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Revista de Antropología, Ciencias de la Comunicación y de la Información, Filosofía,
Linguística y Semiótica, Problemas del Desarrollo, la Ciencia y la Tecnología

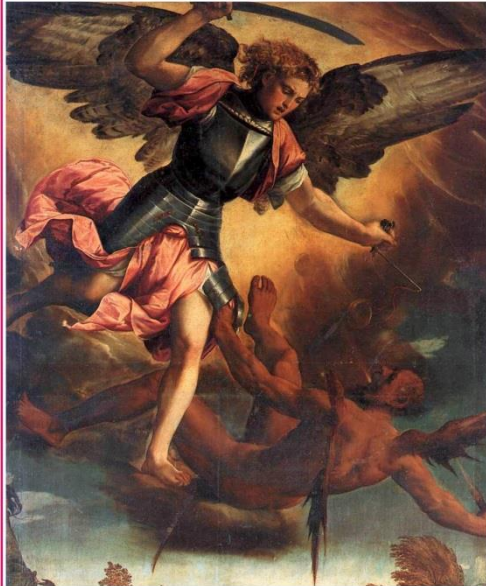
Año 35, 2019, Especial N°

20

Revista de Ciencias Humanas y Sociales

ISSN 1012-1537/ ISSNe: 2477-9385

Depósito Legal pp 198402ZU45



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Innovation: The Key Factor of Competitiveness for Chinese SMEs

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Abstract

Purpose-This study aims to present an overview of SMEs' innovation in China, to identify the main problems, and provide practical suggestions.

Design/methodology/approach-The research of this paper is based on the collection and evaluation of existing literature and survey reports.

Findings-This study presents the general situation and characteristics of SMEs' innovation in China, and concludes the main reason that hinders Chinese SMEs' innovation is the lack of human resources, capital, innovation culture and information.

Practical implications-This study suggests that, in addition to improving resources and environment, SMEs can also try to adopt micro-innovation to promote innovation activities. These suggestions are practical and can help SMEs maintain competitiveness.

Originality/value-This study provides an overview of Chinese SMEs' innovation, which can be the basis for future research in this area.

Keywords Innovation, Competitiveness, Chinese SMEs

Innovación: el factor clave de competitividad para las pymes chinas

Abstracto

Propósito: este estudio tiene como objetivo presentar una visión general de la innovación de las PYME en China, identificar los principales problemas y proporcionar sugerencias prácticas. Diseño / metodología / enfoque: la investigación de este documento se basa en la recopilación y evaluación de literatura existente e informes de encuestas. Resultados: este estudio presenta la situación general y las características de la innovación de las PYME en China, y concluye que la razón principal que obstaculiza la innovación de las PYME chinas es la falta de recursos humanos, capital, cultura de innovación e información. Implicaciones prácticas: este estudio sugiere que, además de mejorar los recursos y el medio ambiente, las PYME también pueden intentar adoptar la microinnovación para promover actividades de innovación. Estas sugerencias son prácticas y pueden ayudar a las PYME a mantener la competitividad. Originalidad / valor: este estudio proporciona una visión general de la innovación de las PYME chinas, que puede ser la base para futuras investigaciones en esta área.

Palabras clave Innovación, competitividad, pymes chinas

1. Introduction

Any company that wants to survive in competition must have certain competitiveness. It may be reflected by competitive advantages in terms of price, quality or brand (Luo, 2004). Due to the lack of resources such as technology and capital, SMEs have been plagued by short life and low competitiveness (Wang and Liu, 2014). The globalization of trade and the development of science and technology have made enterprises in a complex and changing environment, which makes competitive advantages of enterprises more and more short-lived (Zhang, 2014). How to cope with environmental changes and promote enterprises' continuous growth have become main concern of enterprises and government (Wang and Liu, 2014). There is a widely accepted view shows that the strategy of developing competitiveness will be the key to solve this problem (Lou and Rong, 2007). Especially for SMEs, which with high business failure rates, it is more important to create and maintain competitive advantages (Aksoy, 2017). But the shortage of resources determines that SMEs cannot balance all the drivers of competitiveness. Therefore, SMEs should invest their limited resources to the most important factors (Hsu, Chang and Luo,

2017). As a factor that be widely discussed by scholars in recent years, innovation is considered to be the key to improve a company's sustainable competitive advantages. Base on the existing literature, this study presents an overview of the development of Chinese SMEs' innovation, analyzes existing problems, and attempts to propose solutions.

2. Literature review

2.1 Competitiveness

For a company, the definition of competitiveness depends on the external environment, the internal environment, the views of leaders, and the vision of it. For scholars, the definition of competitiveness depends on their knowledge background and understanding. A widely accepted explanation is that a company's competitiveness consists of resources and capabilities, and enables companies to gain competitive advantages. In addition, the constantly updated competitiveness helps companies maintain these advantages (Ahmedova, 2015). Companies with better competitiveness can gain more market share, and they are likely to get higher profits (Utami and Lantu, 2014). However, companies with worse competitiveness will likely be eliminated in the free market (Sipa, Gorzeń-Mitka and Skibiński, 2015).

Low price strategy and differentiation strategy reflect the traditional view of competitiveness. That is, to provide consumers with high quality, low price products and services. But with the increase in income and the upgrading of consumption structure, price is no longer the most important factor that affecting consumption, and customers are beginning to pursue more special and more personalized products (Q. Wang, 2016). Sipa, Gorzeń-Mitka and Skibiński (2015) also points out companies pursuing low prices can only gain advantages in a short period of time. Moreover, as the cost of raw materials and labor increases, the low price strategy will further narrow the profit margin of companies, causing more companies to lose money and even go bankrupt.

With the deepening of research on companies and markets, the connotation of competitiveness has gradually expanded. Lin and Guan (2004) propose an evaluation indicator system for the competitiveness of SMEs with 73 elements, including external indicators such as competition, capital, regulations, trade, market, credit, society, government, and internal indicators such as profitability, product competitiveness, R&D investment, production technology, operational capability, financing capability, and human resources. The competitiveness of SMEs in different regions of China was

evaluated in their study by using this indicator system. This indicator system actually shows comprehensively the influencing factors of competitiveness of SMEs.

However, corporate resources are limited, especially for SMEs. This fact determines that companies cannot take into account all the factors that may improve competitiveness. They can only invest resources to factors which are most likely to bring benefits. Therefore, in order to improve the survival and development of enterprises and enhance their competitiveness, scholars have made many efforts in exploring the key influencing factors of competitiveness. Sipa, Gorzeń-Mitka and Skibiński (2015) found that the most important competitive factors recognized by companies are brands, low prices, focus on a certain customer group, new technologies, and new products. In particular, the brand of products becomes more and more important as the market changes. This means that good reputation and consumers' impression is the key for a company to win the competition. There are also some other scholars believe that human resources, marketing, technological innovation, corporate culture and organizational management are the core factors of a company's competitive advantages (Lou and Rong, 2007).

Ding, Rong and Gui (2005) argued that there are five factors that are most relevant to core competitiveness: human resources, marketing, technological innovation, corporate culture, and organizational management. In addition, environmental surveys, resources, management, networking, marketing techniques, consumers, and creativity are also considered to be important factors influencing competitiveness (Ibrahim, Abdullah and Ismail, 2016). Matinaro et al. (2019) present that a sustainable business model is a key to superior competitiveness, and it may bring direct benefits to the business.

2.2 Innovation

Broadly speaking, innovation is the act of using current resources to improve or create new things, methods, or environments in a way that is different from others. Corporate innovation often refers to the emergence of new products, services or business models within an enterprise, which is a result of processing and transformation of its resources. The output of innovation can be inventions, patents, new products, new services, trademarks, etc. (Zhang, Zheng and Ning, 2018). As an important component of a company's development strategy, innovation has created additional profits and more market share for the company; moreover, it is also estab-

lished market position for the company (Liu et al., 2017). Liu et al. (2018) also point out that investing in innovation can positively affect corporate value. In addition, innovation has also promoted a country's economic development and even improved the technological level of human society.

Corporate innovation, especially in SMEs, mainly includes three objects: product, organization and market. Product innovation focuses on providing new goods and services; organizational innovation focuses on changes in human resources and management; market innovation involves the expansion of new market relationships and sales, which will bring greater market share (Aziz and Samad, 2016).

However, there are also some risks associated with innovation activities that are expected to bring revenue. In particular, product upgrades are often accompanied by a large amount of sunk costs. If a company misjudges the market, or it is attacked by other competitors' unethical competitive behavior such as stealing technology, then the company that cannot recover the cost may face the possibility of business failure (Zhang, Zheng and Ning, 2018).

There are some studies have shown that the innovation of SMEs has contingency. That is, the innovation results may be generated by informal knowledge in an informal process. In other words, the innovation process of SMEs may lack well-designed planning and rigorous processes. Although SMEs have strong environmental adaptability and fast decision-making so that they are able to respond faster to changes in demand and environment (Li, 2011), they are limited by resources such as location, technology, talents, capital, management, etc. Therefore, it is still hard to get more returns from extraordinary innovation like larger enterprises (Aziz and Samad, 2016).

Independent innovation is an inevitable choice for SMEs to achieve survival and development under the rapidly changing technological environment and fiercely competitive market. How to use limited resources to promote innovative activities of SMEs and enhance the efficiency of innovation has become a common concern of enterprises, scholars, and governments.

2.3 Relationship between innovation and competitiveness

It can be easily found that innovation is the most emphasized factor in the studies on core influencing factors of enterprises' competitiveness. New economic theory and new trade theory also prove the key position of innovation (see Fig.1).

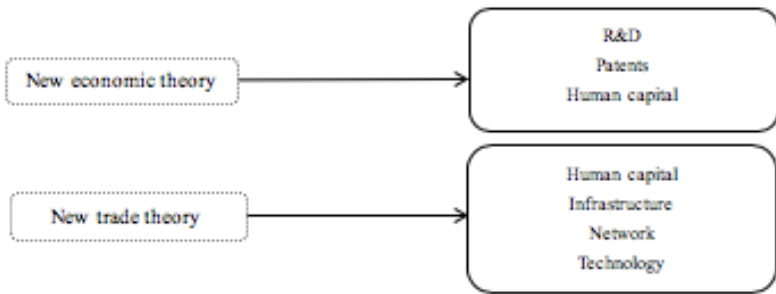


Fig. 1. Determinants of competitiveness in new economic theory and new trade theory

Source: Sipa, Gorzeń-Mitka and Skibiński (2015)

Existing research shows that competitiveness depends to a large extent on a company's ability to innovate (Rahman, Yaacob and Radzi, 2016). Innovation as a core factor can effectively promote competitive advantages of enterprises. In other words, the higher the level of innovation, the more likely a company is to win in competition (de Vasconcellos, Garrido and Parente, 2019). Moreover, this trend will be even more pronounced in younger companies (Aziz and Samad, 2016). Distanont and Khongmalai (2018) present external factors such as competitive environment drive the development of innovation. Specifically, when competition among similar companies becomes fierce, as a strategy to create competitive advantages, innovation increases opportunities for enterprises to earn profit. Zhang, Zheng and Ning (2018) also pointed out that the patents and more active foreign trade activities brought by innovation have significantly improved the competitiveness of enterprises, so that enterprises can survive in the competition.

Technological innovation and market innovation give enterprises competitive advantages through different paths. Technological innovation provides new technologies and process. It is a kind of exploratory innovation. Market innovation belongs to exploitative innovation. It proposes new marketing ideas, creates market strategies, and builds differentiated markets by identifying and satisfying customer needs, thereby creating competitiveness that is conducive to enterprises. In the past, companies and scholars often paid more attention to product or technology innovation, yet research on market innovation has continued to increase in recent years (Gupta et al., 2016). Aksoy (2017) argue that product innovation and marketing innovation are synergistic. This research shows that market-

ing innovation is conducive to product innovation, and product innovation brings more profits to companies. However, Li (2015) point out that there may be potential conflicts between technology innovation and market innovation. This is because the rapid changes in market environment and consumer demand require companies to invest more resources and capabilities to market innovation. However, at the same time, these resources also need to be invested in product in order to make sure enterprises are not eliminated in the era of rapid technology upgrade. Therefore, enterprises, especially those SMEs with limited resources and capabilities, will hard to make effective choices.

The patents and information technology achievements brought by innovation can make most of companies more competitive, because these outputs create differences in products and services or optimize management and sales. Innovative investments in internal management systems are not necessarily cost-effective, because they will increase cost of business and cause the burden on business; however, there is no doubt that external oriented IT capabilities can bring significant profitability (Neirotti and Raguseo, 2017). These new technologies help companies maintain customer relationships, develop new markets, and gain competitive intelligence.

3. Innovation status of Chinese SMEs

3.1 Overview of Chinese enterprise innovation

In recent years, innovation has become a primary goal of Chinese enterprises. The Chinese Entrepreneur Survey System implemented three national surveys between 2015 and 2017 with innovation as the topic. Since SMEs account for 99.7% of the total number of enterprises in China (Wu, 2019), most of the sample companies are SMEs: the ratio of SMEs in the sample companies from 2015 to 2017 was 89%, 90.1%, and 90.8% respectively. Therefore, the survey results are not only the overall situation of Chinese enterprise innovation, but also represent the status of Chinese SMEs' innovation to a large extent. By reviewing these survey reports, the current situation of Chinese companies' innovation can be summarized as follows.

One of survey reports shows that Chinese companies' innovation have the following characteristics (Chinese Entrepreneur Survey System, 2015). First, R&D investment is growing fast but talent is a scarce resource, especially in manufacturing. Second, R&D investment of enterprises in different regions and sizes is very different, and this gap is still widening. Third, incremental innovation is the main path that enterprises choose, while only

a small number of companies choose radical innovation. The innovation focus of enterprises shifts from marketing innovation to technological innovation. Fourth, enterprises with better performance and competitiveness will have stronger willingness to innovate, which brings more innovation output.

From survey reports of 2016 and 2017, the overall trend of Chinese corporate innovation activities is similar. Chinese enterprises have a strong willingness to invest in innovation and have high potential for innovation, but they are limited by external innovation environment and corporate innovation strategy, so the innovation is inefficient (Chinese Entrepreneur Survey System, 2016, 2017). Moreover, innovation potential, innovation investment and innovation effect of state-owned enterprises are better than those of private enterprises. However, private enterprises can use innovation strategies more flexible. SMEs are not as good as large companies at strategy, investment, potential and outcomes, especially the potential. Large state-owned enterprises have the highest level of innovation investment and rapid growth, followed by large non-state-owned enterprises, while small and medium-sized non-state-owned enterprises have the worst performance. Large state-owned enterprises have achieved extraordinary innovations in recent years, while the innovation achievements of small and medium-sized state-owned enterprises continue to be at low levels. These statistics show that both size and nature of firms have an impact on the outcome of innovation, and the impact of firm size is more pronounced. In terms of market environment, more than 70% of companies believe that consumption behavior of corporate customers is significantly different from that of five years ago, especially on aspects such as service demand, environmental requirements, and personalization (Chinese Entrepreneur Survey System, 2017). The analysis of the survey report also shows that the upgrading of consumption structure has significantly positively affected company's innovation investment in the coming year. At the same time, 91.46% of companies believe that the main pressure for innovation comes from competition. About 60% of companies hold that competition in the market is fierce and technology updates are faster. 66.24% of enterprises consider that technological change is highly correlated with corporate development. This survey also verified that technological innovation is positively affecting companies' innovation investment in the coming year. These analyses on market environment prove that consumer demand and technological innovation competition are the most important drivers of Chinese corporate innovation.

Both differentiation strategy and cost strategy are the main competitive strategies of Chinese enterprises. Enterprises adopting differentiation strategy are slightly more than those adopting cost strategy (Chinese Entrepreneur Survey System, 2017). In terms of research and development methods, internal R&D is still the mainstream. 38.51% of enterprises plan to complete development of all new products through internal R&D in the coming year. 53.47% of companies plan to purchase some R&D services externally while conducting internal R&D. Specifically, eastern enterprises and foreign-invested enterprises pay more attention to internal research and development. It is worth noting that SMEs are generally more inclined to seek help from external R&D teams due to lack of resources (Gu, Jiang and Wang, 2014). Facing with the risks brought by innovation, enterprises' main responses are to collect more relative information, cooperate with others, apply for patents, and directly purchase mature technology (Chinese Entrepreneur Survey System, 2017). The importance of obtaining information about innovation is recognized by more and more companies. Chinese Entrepreneur Survey System (2017) pointed out that corporate innovation significantly improved the quality of products and reduced costs. In addition, the expansion of new markets, environmental protection and production safety are also the most prominent achievements of innovation in recent years. However, while gaining innovation outputs, companies have also proposed many negative factors that inhibit innovation, such as lack of talents, chaotic market competition, pursuit of short-term interests, and inadequate intellectual property protection (Chinese Entrepreneur Survey System, 2017). In this survey, 81.49% of companies believe that the lack of talents significantly inhibited corporate innovation, which is consistent with previous survey results (Chinese Entrepreneur Survey System, 2015, 2016). In other words, talent is one of the key factors that have continued to influence the innovation of Chinese companies in recent years. In addition, China's eastern region is economically developed, densely populated, and talented, while the western region's economy is relatively backward and talent is in short supply. This national situation has led to a worse status of human resources in the central and western regions of China. The Chinese Entrepreneur Survey System also emphasizes this situation, and points out that enterprises in the eastern region of China should focus on implementing land use policies, while enterprises in the central and western regions should focus on implementing talent policies (Chinese Entrepreneur Survey System, 2017).

3.2 Innovation characteristics of Chinese SMEs

SMEs are the main force in China's innovation and development, they contribute about 65% of patents and inventions, 75% of new technologies, and 80% of new products (Li, Li and Jin, 2017). It can be said that small enterprises and private enterprises will be the main driving force for promoting the growth of Chinese innovation capability in the future.

According to Chinese Entrepreneur Survey System (2017), in general, Chinese SMEs have a huge gap with large enterprises in terms of innovation strategy, R&D investment, innovation potential and innovation outputs. In addition, high risks brought by independent research and development may cause SMEs to be in business difficulties. Therefore, SMEs are more likely to move towards external R&D and collaborative R&D.

Scholars have also found some more detailed features of SMEs' innovation. For example, through an investigation of SMEs in Guangdong Province of China, Long and Lou (2014) found these following characteristics of SMEs' innovation activities: the R&D intensity of small and medium-sized private enterprises is higher than that of foreign-funded enterprises, and the talent resources of them are also superior to foreign-funded enterprise; 50.6% of SMEs choose to give promotion as a way to stimulate innovation, followed by giving bonuses; 71.8% of sample companies are implementing new product development activities, 65.4% of sample companies are conducting research and development of new processes, and 68.8% of sample enterprises have chosen to upgrade existing technologies. It can be seen that the innovation activities of SMEs are mainly concentrated on products and technologies. This study also shows that the source of information for sample companies is mainly customers, followed by enterprise internal, universities and industry associations, while other channels can only obtain less information. It is worth noting that micro enterprises have better R&D intensity and talents resource structure than medium-sized and small-sized enterprises. These above characteristics can represent the operation of Chinese eastern SMEs to a certain extent.

To some extent, a survey on SMEs in Guangxi Province of China can represent innovation situation of SMEs in the west (Qin and Liang, 2015). This study found that SMEs in western China have worse innovation conditions and more complex innovation activities. Although some high-tech industrial parks have been completed, the overall productivity of SMEs in the west is low, and their production technologies vary widely. Most of SMEs are engaged in low value-added production activities. These production activities are often accompanied by ecological damage. SMEs en-

gaged in agricultural and sideline products processing industry have the strongest innovation ability, indicating that natural resource is the main source for western SMEs' innovation. The size and innovation capacity of SMEs in the West are positively related, while the age of a company is negatively correlated with the ability to innovate. The help of government and chambers of commerce is conducive to innovation activities of SMEs in the west. In addition, the legal environment for protecting intellectual property rights can effectively stimulate innovation of SMEs in the west. In general, although SMEs are the main force of Chinese innovation, individual innovation ability of them is weak. There is still a big gap of innovation between SMEs and large companies. In addition, there are a lot of SMEs in China (Wu, 2019), and they are widely distributed. The economic and cultural conditions in different regions of China are quite different. Therefore, SMEs in different regions also show different characteristics.

4. Problems of Chinese SMEs' innovation

The statistical result of Chinese Entrepreneur Survey System points out the main problems encountered by Chinese companies in innovation process (see Table. 1). Since SMEs account for about 90% of the total number of sample companies, this conclusion is also largely represents situation of SMEs. It can be seen that although the problems faced by enterprises vary from year to year, there are certain factors that continue to hinder the innovation and development of them. The shortage of human resources has been considered by entrepreneurs as the most important factor that hindering enterprise innovation in three years, followed by financing constraints and corporate culture.

Table 1
 Major issues faced by Chinese enterprises in the innovation process from 2015 to 2017
 Source: Chinese Entrepreneur Survey System (2015, 2016, 2017)

2015	2016	2017
1. Shortage of human resources	1. Shortage of human resources	1. Shortage of human resources
2. Limited funding channel	2. Poor innovation culture	2. Financing difficulties
3. Low efficiency of innovation	3. Innovation support policy does not meet needs	3. Inconvenient investment
4. Entrepreneurs lack motivation	4. Too much reliance on internal R&D leads to high risk	4. Market competition disorder
		5. Cultural environment of shortsighted action
		6. Insufficient intellectual property protection

Considering the limitation of single survey, this study accesses to some other related literature. It can be confirmed that talents shortage, financing constraints and corporate culture are indeed the main problems hindering SMEs' innovation in China in recent years. Moreover, insufficient information acquisition is also an important reason for impeding innovation activities and innovation achievements (Gu, Jiang and Wang, 2014; Ren, Eisingerich and Tsai, 2015; Chung and Tan, 2017).

4.1 Shortage of human resources

As a series of resources that are beneficial to the productivity and performance of enterprises, human resources play a key role in maintaining and improving the competitiveness of enterprises (Khan and Quaddus, 2018; Fraumeni et al., 2019; Lenihan, McGuirk and Murphy, 2019). The knowledge, skills, experience, and intelligence of quality employees are difficult to be imitated by competitors (C. H. Liu, 2017). They are intangible resources that can bring benefits to enterprises, and are also necessary conditions for innovation activities (Yaseen, Dajani and Hasan, 2016). Moreover, efficient use of creative capacity of employees has become the key to improve the innovation potential of SMEs (Todericiu and Stăniț, 2015). Most SMEs in China have realized the importance of human resources, especially entrepreneurs and employees with professional skills. Entrepreneurs with good educational backgrounds are more willing to accept new ideas and organizational innovations, thus forming a good organizational innovation environment and positive innovation strategies (Wang and Liu, 2014). For SMEs, which is more dependent on managers, the executive team's innovative willingness and innovative strategies are especially valuable (Lu, Li and Xing, 2014). According to Muda and Rahman (2016), managers show a decisive influence on the development of a company in the beginning of business, and the role of employees will be more important in later period (see Fig.2.). This trend also affects companies' innovation process. A stable and efficient R&D team will help company's long-term innovation activities.

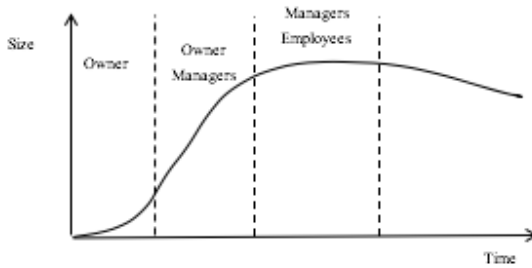


Fig. 2. Key roles at different life cycle stages
 Source: Muda and Rahman (2016)

However, due to geographical location and regional resources affecting the distribution of quality employees (Li, Wei and Wu, 2019), human resource gap between eastern and western China is huge, and significantly hindering the innovation activities of western SMEs (Fraumeni et al., 2019). Moreover, talents with professional skills are very popular in the market, and SMEs need to compete with similar companies, even large state-owned enterprises or foreign-funded enterprises. However, factors such as the difficulty of providing attractive compensation and limited development often cause SMEs to lose opportunities to acquire talents (Chung and Tan, 2017).

Chinese SMEs not only have difficulties to attract talents with innovative capabilities, but also have a high rate of talents loss. He and Tian (2016) suggested that the young and well-educated core employees are more likely to resign, and core employee loss shows a herd effect, which means that the departure of some employees will lead to the departure of a team. This study also analyzes reasons for the loss of core employees in SMEs and sorts them (see table 2). It can be seen that dissatisfaction with salary, promotion and organizational innovation environment is the main reason why quality employees leave SMEs.

Table 2

Reasons why SMEs lose core employees

Source: He and Tian (2016)

Ranking of importance (high to low)	Reasons why SMEs lose core employees	
1	Salary	1. The salary is lower than the same position of other companies 2. Pay and return do not match 3. The salary system within organization is unfair
2	promotion	1. There is no clear promotion system 2. Lack of promotion channel, and it is difficult to be promoted to become a manager
3	Organizational innovation environment	High organizational centralization and lack of a free and innovative working environment
4	Work pressure	Frequent overtime work, long working hours
5	Interpersonal relationship	1. Incompatibility with colleagues or supervisors 2. Lack of trust
6	Value	Employees' goals and development are inconsistent with the company
7	External opportunity	Other companies provide job opportunities for quality employees

According to Ding, Rong and Gui (2005), 81.3% of interviewed companies believe that human resources is the most important factor that constitutes the core competitiveness of an enterprise. Although the importance of human resources has been well known to SMEs, the difficulty of recruiting innovative employees and high talents loss rate have become the most significant factors that hindering the innovation of SMEs in China.

4.2 Financing constraints

One of the characteristics of innovation activities is high investment, especially product innovation (Gu, Jiang and Wang, 2014). However, like many other countries, financing constraints have always been an important issue for Chinese SMEs (Li, Karim and Munir, 2016; Kent Baker, Kumar and Rao, 2017; Quartey et al., 2017; Y. Liu, 2017).

Applying for bank loans has always been the main financing method for Chinese companies. Bank loans accounts for 65.7% of total financing in SMEs (Wu, 2019). In order to provide financial support to SMEs, Chinese government has introduced a number of regulations and policies. However, on the one hand, the low-level management of SMEs leads to the failure of meeting requirements of banks (Karadag, 2015). On the other hand, the

information transparency of SMEs is lower than large enterprises, and information asymmetry brings additional risks. Chinese banks stipulate that when a non-performing loan occurs, the responsible loan officer needs to bear part of bank's losses. This makes loan officers more cautious about granting SME loans. In addition, information asymmetry leads banks to increase costs for additional investigations, which will reduce bank profits and make banks less willing to lend to SMEs.

Due to the difficulties in bank loan borrowing, more and more SMEs choose equity financing (Feng and Liu, 2018). However, only a small part of SMEs can meet listing conditions, and most SMEs still face financing problems. Li, Li and Jin (2017) pointed out that the current funds for promoting SMEs' innovation in China mainly come from government and venture capital investment, while commercial bank loans and capital market financing only have limited effects. This conclusion is consistent with the actual situation of SMEs.

Due to financing constraints, many SMEs face difficulties in independent R&D, which limits their ability to innovate. Cooperative research and development may become a new option. However, some studies have pointed out that cooperative R&D may negatively affect the market value of SMEs (Lv, Zeng and Lan, 2018). There is a study shows that SMEs facing less financing constraints generally have better innovation input-output ratios, which means, financing constraints have a negative impact on innovation efficiency of SMEs (Xiang et al., 2019).

4.3 Lack of innovation culture

The core of corporate culture is spiritual culture, which including values, business philosophy and behavioral norms, and corporate values are the core of corporate spiritual culture. Corporate culture is often a reflection of corporate system in concept of people, and has a greater impact on corporate image and performance (Ding, Rong and Gui, 2005). Corporate culture is a unique feature of an enterprise and also the core of a company's strategy. It forms a company's own business philosophy and principles (Li, 2011). Corporate culture is also the basic platform for cultivating core competitiveness, and its role is subtle (Lou and Rong, 2007). Existing literature shows that organizational culture has a positive impact on corporate innovation (Abdullah et al., 2014; Szczepańska-Woszczyzna, 2015; Verdu-Jover, Alos-Simo and Gomez-Gras, 2018). Moreover, better organizational culture often leads to more successful operations (Naranjo-Valencia, Jiménez-Jiménez and Sanz-Valle, 2016; Shahzad, Xiu and Shahbaz,

2017).

When corporate culture shows the characteristics of innovative spirit, the enterprise forms an innovation culture, which will stimulate and promote innovative ideas, innovative behaviors and innovative activities (Bai, Zhang and Yin, 2016)(Aksoy, 2017). This culture has a series of characteristics such as challenge, adventure, vitality, openness, tolerance for failure and continuous learning. The innovation culture seeks to align values of employees with development of companies, and inspire employees' willingness to innovate (He and Tian, 2016). Encouraging a innovation culture is very important for the development of SMEs' innovation (Aksoy, 2017), because innovation culture is conducive to corporate innovation activities. Innovation culture also helps companies become learning organizations (Lee et al., 2016), and helps companies achieve better performance (Altındağ and Köseadağı, 2015; Padilha and Gomes, 2016). Innovation culture is an intangible resource for SMEs, especially high-tech SMEs.

The existing related literature mainly focuses on the relationship between cultural environment and competitiveness, innovation and other factors. Few studies have evaluated the cultural environment of Chinese SMEs. However, according to the limited existing literature, the overall organizational cultural of Chinese SMEs is not optimistic. Ding, Rong and Gui (2005) argued that human resources, marketing, technological innovation, and organizational management are the most representative elements of Chinese SMEs' core competitiveness. However, 61.33% of respondents deny the role of corporate culture. This lead to a conclusion that corporate culture do not constitute the core competitiveness of Chinese SMEs, which is conflict with existing literature. This study implies that the investigated SMEs haven't build a successful corporate culture yet. Lou and Rong (2007) also prove that organizational culture has not yet become the core competitiveness of Chinese SMEs. Therefore, SMEs still need to focus on building organizational culture, especially innovation culture.

4.4 Lack of information

The simple management mode determines that SMEs will rely too much on business owners and managers. Therefore, decision-making and development strategies are easily limited by knowledge structure of corporate managers. It is negatively affect innovation and development of SMEs (Miao and Xu, 2014). In other words, multiple sources of innovation information are necessary for enterprises to achieve innovation (Chinese Entrepreneur Survey System, 2017). Gu, Jiang and Wang (2014) found

that customer input is positively affecting the competitiveness of SMEs through providing information related to customers. These information is also conducive to their innovation activities. Ren, Eisingerich and Tsai (2015) also present that marketing significantly positively affects R&D achievement by providing companies with information about markets, consumers, and other similar companies. As can be seen from the above research, information related to customers, competitors, and markets has played an positive role in innovation activities of enterprises.

Chinese SMEs have the same demand for information as large companies, and they also hope to gain a comprehensive understanding of competitive environment (Zheng, Zhao and Liu, 2013). Chinese SMEs are most interested in obtaining information related to product technology, target markets and direct competitors (see table3). These information is closely related to a company’s innovation activities, especially product innovation and market innovation. Moreover, these information can also help managers in making innovation decisions (Miao and Xu, 2014).

Table 3
 Information needed by Chinese SMEs
 Source: Zheng, Zhao and Liu (2013)

Ranking	Information needed by Chinese SMEs
1	Product technology information
2	Target market situation
3	Domestic direct competitor information
4	Domestic market competition trend information
5	Analysis of domestic laws, regulations and policies
6	Industrial technology development
7	Domestic competitor patent
8	Technology information on domestic alternative industries
9	Patent distribution information
10	Domestic potential competitor information

However, it is difficult for SMEs to get all the information they need. By summarizing the existing literature, Chung and Tan (2017) pointed out that the shortage of funds, management capabilities, market information, technology, talents and other resources is the biggest obstacle to SMEs’ innovation. Most of the information currently available to Chinese SMEs comes from informal sources (Wang, Zhang and Zhu, 2015). According to a survey conducting by Zhou and Zhu (2015), 70% of investigated SMEs do not have an independent information research department, and only

16% of investigated companies have full-time information research specialists. In addition, there are few professionals with good education background among information researchers. Most employees not only lack marketing and business management knowledge, but also lack the ability to analyze and predict information.

According to Chinese Entrepreneur Survey System (2017), chairman of the board, customers and internet are main sources of innovation information for Chinese companies, while the information provided by other channels is very limited. Enterprises can't make good use of database, corporate annual report, industry analysis report, internal staff and other information sources (Zhou and Zhu, 2015), so that SMEs can only get a small amount of information, which limits the development of innovation.

5. Suggestions for improving SMEs' innovation

5.1 Improving existing major issues

One way to improve SMEs' innovation is to solve key problems mentioned above and improve factors that hindering innovation.

In terms of human resources, on the one hand, SMEs should provide attractive salary for recruiting employees with better innovation capability (Onkelinx, Manolova and Edelman, 2016). On the other hand, SMEs need to continuous train existing employees (C. H. Liu, 2017). Due to owners has a decisive effect on SMEs, owners should also cultivate their innovation mind in daily work and communicate it to employees (Lu, Li and Xing, 2014). In addition, due to salary, promotion opportunities and organizational innovation environment are the main causes of employees' dissatisfaction with the work of SMEs (see table 2), SMEs should design a more reasonable and fair salary system, clarify conditions for promotion, increase promotion options, optimize innovation environment, and give employees a more free and innovative atmosphere.

In terms of financing, SMEs should pay attention to government's SME support policy and actively apply for government subsidies, especially innovation special subsidies (Y. Wang, 2016). In addition, methods such as strengthening management of the company, improving profitability (Erdogan, 2018), providing real and transparent accounting information to banks (Ding, Liu and Wu, 2016), improving tangible assets that can be used for mortgage (Ai and Zeng, 2017), can also help SMEs to get more bank loans. Moreover, SMEs can also try to list on stock markets such as Science and Technology Innovation Board or National Equities Exchange and Quotations, in order to obtain a wider source of funds.

In terms of culture, since SMEs in China are generally do not pay attention to organizational culture, the owners and employees of SMEs should first be aware of the importance of culture to innovation (Ding, Rong and Gui, 2005). In addition, SMEs should also build a culture with following characteristics: care for employees’ values, encourage employees to come up with ideas, pay attention to emotional connections among members, create a fair corporate atmosphere, and establish a harmonious working relationship (He and Tian, 2016). To create an excellent corporate innovation culture requires the advocacy of managers, and great effort of every employee (Lou and Rong, 2007).

In terms of information, SMEs can enhance their ability to analyze resources such as database, corporate annual reports, and industry analysis reports through training. In addition, although SMEs lack resources to build their own information and intelligence departments, they can purchase data and analysis services from third-party big data intelligence companies (Wang, Zhang and Zhu, 2015). It will enable SMEs to be more sensitive to environment and respond to changes rapidly, thus contributing to the innovation of SMEs.

In summary, these suggestions for existing major issues are shown in the Table 4 .

Table 4
 Suggestions for improving existing major issues
 Source: own elaboration

Problems	Suggestions
1. Shortage of human resources	Providing attractive salary for innovative employees. To strengthen employee training. To design a more reasonable and fair salary system, and clarify conditions for promotion. To optimize innovation environment.
2. Financing constraints	To focus on government's SME support policy. To strengthen corporate management, profitability, accounting information quality, and tangible assets. To try to list on new stock markets.
3. Lack of innovation culture	Giving more attention to corporate culture. To care about employees' values. To encourage employees to come up with ideas. To pay attention to emotional connections among members, To create a fair corporate atmosphere. To establish a harmonious working relationship
4. Lack of information	To enhance corporate ability to analyze data from database, corporate annual reports, and industry reports through training. To purchase data and analysis services from third-party big data intelligence companies.

5.2 Micro-innovation

For SMEs with less human resources and capital, micro-innovation may be a more suitable innovation choice. The concept of micro-innovation is originally proposed for internet industry, but it is equally applicable to business management. Micro-innovation requires companies to consider issues from consumers' perspective, identify consumers' needs or find a point where consumers are most dissatisfied with products and services, and then improve it (Zhou, Wu and Fang, 2015). Micro-innovation does not require a lot of resources to invest, and it also reduces risks of innovation, but it requires SMEs to have better dynamic capability. Focusing on a specific market for a long time, collecting consumer feedback and continuing to make micro-innovations in products and services will help SMEs maintain competitive advantages and survive in the fierce market competition.

6. Conclusion

Nowadays, innovation has become a common concern of most countries. In general, Chinese companies have strong willingness to innovate and good potential for innovation. SMEs have made outstanding contributions to new products and patents; however, due to the limitations of size and resources, innovation performance of SMEs is still need to be improved. By reviewing relevant previous literature and reports, this study finds that the main obstacles to SMEs' innovation are the human resources shortage, financing constraints, poor innovation culture and lack of information. At the end, this study suggests that while improving these issues, micro-innovation may become a new innovation model for SMEs.

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Revista de Ciencias Humanas y Sociales

Año 35, N° 20, (2019)

Esta revista fue editada en formato digital por el personal de la Oficina de Publicaciones Científicas de la Facultad Experimental de Ciencias, Universidad del Zulia.

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