
A Strategy Research on Performance Improvement of Small and Medium-sized Enterprises Clustering Innovation

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Abstract

Innovation of small and medium-sized enterprise growth in geographic agglomeration phenomenon more and more common, agglomeration can lead to learning effect and shared economic effect for the companies. But from the point of the development of the current small and medium-sized enterprises cluster is still has the problem of independent innovation ability is low. And solve the paradox in addition to analysis the influence factors of innovation cluster, the more strategic issues to delve into cluster innovation grow. Based on the theoretical deduction of the model, the practice strategy of small and medium-sized enterprises to choose the appropriate location to consider cluster and market competition structure of cluster two factors, and geographic distance needs to be considered in selecting cluster growth strategy, technology, distance and cluster internal heterogeneity factors such as the stock of knowledge.

Keywords

Cluster innovation paradox; Agglomeration economy effect; Competition in the market structure; Cluster heterogeneity.

1. Introduction

The innovation growth of small and medium-sized enterprises often has a "small disadvantage"[1]. This "small disadvantage" can bring many problems, such as financing channels, personnel recruitment and supplier selection. Due to its small size, it is difficult to achieve economies of scale, which may lead to higher interest payments, higher management costs, and difficulty in obtaining external legitimacy. If you follow this logic, the best way to deal with a "small disadvantage" is through the expansion of enterprise scale, which will make small and medium-sized enterprises grow into big enterprises. But the scale growth may lead to problems than income, on the one hand there is a limit of any enterprise scale expansion, under the limit of growth may not bring more benefits to the enterprise, brought about by growth and will bear the cost[2][3]. On the other hand, it is more serious that there will be "big business disease" after the large scale, resulting in high management cost, lack of innovation spirit and self-imposed conservatism, etc.[4][5]. It is clear that small and medium-sized enterprises need to achieve a balance between "big" and "small", hoping to achieve both economies of scale and innovation flexibility. So more and more small and medium-sized enterprises begin to choose other alternative to large-scale growth pattern, one of the most typical is through small and medium-sized enterprise external network access to resources required for growth, specifically by the small and medium-sized enterprises cluster to achieve the balance between the scale growth and innovation flexibility. A large number of studies have shown that the enterprise cluster can share the benefits of gathering, similar enterprises gathered in geography can produce regional externality benefits[6][7], this may include close to consist of high-quality human resources, professional and knowledge overflow[8]. Therefore, a large number of small and medium-sized enterprises will choose to gather in a certain area to achieve the competitiveness of enterprises outside the cluster. To sum up,

the agglomeration as an effective mode of governance innovation dilemma is undoubtedly conducive to improving the performance of technology innovation of small and medium-sized enterprises. However, from the perspective of the current situation of innovation and development of small and medium-sized enterprises in China, the most serious problem that restricts the development of industrial clusters is the low capacity[9][10]. This seems to be a paradox, which can bring the agglomeration mode of external innovation and growth to small and medium-sized enterprises but fail to achieve the effect of performance improvement. There are two important reasons for this inconsistency. Firstly, agglomeration has both positive and negative impacts on small and medium-sized enterprises. When the positive offset negative, or vice versa, it will lead to different innovation performance of SMEs in the cluster. The counterbalance between these positive and negative effects will not only occur in the formulation and implementation of a strategy, but also between the choices of different strategies. Therefore, only the comparison among different cluster the average performance of small business will inevitably bring the result of the confusion, this needs us to further study the influence of heterogeneity on innovation performance of cluster enterprise between; Second, the cluster enterprises due to its cluster has particularity, therefore need to further study the cluster structure for the influence of the small and medium-sized enterprise innovation performance, such as cluster agglomeration status and competition structure factors such as regulation[11].

Innovation of small and medium-sized enterprise growth should choose what kind of growth strategy has become one of the core strategy of enterprise pursues, therefore understand the strategic choice for small and medium-sized enterprises cluster innovation and regional interaction, to understand theoretically the effects of small and medium-sized enterprise strategy on innovation performance. The research on the selection of regional environment can help to understand the strategic meaning of small and medium-sized enterprises. Finally from the practical point of view, the cluster enterprise heterogeneity between cluster structure factors can help us to understand from the perspective of heterogeneity within a cluster of small and medium-sized enterprise how to grow, and where is the key to the growth of the decision, this is undoubtedly an important strategic issue[12]. The basic assumption of this paper is that there exists a curvilinear relationship between the scale of small and medium enterprises' agglomeration growth and innovation performance. Before reaching the optimal scale, enterprise agglomeration can help small and medium-sized enterprises to overcome the problems caused by miniaturization, which is mainly based on the growth of the cluster external-income sharing mechanism. But when the scale of growth exceeds the optimal scale, it becomes difficult for small and medium-sized enterprises to innovate and grow. From the choice of enterprise innovation strategy, it is necessary to pay attention to the heterogeneity of cluster. Therefore, this paper first clearly defines the cluster innovation strategy of small and medium-sized enterprises, namely, to achieve innovative growth through agglomeration; Then, we study the conditioned conditions of the agglomeration innovation growth, namely the contingency factors of the cluster and the boundary conditions of innovation performance improvement. Moreover, according to the theoretical framework, the paper puts forward the steps for the implementation of the strategy of small and medium-sized enterprises to gather innovative growth strategies, and finally the conclusion part of this paper.

2. Innovation agglomeration and performance analysis of small and medium-sized enterprises

2.1 The agglomeration of small and medium-sized enterprises' innovation

Agglomeration has become an important way for SMEs to innovate and grow. Previous studies have focused on how small and medium-sized enterprises can obtain survival and development opportunities through innovative agglomeration. Small and medium-sized enterprise because of its innovative flexibility in the proportion of high technology industry is higher, so the small and medium-sized enterprises cluster's research also often in high technology industries, such as the

semiconductor industry and biological engineering industry[13].The geographical proximity and interaction between the organization created the agglomeration of externality benefits[11], including the labor market appear to produce professional knowledge spillover and search cost reduced benefits[8][14].In addition, many enterprises geographically between adjacent special promotes tacit knowledge transfer between cluster, this kind of interaction can be realized through multiple channels of nonverbal communication, and can also achieve real-time feedback, thus can communicate some complex information[15].From the point of the development of the world and our country small and medium-sized enterprises innovation cluster, the agglomeration economy effect is to promote a large number of high-tech industrial park and the professional area, the emergence of innovation cluster area, such as such as specialized town economy of the pearl river delta region in our country, has played an important role in promoting regional economic development.

However, the present study does not have a good performance difference between enterprises in cluster and outside enterprises. Considering the diversification of the innovative growth mode of SMEs, agglomeration innovation is only one form. Moreover, there are still many problems in the innovation process of small and medium-sized enterprises. That is to say, this kind of agglomeration innovation effect can play its role under what condition. Whether it is agglomeration economy or SMEs innovation network research scholars have discussed this. For example, Chinese scholars Yang Juping and Jia Shenghua[9] have studied the matching of knowledge diffusion of leading enterprises in clusters and the absorption capacity of small and medium-sized enterprises. And Zhao Yanhua[10] just focus on what type of innovation network had the greatest influence on the performance of small and medium-sized enterprises, and finally concluded between enterprise and enterprise network function is far greater than network between the enterprise and the government. In the research on the strategic research of R&D investment location, Yu Pei[16] believes that the geographical proximity of enterprises promotes the investment of development research, while the proximity of knowledge and the proximity of the organization promotes the investment of basic research. And Chen, Cui Chunmei and Chen Jingjing[17] presents some features of industry factors will affect the accumulation process, capital and technology intensive industries tend to be more centralized urbanization, concentration and labor-intensive industries more tend to be localized. However, foreign scholars like Almazan et al.[18] believe that enterprises in clusters are more likely to choose acquisition strategies for innovative growth than enterprises outside the cluster. Narula and Santangelo[19] and Rothaermel[20] established the relationship between the number of enterprises in the cluster and the number of alliances, and from another perspective, they studied the clustering strategy selection of enterprise innovation growth. As can be seen from the above studies, the clustering innovation itself does not necessarily result in performance improvement. This requires us to further analyze the performance problems after the innovation agglomeration of small and medium-sized enterprises, and to study the conditions and contingency factors.

2.2 The performance of small and medium-sized enterprises after innovation agglomeration

On the one hand, there is little research on the change of innovation performance before and after the agglomeration of small and medium-sized enterprises. Almost all agree that the agglomeration is much higher than the previous innovation performance, so it also ignores the heterogeneity of the enterprise strategy formulation after agglomeration. In fact, in our actual development process, innovation agglomeration does not necessarily bring about the improvement of performance. So we think that small and medium-sized enterprises may show different performance after the innovation cluster, this may depend on how to manage the cluster of small and medium-sized enterprise internal and external balance between these interactions. Therefore, there are two main keys to the "black box" key to the innovation process of small and medium-sized enterprises: first, the heterogeneity between cluster enterprises and the influence of the clustering innovation; The second is the influence of cluster structure factors on agglomeration innovation. Below we will based on the theory of agglomeration economy theory and resource partition two theories to discuss the two factors is how to adjust the performance of small and medium-sized enterprise cluster innovation, so as to provide

theoretical support for further performance improvement strategy. The overall strategic analysis framework is shown in figure 1.

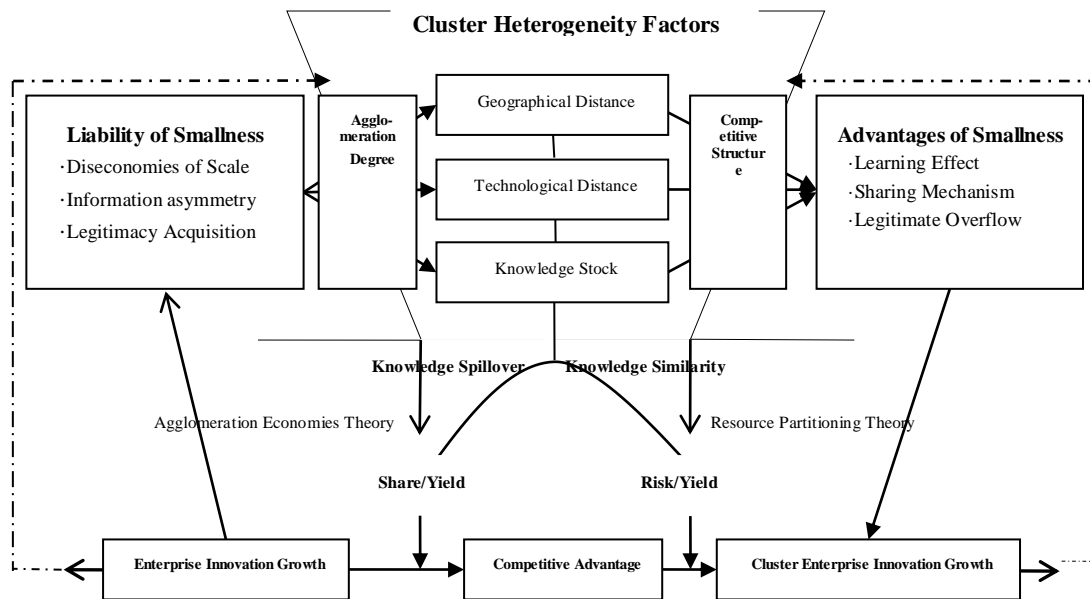


Figure 1. The strategic analysis framework for the cluster innovation of smes

Cluster Structure Characteristics

The characteristics of cluster structure mainly include the "absolute index" of cluster agglomeration degree and the "relative index" (structural index) of the cluster competition structure. Both are the characteristics of the cluster environment and the important factor[6].

Agglomeration degree. The geographical concentration of enterprises is considered to improve the performance of cluster enterprises. This clustering economic effect is derived from the synergistic effect of some micro mechanisms, so the concentration of economic effects may vary greatly due to different industries or regions[21].The heterogeneity between singular question discussion about cluster was more focused on agglomeration economy effect, the features of mainly includes the cluster enterprise can be easier to obtain specific inputs, access to certain suppliers and gain more knowledge spillover and so on. From the perspective of demand, agglomeration can also increase the purchasing motivation of consumers, which includes reducing the search cost of goods, and making it easier to compare the quality among merchants[22].We think the agglomeration effect weakens growth limit the size of small and medium-sized enterprises innovation, because the agglomeration offers many benefits can replace massive growth of income, and it could avoid massive growth brought about by the ‘big enterprise disease’ problem. Cluster internal enterprises can more easily adjust their technology, human resources, financial and market strategies, and not worry about the rigidity and sunk costs of large-scale organizations.

It is obvious that the greater the geographical concentration of enterprises, the higher the performance of innovation growth of SMEs. There are three reasons: one is the greater the degree of agglomeration, the more likely to attract a large number of professional providers, such as distributors, equipment suppliers, professional consultancy, market research and test the audit services, etc.[23].These external institutions can substitute for the conditions required for scale growth and can create opportunities for subcontracting and outsourcing. Second, the greater the degree of agglomeration, the synergies between enterprises becomes more obvious, the constrained conditions of the knowledge is more greatly weakened, thereby gaining greater than the low degree of agglomeration of enterprise innovation, at the same time to obtain the sustainable development of competitive advantage. Thirdly, the greater the degree of agglomeration, the greater the regional reputation and legitimacy of the region, and the greater the system spilt benefit of the cluster enterprises. Generally speaking, the acquisition of legitimacy can be achieved through enterprise growth[24], and the

cooperative relationship established between suppliers or purchasers[25] or the aggregation density between similar enterprises[26]. Companies that are clearly clustered can gain a greater say and negotiating power. So can be seen from the above accumulation effect is replaced by more small and medium-sized enterprise innovation and growth, the size of the growing problem is mainly embodied as the substitution effect, and the intensity of the alternative income in agglomeration more both in quantity and structure can make the externalities of cluster enterprises gain more benefits.

Competitive structure. The agglomeration effect or agglomeration degree is studied from the "absolute quantity" of a cluster characteristic, and we need to further discuss the structural problems of agglomeration. It is how the agglomeration of market competition structure affects small and medium-sized enterprises to gather innovation performance. From the perspective of the overall market competition structure, the concentration of the market structure is low and the market structure is highly competitive. In the face of these two different market competition structure, small and medium-sized enterprises each have the advantages and disadvantages. In the centralized market competition structure, small and medium-sized enterprises may gain competitive advantage by finding niche market because of their miniaturization. Partition theory and resources but also underlines that[27][28], this theory is that competition is more tend to have similar characteristics between enterprises, and won't compete with markedly different enterprises. No matter from the technology, the scale and operation mechanism of small and medium-sized enterprises and large enterprises have obvious difference, so large companies are more likely to compete with large enterprises, to allow room for the resource space, has released more resources and market opportunities for small and medium-sized enterprises. In contrast in a decentralised market competition structure, space, a large number of similar enterprises exist the same resources will inevitably in order to obtain specific areas such as suppliers, Labour and consumer to fierce competition for resources. In this market structure, the survival of the fittest is very obvious, the birth rate and death rate of small and medium-sized enterprises are very high, so the risk of innovation growth is very large. In discrete type market structure, due to increased competition makes the enterprise scale is very small, may be difficult to attract high-quality managers, can only rely on internal training manager to achieve growth. In a centralized market structure, small and medium sized enterprises may easily hire middle managers of large enterprises. Therefore, from the perspective of resource partitioning, it is difficult for small and medium-sized enterprises to achieve differentiated competition in the competitive and fragmented market structure, so it is difficult to achieve 'small advantages'. It can be seen from the above discussion that small and medium-sized enterprises should choose the centralized market competition structure to gain the differentiation competitive advantage.

2.3 Heterogeneous Factors Among Cluster Enterprises

Factors affecting factors in addition to the cluster characteristics of cluster enterprise innovation, should also include cluster heterogeneity factors between businesses, it may partly reflect on the aggregation degree factor, but the more peculiar to show the internal enterprise agglomeration mechanisms. We believe that the cluster economic effect weakens the relationship between the cluster and innovation performance of small and medium-sized enterprises, because it provides many benefits that can replace the growth of enterprise scale. Including SMEs can benefit from the agglomeration scope economy[23] and obtain the legitimacy of innovation growth[26]. However, the accrued benefits are not uniform for each enterprise in the cluster, but there are differences. And our strategy is to find these differences. There are three main aspects:

Geographic distance between cluster enterprises. The geographical distance between cluster enterprises may be the first factor that we need to pay attention to. Previous studies did not take into account the geographic heterogeneity of intra-cluster transactions, only that the associated benefits generated by clustering were homogeneous within the cluster. But these gains may be bigger when companies are closer. On the one hand, proximity of geography can improve the convenience of information communication[7]. On the other hand, the closer the enterprise is, the more absorptive capacity[29]. This geographical proximity facilitates the overflow of knowledge and reduces the

search cost, thus making it easier for enterprises in the cluster to realize agglomeration economic effect. The space adjacent objectively provides a convenient communication cluster enterprise geographic conditions, but this kind of geographical convenience also does not necessarily produce effective interaction, we also need to discuss technology distance and the factors affecting stock of knowledge.

Technical distance between cluster enterprises. The technical distance between cluster enterprises refers to the similarity or similarity between enterprises in knowledge resources. This characteristic may regulate the effect of enterprise on geographical location. Cluster enterprise if have similar technical background can save confirmed partner a costly investment, and more importantly can better assess the resource prospect of partners, which can more accurately forecast cooperation future earnings generated by the[29], the effectiveness of the internal mechanism of sharing for the cluster can produce important influence. When companies lack this ability to absorb, it is difficult to understand and identify innovative resources and potential opportunities[30].So when the cluster more unlike the internal knowledge resources between enterprises, between enterprise ability to absorb and share will drop, agglomeration economy effect is hard to play, which would reduce the cluster innovation performance.

Knowledge stock of cluster enterprises. The communication between cluster enterprises may involve complex knowledge. And the knowledge resource trade presents some special challenges: the sales of knowledge resources must disclose enough information to the purchaser to prove its potential attraction. But if the seller discloses all the information, it will reduce the incentive for the purchaser to purchase the resource. Another problem is that knowledge resources are difficult to observe, and their value may be specific to a particular enterprise, so their value assessment is more difficult than tangible resources. When the stock of relevant technical knowledge increases, the level of information asymmetry and the related adverse selection risk will also increase continuously [31].Therefore, when the knowledge stock of both parties in the cluster is larger, the clustering is more valuable as the arrangement to reduce the information asymmetry, and the clustering economic effect will be more obvious. As an effective way to convey tacit knowledge, cluster governance will achieve the enhancement effect of agglomeration performance.

3. Small and medium-sized enterprises cluster innovative performance improvement strategy

In order to improve the performance of small and medium-sized enterprises' innovation agglomeration, we need to take more effective measures in accordance with the conditions discussed above. From the perspective of strategy, small and medium-sized enterprises can obtain 'small advantages' by choosing different agglomeration strategies.

3.1 Cluster Selection Strategy

First, we will discuss how small and medium-sized enterprises choose location. Given that a small and medium-sized enterprise needs to innovate and grow through agglomeration, what kind of cluster can we choose to gain competitive advantage? According to our previous analysis, we can get the cluster selection matrix diagram shown in figure 2 below.

		Degree of Market Competition	
		Low	High
Agglomeration Degree	High	I .Large External Economy .Diversified Competition	II .Large External Economy .Homogeneous Competition
	Low	IV .Small External Economy . Diversified Competition	III .Small External Economy . Homogeneous Competition

Figure 2. The selection strategy of smes

Let's take a look at the two extreme choices. Through the theoretical analysis of the influence of the two structural features of the cluster on the innovation performance of small and medium-sized enterprises, the I region in figure 2 is the best choice. In this type of cluster, the clustering degree is high, and the cluster enterprises are closely related to each other, so that the enterprise can gain greater external economy. At the same time, agglomeration enterprises can gain the advantage of resource partitioning through the differentiation of competitive strategy, avoiding the pressure of homogenization competition and obtaining the spilt income. Therefore, from the perspective of cluster selection of small and medium-sized enterprises, some clusters with high concentration and leading enterprises should be entered. However, if we look at several other types, the least expected cluster of small and medium-sized enterprises should be zone III, which will not be able to gather economic benefits, but also face the pressure of intensifying competition. It is very difficult for small and medium-sized enterprises to distinguish themselves in such clusters. There is an advantage in both zone II and IV, but there is another disadvantage. We should pay more attention to the agglomeration effect in the order of selection, so the choice of II area is better than that of zone IV.

Small and medium-sized enterprises are faced with many constraints in their innovation growth, and their 'small disadvantages' need to make more detailed strategies on location selection. Undoubtedly, it is of great significance for the growth of small and medium-sized enterprises to correct the "small disadvantages" through the two dimensions of agglomeration degree and market competition degree. Agglomeration innovation starts with the "agglomeration" effect, and then comes to the question of market competition structure. For small and medium-sized enterprises, it is necessary to choose high concentration degree in strategic practice into the cluster, and the other on the leading enterprises in the cluster can give enterprise to bring the resources sharing at the same time, the small and medium-sized enterprises have a material pressure of competition. Further, after the strategic choice of small and medium-sized enterprises, the next step should be to consider how to gain innovation advantages through agglomeration of economic effects, mainly including acquisition and alliance strategies.

3.2 Cluster Innovation Strategy

According to the analysis of the heterogeneity factors in the cluster, the cluster innovation performance is affected by geographical distance, technical distance and knowledge stock. The heterogeneity of this enterprise clearly affects the choice of innovative growth strategy. The strategy of small and medium-sized enterprises' innovation growth mainly includes three kinds: one is the vertical integration mode, namely the acquisition mode. One is the alliance governance model. One is externalization, the outsourcing model. Based on the study of transaction cost theory, capability theory and information economics theory, we can see how the heterogeneity factors within the cluster influence the choice of these three strategic models. As shown in table 1 below:

Table 1. Small and medium-sized enterprises cluster innovation growth strategy choice

		INNOVATION GROWTH STRATEGY		
		Merger	Alliance	Outsourcing
Geographical Distance	Far	√√√		
	Near		√√√	
Technological Distance	Far			√√√
	Near		√√√	
Knowledge Stock	More	√√√		
	Less			√√√

When the cluster enterprises in the relatively nearby in the geographic distance, greatly increases the chances of face-to-face communication, thus reducing the cost of information asymmetry, both parties know each other more easily. But also for neighboring can construct knowledge[32], the lower the transaction cost, so as to make the small and medium-sized enterprises innovation growth strategy will choose more alliance mode, rather than the acquisition mode. When the enterprises in the cluster

are far away from each other, the transaction costs are increased rapidly, making it difficult to complete the transaction through the market or the middle governance mode. And the distance from a technical perspective, trade both sides of the technical knowledge difference, the greater the need to spend more to search for more resources to invest in technology, understanding and cooperation among, so the transaction costs will increase. In addition, due to some characteristics of innovation, mergers and acquisitions are not a good choice, so when the technology is far away, small and medium-sized enterprises can choose to outsource some business. After knowing about the relevant technical knowledge, adopt the mode of alliance. Based on the absorption ability of knowledge stock of factors can also affect the innovation growth strategy choice, when both parties technology knowledge stock increase, the corresponding transaction has become more and more complex, the corresponding transaction costs will increase, by mergers and acquisitions is better choice model. Instead, the outsourcing model is appropriate.

Due to the complexity of the analysis of innovation growth strategy, the above analysis only provides a thought. In specific strategic practice, small and medium-sized enterprises also need to pay attention to the synergistic effect of cluster heterogeneity factors, the overlap between the three factors and the offsetting hedging effect. Geographic distance as a business location factors within the cluster distance from objectively affect the technology and knowledge stock of factors, so in practice of small and medium-sized enterprises also need to be especially concerned about the problem of the location choice within the cluster through the superior geographical location to better understand the skills and knowledge counterparties.

4. Conclusion

This paper discusses the cluster strategy of improving innovation performance based on the practical problems of small and medium-sized enterprises. It is found that small and medium-sized enterprises need to study the possibility of improving their innovation performance from two aspects: cluster feature structure and internal heterogeneity factor. Concentration degree is higher, the lower level of competition in the market of cluster competitive advantage can bring to small and medium-sized enterprises cluster innovation, and according to the geographical distance of small and medium-sized enterprises within the cluster, technological distance and the effect of knowledge stock, we need to match different mode of cluster innovation growth strategy, including mergers and acquisitions, alliances and outsourcing model. From the perspective of strategic implementation, small and medium-sized enterprises need to improve their innovation performance from the following three aspects: first, expand the scope of the acquisition of innovative resources within the cluster. The scope of the expansion includes geographical coverage and the scope of stakeholders. By forming an innovative network to fully play the agglomeration economic effect. Second, the screening of innovative projects is used. Based on space partition theory advocated by resources strategy, small and medium-sized enterprises for a broad range of innovative projects must be selected, try to find the future into the niche market of potential projects. Third, we should try to mobilize the innovation motivation of small and medium-sized enterprises. This is also the key to strategy implementation. Any good strategy needs to be implemented. It is necessary to enhance the communication between entrepreneurs within the cluster, shorten the technical distance, communicate with each other and enhance the consciousness of collaborative innovation.

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