Research on Path Dependence of Industrial Clusters: Taking Xuchang Tobacco Industrial Cluster as an Example

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Abstract: As the major carriers for the development of the regional economy and small-and-medium-sized enterprises, industry clusters are faced with challenges of sustainable development in the process of China's industrial upgrading and transformation. This study takes the development history of China's Xuchang tobacco industry cluster as the background, extracts some key concepts from Path-Dependence Theory and then constructs the relational model of path dependence elements, hoping to find out the formation mechanism of path dependence. The study shows that, firstly, learning costs, transaction costs, transformation costs and innovation risks determine what decisions to be taken for those enterprises in the clusters, and they are also the internal economic factors for formation of path-dependence. Secondly, the competence of an enterprise is the main reason accounting for the path dependence of the cluster. Lastly, habit seem to be the social cause and the highlight of the path dependence. Moreover, those path dependence elements are interactive and reciprocally enhanced.

Key words: industry cluster; tobacco industry; path-dependence; lock-ins risk

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INTRODUCTION

The industry cluster is a competitive formation which can help enterprises reduce the costs of access to information and transaction, bring about complementary benefits and be conducive to innovation as well(Porter, 1998)[1]. But it is hard to tell the formation of an industry cluster is a blessing or a curse, for what contributes to its success may one day render it a closed system with the development of specialization. The more is advanced evolution of specialization, the more likely an industry cluster is to become closed, and it will undermine the ability to respond to the changing market. With the accumulation of risks and decreases of competitive power, the industry cluster will inevitably come to an end.[2] In initial stage of the formation, the industry cluster would

increase productivity of the companies because the external economies, lower market-access costs and information advantages will attract more businesses to cluster and drive innovation in the field. But the founding enterprises and the latter-coming actors then create a homogeneous atmosphere which curb the innovation in the cluster[3]. The question is why a business cluster used to be vigorous and innovative has been locked. Many experts argue that it is network that should be responsible for it. Harrison[4] has done a research on the cluster risks from the perspective of cooperation network between actors within a cluster. After examining the cooperation model in Italian clusters, he maintains that "network is a double-edged sword". Network relations are based on trust, but trust may evolve into a protection for traditional methods and curb innovation as well. Abrahamson & Fombrun[5] hold the similar points. They state that the network of local embedding is not only the decisive factor maintaining the competitive advantages of the clusters, but also the source of the cluster being locked-in.

While we agree on the benefits that the industry cluster can bring about, rational reflection from experts on the risks that industry cluster would produce is of great significance. Not until we have realized the risks the industry cluster will bring on and the cause of the risks can we find a better way to drive innovation, upgrading and transformation of the industry cluster. However, the above-mentioned studies have certain limitations. First, Opinions that success always accompanies risks and networks lead to being locked are definitely true. But they are viewed from the wholeness of the cluster and its organizational traits rather than motivation of the economic actors. Cluster behaviors are absolutely the actions performed by all enterprises. Only from the motivation of economic actors can we have a better understanding of enterprises' acts, and find out the real reason for path dependence of the clusters. But studying from the motivation does not mean that we have ignored the role the organizational traits play. On the contrary, the motivation we research on is one in the peculiar cluster and network. We believe that this methodology can better help us understand the process in which competitive advantages turn into disadvantages.

What methodology is to be adopted in this study is to apply the Path-Dependence Theory, extract some key concepts from it and then construct the relational model of path dependence elements, hoping to find out the formation mechanism of path dependence of the industry cluster. Meanwhile, taking China's Xuchang tobacco industry cluster as an example, it illustrates the influence of path dependence on its development process.

The Xuchang tobacco industry has a long history of industrial clusters. From 1913 to 1915, after American tobacco merchants went to Xuchang to test flue-cured tobacco successfully, British American Tobacco Company and Nanyang Brothers Tobacco Company set up factories in Xuchang City, Henan Province to purchase, redry, and promote Local tobacco planting. At the end of 1947, Xuchang’s entire city has grown to about 150 large and small tobacco shops; after the founding of the People’s Republic of China, the state-owned Xuchang flue-cured tobacco factory, cigarette factory and tobacco machinery factory were established, and the planting area expanded rapidly. Xuchang was called it in the 1950s. "Kingdom of Tobacco Leaf": At the beginning of reform and opening up, Xuchang had formed an industrial cluster of tobacco planting, redrying, management, storage and transportation, rolling, machinery, and scientific research. At the end of 1985, there were more than 3 billion catties of flue-cured tobacco in Xuchang district, accounting for about 50% of the country's total flue-cured tobacco purchases. In the mid to late 1980s, with the rise of Yunnan tobacco, the competitive advantage of the Xuchang tobacco industry cluster declined due to many reasons, but path dependence is an important factor. Second, regarding the issue of cluster lock-in, the tobacco industry cluster is rarely involved. Research papers on the tobacco industry mainly involve monopoly and competition issues[6,7].

MODELS OF PATH DEPENDENCE OF THE INDUSTRY CLUSTER

In the process of cluster's development, the cluster will be locked into a certain state and lose its innovative and competitive advantages. So why will it be locked? The answer may be found from Path-Dependence Theory. Path-Dependence Theory was originally developed by some economists as David[8] and Arthur[9]. They propose that the theory explains a phenomenon that a technology, though it is not the best option, would be locked and become a "common" once it has been chosen. North[10] applies this theory to the field of institutional change. He thinks that the increasing returns and the incomplete markets develop the path of institutional change. This theory can be also applied to analyzing industry clusters. Martin & Sunley[11]believe that regional development also depend on a path, and the place dependence is its prominent feature. Because of the place dependence, the industry cluster might evolve from an innovative organization into a fossilized one, and then lose its competitive advantages. This phenomenon is not occasional. Why a cluster would be fossilized is related to its organization traits and determined by many factors. Considering the reality of Chinese industry clusters and the motivation and competences of the economic actors within the cluster. Five factors that determine a cluster's dependence on a path or paths can be summarized. These factors include learning cost, conversion cost, innovation risk, competence and habit. There is no clear boundary between each factor. In nature, they are interactive and even there exists a causal relationship. Due to the path dependence, a cluster might be locked in terms of technology, transaction, institution and strategy. Consequently, it cannot embrace a sustainable development. Figure 1 shows five factors and their relationships.

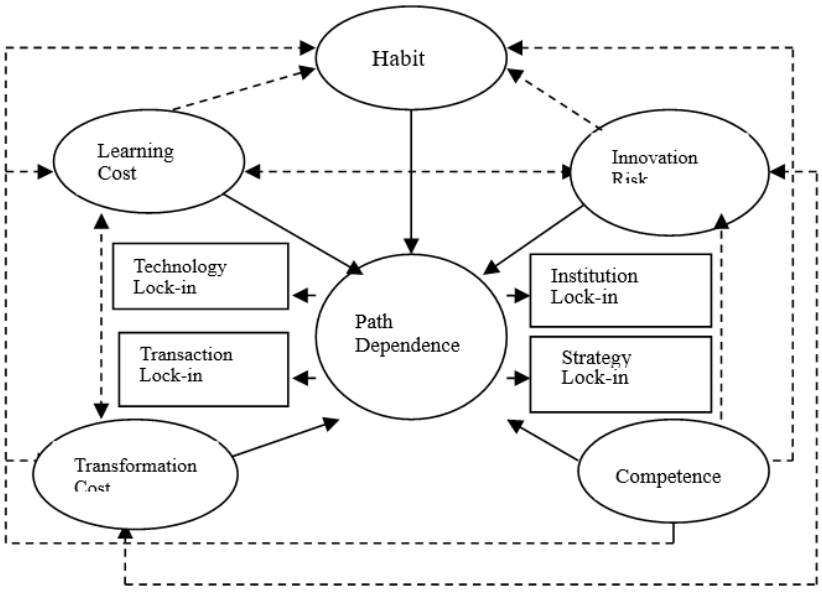

Figure 1 Factors of path-dependence and their relational model

INTERNAL AND EXTERNAL LEARNING COSTS

To some extent, path dependence results from path development. So the formation mechanism of the industry clusters seems to be the logical starting-point of analyzing path dependence. It is complicated to find out how an industry cluster formed, but we can start our analysis from the motivation of the enterprise and focus on the term--learning cost. The learning cost is similar to (but not the same as) the transaction cost. The learning cost refer to the cost of getting access to knowledge and information. Broadly, the learning cost includes cost of processing information and decision-making, and of using knowledge and introducing innovation, while the transaction cost is mainly linked to transaction activities and contract relationship. The main reason why enterprises producing the same products cluster

together is that they want to save learning cost. Knowledge is the basis of the enterprise's food or the competence. But to acquire knowledge needs costs as well as environmental conditions. As for tacit information which is hard to encode, learners can get it only when they are in the virtual scenes by way of daily observation. Tacit information includes not only productive knowledge, technical expertise, managerial knowledge, transaction knowledge, but also some market knowledge which is hard to encode. Doloreux[12]thinks that under the conditions of spatial agglomeration enterprises are much easier to learn and share. The costs of knowledge and information exchange (here he considers the learning cost as the transaction cost) could be reduced. Moreover, it is conducive to understanding and trust between economic actors, which is an inseparable part in knowledge exchange. The desire to reduce learning cost and the motivation to learn from other peers result in the formation of clusters of horizontal specialization (clusters of businesses manufacturing the same product).

Businesses clustering can be viewed as the establishment of a new enterprise which is a decision-making based on knowledge and which shows great uncertainty. Generally, even though a careful preliminary evaluation has been carried out by investors, the decision will not definitely ensure the success of the investment because there exist uncertainty and complexity. However, the economic actors will not be at their wits' end. They might go and seek for the ways to solve the problems and save costs. Just as Simon[13]says, the method of managing people, as a result of people's limited reasoning, has been abstracted to a simple model rather than a decision-making act with complexity. When an enterprise operates in an environment with uncertainty, it surely lacks data and skills needed by maximum computerization. Thus we can see that it is two types of model (simulation and try-and-error learning) instead of prediction that can ensure an enterprise's success.[14]

Simulation is a learning style, and it is the most popular and low-cost learning style or decision-making style. The first arrivers into acluster are mainly small-and-medium-sized enterprises (SMEs) which are operated by mostly novice entrepreneurs. A great many of the novice entrepreneurs (most of Chinese SMEs clusters feature local farmers) don't have an idea of relevant knowledge about establishing and operating an enterprise. Especially, they lack specialized expertise in their own field. If they cannot easily gather and take advantage of relevant knowledge and information, their decisions to cluster and start a business is simply a simulative act, that is, simulating those who have succeeded in the field and establishing their own. To reduce the cost of simulation or achieve efficient simulation, the simulators need to get close to the models spatially. If there are enough simulators doing like this, a cluster will then come into being. Once a cluster takes shape, each business adjoin each other. They have the similar production environment and conditions. Combined with some social relationships like kinship, blood relationship, geological relationship and scholarship, knowledge and information can quickly flow and be shared, and the costs of internal learning or simulation are still at a lower level. At this stage, the cluster can facilitate the development of the businesses and itself as well. What is discussed above reveals that internal simulation is the primitive formation model or even the development model which comes from the historical origin. It is the "seed" of path dependence. Moreover, internal simulation, which is a self-reinforcing mechanism, is also an institutional adjustment to reduce learning costs.

Learning is also a self-reinforcing process, so the knowledge itself is accordingly path-dependent.[15] Learning is to learn and repeat. It needs practice to make perfect. So are operational skills and the process of retrieving information and making using of knowledge. The accumulation of knowledge in one field means the increase of production efficiency and decrease of production costs. And it also means the acceleration of knowledge access and reproduction, because accessing to new knowledge is based on the existing one. This shows that learning along a path can save costs or increase profits. Generally, when turning to a new field of learning, without the accumulation of the knowledge and skills, the learning costs will comparatively be high. That's why learners are not willing to throw off old learning habit and path. In the case of industry cluster, the local simulation has been repeated, which is the internal reason for path dependence of a cluster.

Because in a cluster, simulators learning from models (nearby and internal learning) manifest

simple simulation rather than innovation, it is hard to drive knowledge to improve continuously. Learning beyond the cluster and simulation is a type of external learning. The external learning will broaden learners' horizon and help them get access to the new knowledge faster, but it has an innate defect: higher learning costs. Firstly, the spatial distance will hinder the learning and information communication, which is a geological factor that push the external learning costs higher. Secondly, knowledge exchange is a systematic and long-term process which needs relationship-specific investment and depend on businesses improving their learning ability. WANG Lan[16] holds that the construction of systematic knowledge structure between businesses in clusters and their external associates is not an occasional knowledge exchange, for the economic actors need strategic and systematic relationships to develop their mutual trust. But the costs of constructing mutual trust is high because establishing and maintaining the strategic and systematic relationships need preliminary plan and pre-design, which is a complex and systematic project. Relationship-specific investment is a must in establishing relationships between businesses within a cluster and their associates beyond a cluster, cooperating with universities and other academic institutions and building horizontal collaboration between businesses. But the knowledge sharing and distribution between businesses based on geological proximity and local capital make it possible for businesses within a cluster not budgeting a specific investment[17]. In addition, tacit knowledge, which are embedded in skills, competences, specialties and management possessed by business operators and their staff, is very important for a business. The face-to-face communications of business actors in the clusters can easily solve this problem, which facilitates objectively the internalization of the learning objects.

Internal learning is a local retrieving. It is low-cost, but it is hard to improve cluster members' knowledge structure and broaden their competence boundaries. With fast development of knowledge and increasing environmental uncertainty, businesses' knowledge absorption and reform need openness and flexibility of the network, but cluster learning mechanism, which creates island of knowledge, will reduce the possibilities of knowledge absorption and breakthrough. External learning is important for improving knowledge structure and boosting competitiveness, but it is high-cost. Considering the cost differences between internal and external learning styles, cluster members have generally inclination to internal learning if confronting no survival crisis. By the way, this inclination may result from cluster members' desire for free ride. The long-term neglect of external learning may lead to narrowing horizon and fossilizing knowledge, thus both competitive advantages and the abilities to change will lose eventually. The path dependence of the cluster members is the foundation for the path dependence of the industry clusters. Members are interactive in a horizontal specialization cluster. When there are enough members with no ability to change or unwilling to change, the path dependence of the cluster is doomed. What discussed above just analyzes the path dependence from the perspective of knowledge access and information retrieving. As a matter of fact, once the clusters plan to throw off path dependence and carry out strategic transformation, they should pay the sunk costs and transformation costs which in turn will restrict the transformation of the clusters. Limited by the length of the article, and because the following sections will cover some of the points, this issue will not be analyzed further here.

In the mid to late 1980s, most of the planting was smallholders. In addition to the guidance of the local agricultural department, the planting techniques were mainly based on mutual learning among tobacco farmers and accumulation of their own experience. The quality of planting and flue-cured tobacco was unstable, and the planting income varied greatly from year to year. In some years, they even suffered losses, affecting farmers' enthusiasm for planting, reducing planting area and unstable product quality. As a result, the competitive position of the cluster has declined.

TRANSACTION COST AND TRANSFORMATION COST

The concept of learning cost is best to be applied to analyzing some industry clusters consisting of homogeneous businesses, because membership in horizontal specialization clusters is mainly mutual competition and learning. The

formation mechanism of the vertical specialization clusters is different from that of the horizontal specialization ones. At the very beginning of the formation of vertical specialization clusters, the upstream and downstream enterprises cluster mainly for saving transaction cost. So the distance and stable transaction relationships matter for all of the businesses. If they are close geologically, they can save many exogenous transaction costs like transportation cost and create a better synergic effect. Because of the geological proximity, it is convenient for businesses to communicate and exchange information. Moreover, the previous and latter social networks make it easier to build trust between businesses which can greatly curb the speculation and reduce endogenous transaction costs. The purpose of saving transaction costs make it possible for upstream and downstream businesses getting together. Once there are enough businesses clustering together, an industry cluster then comes into being.

Once the cluster comes into being, established partners will speed up the frequency of transactions and the decreased transaction costs will demand a deeper specialization as well. The major performances are: (1) a trust mechanism has been formed with the further information and knowledge exchange and less conflicts. Once the trust has been established, businesses are more likely to establish long-term trading contracts and sales & purchase agreements to strengthen synergic effect of the transaction, and further save transaction costs of businesses as well as of clusters so as to boost competitive advantages. (2) The technical synergic effect within the cluster chain will be enhanced as time goes by. All of businesses can make use of infrastructure. In this way they can improve their specialization and achieve in-time production so that they can save much production costs and storage costs. (3) The cooperation and innovation will be accelerated within the existing technological level. In the process of technological innovation, the development and popularity of each new technology depend on both internal restriction and the position a business stands. If the relationships between upstream and downstream partners are stable, and the technology a business develops adapts to technological environment of upstream or downstream businesses, a synergic effect is easier to be developed. And it is possible to achieve technological innovation cooperation and reduce cooperation costs so that an efficient network of technological innovation will come into being[18].

What discussed above shows that saving transaction costs is the initial motivation for the formation of vertical specialization clusters, and it is also the source of clusters' competitive advantages. With the passage of time, the finance, technology, and social links of cluster members are further enhanced, and the transaction costs reduce further. Combining with the synergic effect, the competitive advantages of a cluster will become obvious, and businesses gain more profits. Above all, from the generation of the motivation to the formation of business cluster and to the strengthening of competitive advantage, this path, is a historical course and can be self-enhanced.

The industry, products and technological path may not be the best ones when the clusters comes into being, for the formation of a cluster is occasional. But it does not matter. What matters is that assuming the initial path is the best, with the passage of time, this path will be no better than other, and clusters will gradually lose their comparative advantages as well. If the clusters cannot transform in time, they are likely to be locked. But what causes hidden behind the path dependence? Schmidt & Spindler[19] believe that to save adjustment costs or transformation costs is the one of causes. In other words, clusters are unwilling to transform for fear of paying higher transformation costs. As a consequence, they are locked.

The transformation of vertical specialization clusters involves businesses in the cluster and the cluster itself. From the angle of businesses, transactions between them are virtually market-oriented dealings, so it is possible for businesses to choose any partner as they like. However, trading with different partners will produce different transaction costs. Due to the natural factors as spatial distance and social factors as interpersonal relationships, the transaction costs between cluster members are obviously lower than those with external partners. Thus, as they are inclined to internal learning, the enterprises within a horizontal specialization cluster tend to trade with associates within. But the difference between

the internal and external transaction costs is only one of elements leading individual business to being locked into the cluster network. It only reveals why enterprises choose this or that path and the possibilities of path-enhancing. If a business breaks away from the old cluster and participates in a new cluster, the decision-makers of this enterprise should not only take the internal and external costs into account, but also consider the additional charges resulting from breakaway. We identify this kind of charges as transaction costs which include external transaction cost. Obviously, it is higher than external transformation cost. This transformation costs include at least: (1) Searching cost, that is, the cost of searching for new partners and signing contracts. (2) The cost of establishing and maintaining new trust with new partners. Building trust is a long-term investment, which will restrain those enterprises which are short of resources from development. (3) Transportation cost. The extension of spatial distance will not only lead to the increase of transportation cost, but also be detrimental to the transportation convenience. (4) Disturbance cost. Any member breaking away from the cluster will bring about some disturbance to the stable trading relationships, resulting in disturbance cost. Disturbance cost is a type of social restriction for those cluster members who have been deeply embedded in the cluster and who have close social relationships. The external transaction costs consist of above-mentioned four types of cost. If the transformation involves the adjustment of products and technological structure, the transformation costs should take the sunk cost into consideration. Thanks to the specialization and long-term dependent relationships within clusters, the assets possessed by individual business are highly specific. Such specific assets as fixed assets, productive technology and staff's skills will then be turned into sunk costs. The existence of transformation costs greatly strengthen the stability of the trading network. In general, without external influence, the cluster members will not easily break away from their trading networks to participate in new ones.

From the angle of the cluster, transformation cost is another story. The stability of the cluster network is the basis for the path dependence of a cluster. No transformation of the individual business means no transformation of the cluster. But within the cluster, individual business is impossible to transform unless it breaks away from established network and joins in a new network. The transformation of the cluster needs the collective action of all businesses. But to reach a consensus is a time-consuming job, and it will produce high coordination cost. What's more, each member of the cluster needs to pay sunk cost if the cluster determines to change. In summary, the trading network may keep stable with the joint efforts of each member. This stable network makes it convenient for internal trading and cooperation between cluster members, but the cooperation is conditioned and local. The local cooperation keeps stable at the cost of flexibility of free choosing trading partners. And at the same time, local cooperation is the major element leading to path dependence the cluster.

Tobacco planting, purchasing, and processing implement a “monopoly” system. Flue-cured tobacco and famous-cured (sun-dried) tobacco implement planned planting and planned purchase. Tobacco farmers can only trade with local tobacco companies. Under this system, tobacco farmers can also obtain government and Tobacco companies provide incentives and other support. Therefore, tobacco farmers in traditional growing areas are generally not easy to switch careers.

INNOVATION RISK AND INNOVATION COST

Innovation is crucial to shake off the path dependence but it needs to be paid. In other words, we should pay innovation cost. To some extent, innovation cost is a special type of the learning cost. Though the local simulative learning costs less, it is the primitive learning style. While learning for knowledge creation or innovation is an advanced learning style or innovative behavior. Innovation is a kind of knowledge creation. It starts from the systematic and extensive information retrieving, and needs investment of material and human capital. Moreover, it takes long time to achieve and it is high cost. Innovation cost to some extend sets up a barrier for the newcomers. Faced with high barriers, enterprises' ability to pay innovation becomes a precondition for any innovation.

What's more, innovation is a risky activity, because it involves unknown fields and the results

are uncertain. Any innovation activity is risky, and the level of risk will increase correspondingly as the importance of the innovation grows. Innovation failure means the investment comes all in vain. So the operators when making decisions not only weigh the innovation cost and expected returns, but also reckon with the innovation risks.

Innovation costs and risks curbing the innovation is not a particular case found in clusters but a universal issue. Apart from the innovation costs and risks, other elements that curb the innovation of the clusters are as follows.

Enterprise's Resource Capability

The willingness of the enterprise's innovation is dependent on its capability of adapting itself to the risks which has a positive correlation with the magnitude of an enterprise. In a cluster consisting of SMEs, the businesses are struggling to survive, and they lack resource capability. That means they are hard to take innovation risks, especially those big risks as strategic transformation. Strategic transformation is a significant innovation activity. It is the transformation and reform of the system. But at the same time, it will produce many risks such as industry choice, business choice, process control and post-management[20].Therefore, SMEs may bold enough to invest in innovation activities, but they will hesitate when deciding whether to carry out strategic transformation. Most importantly, the lack of resource capability will increase the risk of transformation. Generally, the fewer the resources an enterprise accumulates, the worse its resource flexibility has. The fewer types of capability, the slower the capability plays its role in transformation[21]. If an enterprise cannot make use of and integrate all its resources, it cannot ensure its success of transformation, which means the risks are easier to take place. In the mind of decision-makers, if the innovation risks are big enough to threaten the survival of the enterprise, they are inclined to be conservative. The innovation cost is the direct barrier for SMEs. Most SMEs cannot overcome this barrier and get access to some fields which they cannot pay. All in all, SMEs in the clusters are unable or unwilling to pay the extra costs. That's the reason why most traditional industry clusters, when establishing new correlation mechanism and corresponding innovation capacity, become poorly efficient, leading to so-called market failure or community failure[22].

Cluster Environment

Cluster innovations are not only affected by the resource competence, but also influenced by the knowledge spillover environment of the cluster. Knowledge spillovers have two sides. On the one hand, they can lead to the technology diffusion and produce common knowledge. On the other, the spillovers of knowledge mean the property of the knowledge has been shared by all the users. If the enterprises take free ride, simulators will save many production costs which are much lower than those of knowledge developers. Competition will not only dilute developer's super profits (innovation rent), but also make it possible that the developer's yields may be lower than average return on investment capital for the reason that the simulators taking advantage of cost advantage cut price. Thus according to the Nash equilibrium, no one is willing to develop new knowledge[23]. In an environment where lacks protection of innovation stimulation especially the intellectual property, the innovative products will not be fully protected, which will directly affect or even curb the enthusiasm of entrepreneurs to develop new products[24.] For an enterprise, failing to achieve its expected profits is also a risk. The decrease of the profits will more or less have an influence on decision-making. The cluster environment not only has negative effect on an enterprise's technological innovation and production innovation, but also restrict many significant changes as strategic transformation. The cluster businesses gather all strength to achieve synergic market effect, so the collective forces have played a decisive role. If an individual carries out personally industry and business transformation, it to a large extend will lose the sharing profits incurred by clusters, and it will break away from the supporting systems which particularly aim to cluster businesses. In this case, individuals, especially the SMEs, are difficult to deal with the

state of being isolated. From this point of view, it is not that difficult to carry out the innovative transformation of the cluster. What is really difficult is the strategic transformation and business shift.

Innovation risk is also an important reason for the lack of innovation motivation for tobacco farmers and tobacco processing companies. Xuchang tobacco industry cluster has not made major breakthroughs in key links such as variety, ecology, and technology in a long period of time, and the level of scale and intensification is not high enough., The professional service system is not perfect, etc., which affects the improvement of the competitiveness of the cluster[25].

ENTERPRISE'S COMPETENCES AND CLUSTER'S COMPETENCES

For most of the clusters consist of SMEs, they are highly specialized and organized. Compared with giant enterprises, SMEs are more flexible, efficient and innovative. But the magnitude of those SMEs decide their competences. It is common that the lack of competences constrains the transformation and innovation of the cluster.

Costs and risks are the prerequisites but not the sufficient conditions that lead to the path dependence of the clusters. The path dependence is closely related to the competences of the cluster. Competences are the prerequisites of the changer. Even if a business actor wants to change, it has to depend on a certain path because of the lack of competences. It is a common phenomenon, however. In this sense, locking means locking the weak.

A cluster presents numerous competences, among which the innovative competence is crucial. People hold different opinions on the elements and source of the innovative competence. Lawson & Lorenz[26] believe that the innovative competence of the cluster is displayed as its regional innovation system. Knowledge sharing, habits and integration at regional level as well as reconstructing diversified knowledge are three basic elements of cluster competences. Some other scholars such as Zhou Minfei and Wei Jiang[22] believe that the regional innovation system has not displayed the heterogeneity of the business actors and the openness of the networks. They think that the cluster competences should include knowledge infiltration and information retrieving. Focusing on the cluster's competences does not mean neglecting the microcosmic actors. On the contrary, not until we understand the enterprise's competences can we have an idea of innovation and transformation competences of the cluster and find out the source of path dependence of the cluster. The hidden reasoning is that enterprise's competences form the foundation of the cluster's competences, and in the final analysis the innovation of the cluster is the innovation of the businesses within the cluster. The state and the absorption ability of the enterprise's knowledge bases decide the total accumulation of the absorption abilities of the cluster, and they will affect the density and the structure of the knowledge, the communication channel, and learning competence and style of cluster as well as the dynamic innovation competence of the cluster's knowledge system[27]. In addition, the businesses in the cluster have different competences and knowledge bases. They will play different role in the cluster[28]. In this sense, it is very important to cluster various businesses. The reality is that the cluster competences are closely linked to the leading enterprise's competences. In the initial stage of the formation of the cluster, the founding enterprises become the source of the knowledge. As the cluster develops, those high potential or leading enterprises will gradually become the door-keepers by ways of absorbing external knowledge, and then spill over the knowledge to the cluster. Though other enterprises make individual contribution to the accumulation of the common knowledge, they will not, if those high potential enterprises do not take the lead in changing, take full advantage of the knowledge they have to transform.

The innovation and the transformation will be restrained by enterprise's competences. The tangible and intangible assets form the basis of the enterprise's competences. When the enterprise integrates its assets to accomplish a task, the enterprise's competences come into being[29]. The capital generating competence, financing competence, technical reserve and facilities are

tangible assets, while the human resources and the reputation are intangible assets. Both tangible and intangible assets are the important conditions for innovation and transformation. The small-sized enterprises in the cluster lack human resources and capital which greatly constrain its technological innovation. But transformation involves the fundamental change of goal, organizational structure and business type, needing various dynamic competences. Above all, enough resources and effective allocation are key for the successful transformation[30]. The external environment provides the incentives for the strategic transformation. Whether an enterprise can respond to the changes of environment as quickly as possible depends on whether it possesses key resources[31]. The process of transformation or innovation beginning from searching knowledge to achieving goal is risky and complicated. Learning costs and innovative risks are of course the constraints, but they only influence the subjective desire of the decision-makers (to do or not to do). Whereas the resources are of real restraint. If an enterprise has not enough resource, either it is unable to carry out effective external learning and efficient innovation, or it gives up its plan as a consequence of not being able to pay the high learning and innovation costs (can do or cannot do). Similarly, transformation costs play a vital role in the decision of transformation or turning to other networks. But enterprise's competences decide whether it can succeed in transformation or not. Practically, the increasing of cluster competences and transformation and upgrading need the cooperation among businesses, universities and research institutes. They also need to absorb knowledge and carry out collaboration with external enterprises based on the supply chain at home and abroad. But success depends on enterprise's resources. If the cluster members lack competences, they are hard to create new path.

But the cluster competences are not the sum of its members' competences. A cluster is a system in which its members are interdependent. The cluster competence is a system competence. The clustering type (that is, the type of specialization and cooperation) will influence the evolution of the system, so will the openness of the cluster system. In the cluster system, innovative activities will firstly occur in the individual enterprises. But only simulative mechanism without innovative mechanism will surely undermine the cluster competences. Only when effective specialization and cooperation mechanism has been established can most businesses carry out innovative activities and develop numerous innovative and endogenous knowledge which is the basis of diversified knowledge and the prerequisite of achieving innovation of the cluster. A dynamic system is surely an open system. So the openness of the cluster system determines the cluster competences. Likewise, the closed cluster definitely lack innovation.

Xuchang tobacco growers are generally small in scale. According to statistics in 2014, there were 5,824 growers, enterprises, and cooperatives. Farmers with a planting area of less than 1.5 hectares accounted for 4,044, accounting for 69.4%, and farmers with a planting area of more than 7 hectares (family Farm) has 145 households, accounting for less than 2.5%. Among the planting labor force, 75% have a junior high school degree or less, and those with a college degree or above account for 5%. Small scale of operation and insufficient labor technical ability are also important factors for the insufficient innovation ability of clusters.

HABIT OR ROUTINE

The habit or the routine is the products of the experience which can play a role as coordination. To some extent, the habit is a kind of laziness. It is the institutional and social cause of the path dependence and the main manifestation of the path-dependence. The habit has something in common with path dependence. The traits of the routine are presented by background dependence and path dependence.[32] The formation of the habit of cluster enterprises lead to a more complicated formation mechanism of the path dependence.

Firstly, the formation of habit has economic and competence reasons. (1) Simulation is key to reduce learning costs, but it will result in the development of routine. As the saying goes that habit is a second nature. (2) Innovation means risks and uncertainties. Following the habit can

reduce the uncertainties in technology and interpersonal relationships. (3) Adjustment and transformation will produce extra costs, while observing the habit can avoid extra expenditure. (4) The formation of habit is related to the enterprise's competences. When an economic actor is unable to change, it chooses to maintain the status quo which is likely to develop a habit.

Secondly, apart from economic factor, the formation of the habit is closely linked to the historical, environmental and cultural factors. (1) Historical and Environmental Factors Cluster habits are the sum of the habits of cluster businesses which are essentially the ones of individual business operators. But the habits of individuals will inevitably be affected by the historical and environmental factors. A random inspection of the path dependence shows that its asymptotic distribution is the function of its own history[33]. Human's knowledge structure and cognitive structure depend on history, environment and other elements which influence people's cognition and taste and then people's choice[34]. Maskell & Malmberg[35], when talking about the process of the strategy implementation, hold that people will be influenced by habits (path). Even if an individual consciously create knowledge, he/she eventually relies on the path because today's habits are related to the yesterday's habits and learning. The formation of the habit is a historical process, and occasional. Bourdieu[36] believes that the habitus and the field are relative to each other. Habitus can be defined as a system of somatic dispositions (lasting, acquired schemes of perception, thought and action). Field is a system in which various objective conditions have been positioned and finalized. Habitus is the result of internalization of the external structure, responding to the requirements of field in a way of generally coherent system. (2) Cultural Factors Culture is a sort of knowledge and experience which will influence people's decision-making. Culture is also the rules with belief. When the game player predicts what will happen in the future and makes responding decisions, he or she will be greatly influenced by the cultural belief which has been established in the game playing in the previous time.[37] In the process of the formation and development of the industry cluster, the successful experience of technology, management and strategy will help to develop cluster identity. With the accumulation of the identity, some unspoken rules which will restrain cluster members' actions and evolve into habits[38]. Once the conservative culture forms in the cluster (that is, once the consciousness of resting content with old practice becomes the main consciousness of the cluster) non-formal institutional locking will inevitably come into formation.

Thirdly, thinking model and psychological activity are also likely to be habituated and ossified. They are the cognitive causes of the path dependence. (1)Thinking Model Cluster businesses are mainly family enterprises, the operators of which are owners and managers. So the development strategy depends on the owners' decisions which are greatly restricted by thinking model of the decision-makers. The thinking model----In other words, the thinking model with had been used to explain and respond to the past situations will be used again in the new situation.[39] The lasting thinking model is like the filter in the thinking process which makes people focus on what they see and what they want to see, regardless of the truth.[40] The stereotyped thinking model restricts people's reverse thinking and imagination, whereas imagination is the prerequisite of the innovation. All in all, selective attention of the thinking model is the essential cause of the formation of the human institutional habit and social learning[41]. Besides, the thinking model and cognition are the products of the living environment. The cluster businesses develop and inter-exchange in a relatively closed environment. That's why the field of vision of decision-makers within the cluster will be restrained[42]. The decision-makers may turn a blind eye to the upcoming chances and challenges, or they may not have a thorough insight into what will happen, and thus they will respond slowly and miss the chance of transformation. (2) Psychological Activity Habit is related to group psychology. In other words, people are likely to act in conformity with group members. What decision the individual will make depend on how often this decision has been made by others. It does not mean that the decision he has made is better than others. Why he makes such

decision is that many of the group members have made such decision[43]. Group psychology is also experience, which, if repeatedly used, will lead to the path dependence. Once a habit has been developed, the group members will not strive to boost it and pay the extra costs. Thus there will never be strategic transformation[44]. If most group members keep on the rails, more people will do in the same way. If more people begin to simulate others, group members will be accustomed to the simulation. Only when the innovations can bring about amazing profits will a habit then be broken down.

In the tobacco planting process, tobacco farmers apply a large amount of chemical fertilizers and high-dose nitrogen fertilizers, which causes excessive nitrogen fertilizer in the tobacco field and imbalanced carbon and nitrogen; interplanting and continuous cropping also lead to a decline in the quality of tobacco leaves. These problems are related to outdated production habits.

CONCLUSION

The formation of the path dependence of industry cluster is complicated. What conclusion we can draw from the discussion are as follows: (1) Learning costs will be a key factor when an enterprise makes decision. To save learning costs helps to develop the industry cluster, and is the original cause of the development of the industry cluster. In those horizontal specialization clusters, learning costs consist of internal and external costs. Because the external learning costs are high, businesses within the cluster put much emphasis on internal learning while neglecting the external learning, which therefor leads to the path dependence and being locked. (2) To save transaction cost helps to develop vertical business clusters, and is also the original cause of the development of the path dependence. The concept of transformation cost is more general than that of external transaction cost. When the transformation cost is high, the group members are difficult to break away from the existing trading network and carry out transformation. As a consequence, they depend on the path eventually. (3) Innovation risk, competence and habit are three factors that can restrict the changes of the enterprises, and they contribute much to the path dependence. (4) The Xuchang tobacco industry cluster used to have a very prominent position in China, but after the mid to late 1980s, its competitive position declined severely. Compared with the later Yunnan tobacco industry cluster, it has no competitive advantage. The reason is that due to path dependence, insufficient innovation ability, low level of scale and intensification, no more competitive brand has been cultivated.

When the cluster has been locked into a certain track or even the some area, the innovation, especially the strategic transformation will be brought to a halt. Considering the fast development of the technology and fierce external competition, the cluster may well eventually lose its comparative advantages. So it is imperative to create new path and break the locking, and carry out strategic transformation. This is the right way for the cluster to embrace a sustainable development.

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