Analysis on the Formation Mechanism and Dynamic Evolution of Enterprises’ Shared Resources in Logistics Cluster

Shu-Juan LIU¹,a and Run-De LU²,b

¹No.1 Jinjilu, Qixing District, Guilin City, Guangxi Province, China
²No.1 Jinjilu, Qixing District, Guilin City, Guangxi Province, China

a jane_liu_1211@163.com, b lurd@guet.edu.cn

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Abstract. In recent years, there are a lot of researches about the logistics cluster formation, development and other aspects, however, some of the research were in terms of cluster clustering and did not take enterprise into account, and therefore those can’t effectively guide the actual operation. Based on this, this paper based on absorption of the resource-based view of the firm on the research result, combined with the characteristics of enterprise logistics, enterprises’ shared resources in logistics cluster and the relationship of their sources’ interaction and transfer, analyzed its forming mechanism, and discussed its dimension partition and its dynamic evolution.

The Concept of Enterprise Resources and the Division of Enterprise Resources in Logistics Cluster

At present, the resource-based view of the firm (RBV) has become the mainstream of the field of strategic management, the view is from "enterprise resource" written Wemerfelt (1984) [1], its core essence is that the enterprise has different tangible and intangible resources, which can be transformed into the unique ability, and are unmovable and difficult to replicate in the enterprise. It’s these resources and ability is the source of enterprise competitive advantage.

In explain of the acquisition mechanism of logistics enterprise resource for renting [2], The domestic scholar Geng Shuai (2006) according to whether enterprises have ownership of resources and these resources have the heterogeneity and incomplete liquidity, divided the competitive advantage of resources of logistics enterprises into three categories (Figure 1): One is that the logistics enterprises have ownership of resources, which have the heterogeneity and incomplete flow; the second is that the logistics enterprises have not and does not have the heterogeneity and incomplete flow of resources, the last one is the logistics enterprises have not, also does not have the heterogeneity and incomplete liquidity of resources. These three types of resources are called strategic resources, general resources and market factors.

Figure 1. The traditional division of logistics resources by RBV.
Figure 1 shows the interactive relationship between the resource components that affect the competitive advantage of an enterprise. In the chain of logistics enterprises, there is a relationship between the strategic resources, general resources and market factors.

Logistics enterprise strategic resource is the source of competitive advantage for enterprises. Strategic resources is mentioned in the "enterprise resources and sustained competitive advantage" [3] written by Barney (1991), which can provide the most lasting benefits resources when the enterprise is in the face of competition, which have four characteristics--valuable, scarce, difficult to imitate and irreplaceable. This view is widely accepted by people. Therefore, in the logistics enterprise not all of manpower and material resources are strategic resources, such as warehouse, trucks, and so on, that are the general resources without the features of strategic resources. The resource itself cannot be a direct source of logistics enterprises to gain competitive advantage. Logistics enterprise is not an independent one, which must be combined with manufacturing, agriculture, electricity providers, and so on, so as to create an open camp system. So the influence of external free-flow market factors resources to obtain a competitive advantage of logistics enterprises can’t be ignored. Market factors resources exist in the enterprise external, does not belong to any particular enterprises, and are homogeneous and movable for all enterprises. But once they are transformed into strategic resource by the enterprise, they have the heterogeneity and incomplete liquidity, Furthermore, it shows great potential in the process of gaining competitive advantage.

However, for the logistics enterprises within the cluster, which is as a boundary between market and enterprise organization, there is a class of resources -- they are neither owned by enterprises in cluster, but does not rule out the sharing, which enterprises outside the cluster do not have. That is to say this class of resources are not specific for logistics enterprises, but has the heterogeneity and incomplete liquidity (Molina-Morales, 2001) [4], such as the common reputation of the logistics park, the local government support policies and measures and so on. These resources also play an important role in the process of obtaining competitive advantage of logistics enterprises, and they put forward the question of the division of the three law of logistics resources in RBV.

The Concept and Formation Mechanism of Shared Resources in Logistics Cluster Enterprises

The Concept of Shared Resources in Logistics Cluster Enterprises

Enterprises’ Shared Resources in Logistics Cluster are a resource type based on the RBV theory, which is put forward because logistics enterprises Resource-Based View is applied to the study of the logistics industry cluster. It is also one of the important achievements in research development level of logistics industry cluster based on the concept of Resource-Based View. Molina-Morales (2001) put forward the concept of "shared resources", based on his view that does not exist any obstacles to the analysis based on the view of resources and its theory at the regional level. Through the comparative analysis of the enterprises inside and outside the industrial zone, he tested the relevance to shared resources and the competitive advantage of the enterprises in the area, and deemed that shared resources of the industrial area are those resources that can be shared by industry enterprise, including assets, ability and related expertise. On the basis of this, Geng Shuai (2004) [5] further proposed the concept of shared resources in cluster enterprises, namely " the resources in the level of industrial cluster, which exist between a cluster and collective enterprises, owned by whole cluster but not by any single cluster enterprise ". Meanwhile he further called the heterogeneity and incomplete mobility of resources shared resources, based on the traditional enterprise resource division. However, his four points system of resources does not solve the problems of the origin of sharing resources of industrial clusters and how to share them by industrial clusters.

Thus, further analysis of the sources of shared resources in logistics cluster. Enterprises’ shared Resources in Logistics Cluster are retained in the cluster "public area", which can be shared by members, and their sources can be exogenous or endogenous. Exogenous existence refers to the natural resources, such as roads, ports, airports, etc., which all members of the logistics cluster
depend on. Endogenous comes from all voluntary contributions or public resource supplied by the logistics cluster member enterprises, also from the heterogeneous resources, which is characteristics of the cluster, difficult to imitate and difficult to replace, effected by the cluster proximity, the network between the organization and coordination and spillover, such as brand, culture etc. As shown in Figure 2, shared resources in logistics cluster enterprises come from various resources of which influence the cluster members' competitive advantages, including enterprise strategic resources, general resources and market factors resources. It is also clear that show dynamic evolution process of enterprises’ shared resources in logistics cluster, namely it is influenced by the interaction among the members of the cluster, reflects the matching situation between the shared resources of the logistics cluster enterprises and the market environment, and its constituent elements are dynamically changing.

![Figure 2. Enterprises’ shared Resources in Logistics Cluster.](image)

The Formation Mechanism of the Shared Resources in Logistics Cluster Enterprises

Through the above description of the concept of logistics cluster enterprise shared resource, it show that it has "local public goods" characteristics, which is relevant with the interaction result to the four basic characteristics of the logistics cluster -- space agglomeration, specialization, social networking and regional dependence.

First of all, the enterprise in logistics cluster has concentrated in space, which help enterprises within the group to share knowledge and exchange of information through formal or informal channels. In addition, many small and medium-sized logistics enterprises are far not as compared to large enterprises in resources, reputation etc., which leads to the enterprise survival more difficult. And the spatial clustering helps resources sharing, including physical resources, such as warehouse, human resources, and knowledge sharing and integration. All of these form competitive advantage.

Secondly, the development of the division is the direct cause of the formation of the logistics cluster, and the specialized division can make the logistics cluster enterprises reach or close to the optimal production scale through the orderly competition and cooperation. This kind of specialization brings about the relationship between the competition and cooperation among the enterprises of the logistics cluster, which ensures that the single enterprise is close to the optimal scale of production, and the flexibility under the pressure of competition. Logistics industry chain is relatively long, involving transportation, warehousing, loading and unloading, handling, packaging, distribution processing, distribution, information platform. These aspects can be split into many production links. Transportation includes railway, highway, water transport, aviation, pipeline, etc. It is difficult to achieve all aspects in a single enterprise, but under the background of the logistics cluster, various enterprises can be effectively solved through the mode of coexisting cooperation and competition, at the same time to obtain economies of scale and scope economies.

Thirdly, as a new service industry the logistics industry services manufacturing industry, agriculture and so on, which make the logistics enterprises have to cooperate with other industries.
The competition and cooperation state, formed by homogeneous and cooperation enterprise, promotes the logistics cluster to form a variety of social networks, including social network consisted of by members in the cluster, and external organizations. It is because the logistics cluster enterprises exist the relationship of all sorts of "blood" and "geopolitical" and "karma", makes transactions in the cluster are based on "trust", so Cluster enterprises and related institutions become trusted network nodes. The shared resource is actually a logistics cluster all invisible network structural resources, as Marshall said, this resource exists in the "air" of cluster, and it is the comprehensive effect of the characteristics of the logistics cluster. It is characteristic of cluster. Therefore, the social network is the way to realize the sharing resources of logistics cluster.

Finally, port, railway, highway, airport, communications and other infrastructure are the necessary condition for the formation and development of the cluster, which is the key factor to decide life cycle of logistics cluster, so the logistics cluster has a certain dependence on the geographical position. And these infrastructure must rely on local government and other relevant agencies to build, which will inevitably lead to the dependence of local areas. For example, one of the three major national international aviation logistics park, Guangzhou Airport Logistics Park is located in Guangzhou New Baiyun Airport, built by three group joint venture. Both in geography and development have a strong dependence on the local environment. These tangible or intangible resources form the unique shared resources of logistics cluster enterprises.

![Diagram: The formation mechanism of the shared resources in logistics cluster enterprises.](image)

**Figure 3.** The formation mechanism of the shared resources in logistics cluster enterprises.

**Analysis on the Dimension Division and Dynamic Evolution of the Shared Resources In The Logistics Cluster**

**The Division of Shared Resources in Logistics Cluster Enterprises**

Some scholars have done some research on the division of the shared resources in the logistics cluster. But most of them are based on the intangible resources of shared resources. Molina-Morales divided it into three elements: common reputation, exchange and combination of resources, and participation of local institutions. Geng Shuai (2005), derives the shared resources in cluster with the competitive advantage of firms through the view of resource theory, extracts shared resources in the cluster enterprise cluster level and classified into six aspects—collective reputation, the exchange of resources between enterprises and open channels, mutual trust between enterprise, the collective learning and knowledge sharing, to actively participate in and support network, close cooperation and interaction between enterprises and the active participation and support of local institutions. Luo Youhua (2009) [6] is concerned about the resource in the level of industrial clusters through the two perspective of static and dynamic, believes that the cluster resources include both the static meaning resources of the cluster like the regional natural resources and the resources within whole lifecycle. They are produced through the interaction between the main bodies of the cluster, the interaction between the cluster and the cluster, and the interaction between the main bodies and the outside of the cluster. They are all resources owned by the whole cluster but not being monopolized by any single cluster enterprise and bringing value to the cluster enterprise. Du Juan (2015) [7], in the study of logistics cluster sharing resources impact on
competitive advantage, and Jiang Sai (2016) [8] in the study of logistics cluster shared resource effect dynamic capability of the enterprise, divide the logistics cluster shared resources into five dimensions: cluster sharing reputation, support channels, cluster knowledge network, competition atmosphere, local institutional support.

It can be seen that, due to the different objects studied by the scholars, the theoretical analysis tools are different, which leads to the different dimensions of the shared resources. Based on the literature review and theoretical analysis, this paper analyzes the composition of the shared resources of the logistics cluster enterprises from two dimensions of embeddedness and heterogeneity.

**The Embeddedness Dimension of the Shared Resources of Logistics Clusters**

Generally speaking, the enterprises in the industrial cluster have similar institutional environment and cultural background, and their management behavior and motivation are largely rooted in common environment. The characteristics of logistics industry make the logistics cluster have two special characteristics different from other industrial clusters: one is the regional advantages of logistics industry cluster. Based on the dependence of modern logistics industry infrastructure and the demand characteristics, the other is the dependence of logistics industrial cluster on logistics information. Due to the dependence of regional advantages, the logistics cluster must have special requirements for its geographical location, such as the port, airport, highway, railway station, etc. These infrastructures form a unique and tangible shared resource of logistics cluster enterprises. Yossi Sheffi (2015) [9], in his book called Logistics Cluster, said the logistics cluster relies on information and financial facilities, in addition to relying on physical infrastructure. The cluster consists mostly of a number of small and medium enterprises together, so that it determines to they do not have the ability to set up a separate logistics information platform, and they must cooperate with relevant agencies, form complex social networks. So embeddedness, which can represent the dependency relation of network is selected as a dimension of shared resources in logistics cluster.

**The Heterogeneity Dimension of the Shared Resources of Logistics Clusters**

For the logistics cluster, enterprises in cluster share resources, resulting in relatively homogeneous, but the cluster enterprises in reality, always hope and strive to maintain the heterogeneity, in order to enhance its competitive advantage. The heterogeneity of enterprises comes from the heterogeneous and unique way that enterprises are rooted in their network. Compared with the industrial cluster, the network includes not only the internal network, but also the network composed of the cluster enterprise and the external organization. Heterogeneity is the premise of knowledge transfer between enterprises in tourism industry cluster, which can promote the common development of cluster enterprises through the spillover and integration of enterprise heterogeneity so as to expand the cluster reputation and strength. It can be seen that heterogeneity, as a division of shared resources, is of theoretical significance.

**Dynamic Evolution Analysis of Shared Resources in Logistics Cluster Enterprises**

According to the two dimensions of the shared resources of industrial clusters, we can get four quadrants. As figure 4:

![Figure 4. Distribution of shared resources in logistics cluster.](image-url)
Shared resources in logistics cluster in quadrant I has the characteristics of relatively strong embeddedness, relatively low heterogeneity, and they are the core layer of the logistics cluster, and mainly reflect economies scale and quality in the logistics cluster, embody logistics and transportation enterprise, which reflect the competitive nature of logistics cluster, and logistics related enterprises, which reflect the technical characteristics of logistics cluster. In this paper, we define them as the demand production shared resources.

Shared resources in logistics cluster in quadrant II has the characteristics of relatively strong embeddedness, relatively high heterogeneity. They are rooted in the local logistics cluster service layer, including local government, venture capital institutions, customs declaration, etc. This kind of resources has the function of providing service support for the production sharing resources of logistics cluster. In this paper, we define this kind of resource as strong correlation service shared resource.

Shared resources in logistics cluster in quadrant III has the characteristics of relatively weak embeddedness, relatively high heterogeneity. They are the service layer of the external social network of the logistics cluster, including the risk investment institutions, professional training institutions, universities and research institutions. This kind of resources has the function of providing service support for the demand production shared resources and strong correlation service shared resource. In this paper, this kind of resource is defined as weak correlation service shared resource.

Shared resources in logistics cluster in quadrant IV has the characteristics of relatively weak embeddedness, relatively weak heterogeneity. They are the production needs of logistics cluster supporting layer, including the general equipment, raw materials suppliers, general sales channels and customers, etc. In this paper, this kind of resources is defined as production supporting service sharing resources.

The four quadrants refer to the shared resources of industrial clusters, moving and evolving in different quadrants, along with the formation and growth of industrial clusters. See figure 5:

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**Figure 5. The movement and evolution of shared resources in logistics cluster enterprises.**

First, the dynamic evolution process of the shared resources of logistics cluster from quadrant IV to quadrant I. Production supporting services shared resources of the logistics cluster in the fourth quadrant are influenced by the demand for the demand production shared resources in quadrant I. Because of the need of their shared resources each other, both of them form interaction, resulting in the change of the two dimensions of the production-service shared resources in the embeddedness and heterogeneity, That is, the embeddedness is relatively strong, while the heterogeneity remains relatively stable.

Secondly, the dynamic evolution process of the shared resources of logistics cluster from quadrant II to quadrant I. Strong correlation service sharing resources in logistics cluster in quadrant II are influenced by the demand for the demand production shared resources in quadrant I. Because of the need of their shared resources each other, both of them form interaction, leading to the change of the two dimensions of strong correlation service sharing resources in the embeddedness
and heterogeneity. That is, the root remains relatively stable, while the heterogeneity becomes relatively low.

Thirdly, the dynamic evolution process of the shared resources of the logistics cluster from quadrant III to quadrant I. There are three paths, one is the direct evolution from quadrant III to quadrant I; the second is the evolution, from quadrant II to quadrant I though quadrant III; the third is the evolution from quadrant III, then quadrant IV to quadrant I.

Conclusion

When the application of the resource-based view of the firm in the logistics enterprises in the cluster, the traditional resources’ three-law does not explain shared resources in the logistics cluster. Based on this, this research redistricts the logistics enterprises resources, and unifies the related literature, defines the concept of enterprise shared resources in logistics cluster, and explores its origin its dimension partition and its dynamic evolution mechanism in detail. If someone will research thoroughly from the various links to strengthen shared resources of logistics clusters and strengthen the competitive advantages of enterprises, it is not only a theoretical foundation, but also has practical significance for business operation.

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