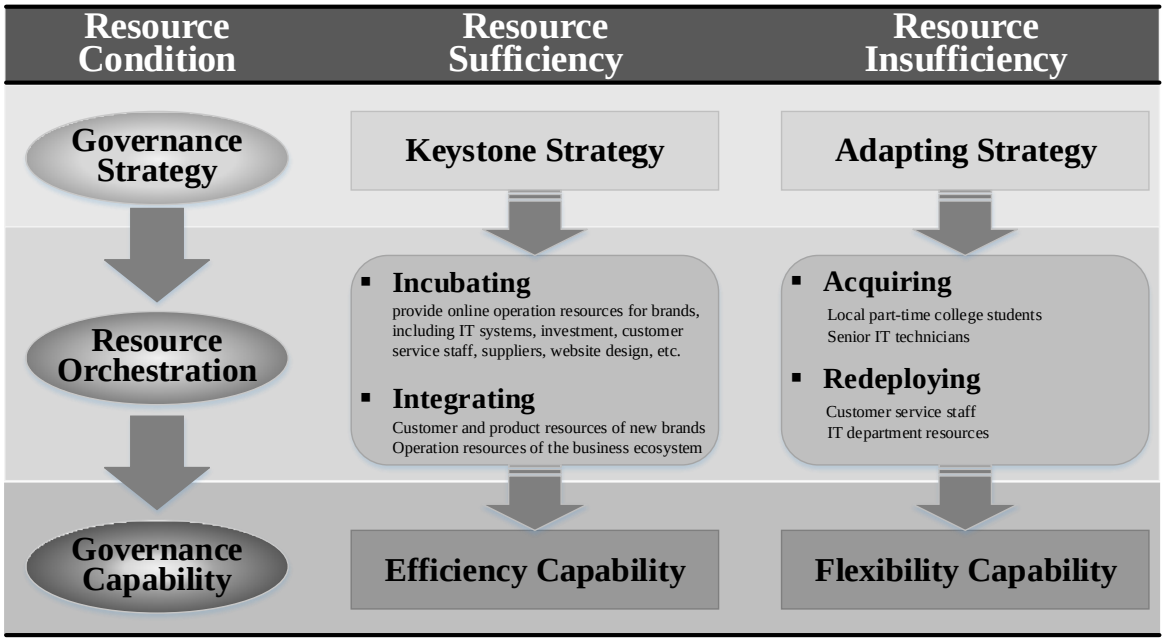

Figure 3. The relationship of governance strategy, resource orchestration, and governance capability

Second, this study subdivides the resource condition of business ecosystem governance into resource sufficiency and resource insufficiency. Prior studies did not pay attention to the condition of resource insufficiency of keystone but only focused on the benefits of resource sharing with a default premise of resource sufficiency (Huber et al., 2017; Colombo et al., 2019; Mukhopadhyay and Bouwman, 2019). Then, this study further answers the "how" question in the two resource conditions. Under the condition of resource sufficiency, the "keystones strategy" can guide a keystone to govern resources in a more high-efficiency way, which is incubating more stakeholders by utilizing existing resources and integrating resources to promote cooperation among stakeholders to create more value for the business ecosystem and form efficiency capability. Under the condition of resource insufficiency, the "adapting strategy" can guide a keystone to govern resource constraints by expanding existing resources, which requires the keystone to break the boundary of the ecosystem to acquire external resources and flexibly redeploy idle resources within the business ecosystem to

maintain the stability of the ecosystem and form flexibility capability.

Third, this study also contributes to the development of resource orchestration theory. First of all, this study expands the research context of resource orchestration theory. Existing research has mainly examined how managers orchestrate resources within a single firm to develop capabilities (Baert et al., 2011), while this study discusses resource orchestration in a business ecosystem. Then, this study identifies four important resource-focused actions in the process of business ecosystem governance, including incubating, integrating, acquiring, and redeploying. Their pairwise combination accurately executes the governance strategies of the keystones. The keystone strategy emphasizes creating value and sharing value. Keystones "incubate" more stakeholders to create value and realize value sharing through "integrate" ecosystem resources to share among stakeholders. The adapting strategy emphasizes flexibility and extending resources to respond to uncertain conditions. Keystones "acquire" external resources to extend resources, and "redeploy" idle resources, which not only extends resources but also reflects the flexibility of governing resources. Our study shows that the matching between resource-focused actions and governance strategy ensures successful business ecosystem governance and forms governance capability.

5.2 Practical implications

By studying the successful governance practices of the Alpha business ecosystem, this paper suggests that keystones adopt the governance model of "governance strategy-resource orchestration-governance capability".

First of all, keystones should choose appropriate governance strategies based on their resource condition. When resources are sufficient, a keystone should choose a governance strategy that can promote the development and value creation of business ecosystems, such as a keystone strategy. When resources are insufficient, a keystone should choose a governance strategy that can solve the resource dilemma to maintain its core position and the stability of the ecosystem, such as adapting strategy.

Then, the resource orchestration actions must match the governance strategy (i.e., be consistent with the governance strategy orientation) so that the governance strategies can be successfully implemented. Under the condition of resource sufficiency, a keystone should make full use of resources of the business ecosystem to incubate new stakeholders to create diversified and multi-channel cooperation opportunities for the development of stakeholders in the business ecosystem. Under the condition of resource insufficiency, a keystone should focus on utilizing external resources and internal idle resources of its business ecosystem with the main purpose of solving the current resource dilemma.

Finally, under the condition of resource sufficiency, keystones can create more value by effectively orchestrating resources of business ecosystems to form efficiency capability. Under the condition of resource insufficiency, keystones can solve the

resource dilemma by flexibly orchestrating internal and external resources of business ecosystems to form flexibility capability.

6. Conclusion

In the practice of business ecosystem governance, only a few enterprises have been able to achieve the healthy development of business ecosystems by virtue of effective governance and finally become industry leaders. More enterprises failed because they failed to govern the business ecosystem properly. Why did some keystones successfully govern their business ecosystem while others failed? What was the key path for keystones to successfully govern the business ecosystem? Prior studies of business ecosystem governance assumed that keystones had sufficient resources to continuously share resources within the ecosystem and emphasized the benefits of resource sharing. However, there is no further exploration of how keystones share resources. In addition, although keystones have resource advantages, their resources are still limited, which leads keystones to face resource insufficiency in the practice of resource sharing. Existing research has not paid attention to this phenomenon. Therefore, this study adopts the resource orchestration perspective to reveal how keystones successfully govern the business ecosystem under the conditions of resource sufficiency and resource insufficiency. From the above case analysis, it can be concluded that under the condition of resource sufficiency, keystones incubate and integrate resources to achieve the keystone strategy to increase the efficiency of resource utilization and form efficiency capability. While under the condition of resource insufficiency, keystones acquire external resources and redeploy internal resources to achieve the adapting strategy, to keep the core position of keystones, and form flexibility capability.

By studying the process of business ecosystem governance, we extracted the key path for keystones to successfully govern business ecosystems under the conditions of resource sufficiency and resource insufficiency. Although this study provides new insights, certain limitations point to some direction for further research. We used a single case study to investigate and describe the business ecosystem governance process in-depth and in detail. However, the single case study can provide only a governance path within a certain research context. Further research may consider more cases to explore other possible governance paths.

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