# External knowledge absorption in Chinese SMEs

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# 5 Effects of Different External Knowledge Assimilation Mechanisms

This chapter is dedicated to answering RQ 3: Which external knowledge assimilation (EKA) mechanisms do have an impact on the performance of SMEs? We have identified five EKA mechanisms that Chinese SMEs often adopt to assimilate new knowledge in Chapter 3. Based on the findings, we proceed to explore whether these EKA mechanisms have a positive impact on the organizational performance of SMEs. We designed a survey (see Appendix 3) to measure the intensity of each of the five knowledge assimilation mechanisms in the context of 221 Chinese SMEs and their firm performance. We tested the relationship between (a) the intensity of each of the five knowledge assimilation mechanisms and (b) the firm performance with linear regression analysis using the statistical package for social science (SPSS).

Section 5.1 introduces how AC may affect firm performance. Section 5.2 describes the five EKA mechanisms and links each mechanism with the relevant literature. Then, we formulate our hypotheses. In Section 5.3, we describe our research methodology, and finally, Section 5.4 discusses the results of this study and its implications.

## 5.1 AC and Firm Performance

In the highly dynamic business environment today, scholars have advocated that firms should purposely adapt their resource base and update internal capabilities to address the external changes (e.g., Teece *et al.* 1997, Chesbrough 2003, Warner and Wäger 2019, Randhawa *et al.* 2020). Knowledge is considered one of the most critical resources, and knowledge management (KM) plays a vital role in facilitating internal innovation and enhancing firm performance (cf. Darroch 2005, Du Plessis 2007, Inkinen 2016, Bashir and Farooq 2019). An increasing number of companies today are breaking their traditional boundaries and are utilizing both internal and external knowledge to generate innovation (cf. Chesbrough 2003, Soto-Acosta *et al.* 2017, Yun *et al.* 2020).

Assimilating external knowledge and learning from others can be costly. Such costs include financial costs, time costs due to coordination and integration, and risk of

knowledge leakage (cf. Helfat and Eisenhardt 2004, Roest *et al.* 2018). Therefore, the extent of interaction with external networks generates both opportunities and constraints and can lead to unpredictable economic outcomes for firms. Some authors even indicate that relying too much on external knowledge may result in worsening a firm's performance (e.g., Enkel *et al.* 2009, Wales *et al.* 2013, Asimakopoulos *et al.* 2020).

Firms tend to use various external knowledge sourcing modes simultaneously. Different EKA mechanisms entail different costs and challenges. Existing studies suggest that various mechanisms of acquiring external knowledge may have different impacts on performance (e.g., Kang and Kang 2009, Lin and Wu 2010, Kang and Kang 2014, Santoro *et al.* 2017). However, these studies on EKA mechanisms either focus on large firms or fail to differentiate SMEs from big firms. In Subsection 3.4.2, we identified five EKA mechanisms that SMEs often use. The findings make it possible to investigate specifically the effects of different EKA mechanisms on the performance of SMEs.

Moreover, organizational performance is multidimensional. Prior studies have focused on the links between the EKA mechanisms and different dimensions of performance. *Financial performance* and *growth performance* are two dimensions of performance that are often emphasized. For instance, Lin and Wu (2010) distinguish growth performance (measured by sales growth) and financial performance (measured by returns on assets) in their study on the effects of different knowledge sourcing strategies on firm performance. They find that both technical acquisitions and R&D alliances have a positive impact on a firm's growth performance but have no effects on financial performance.

To distinguish growth performance from financial performance is particularly relevant for SMEs. Growth potentiality is an important indicator of SME business performance. Firms, particularly SMEs, may prefer growth to financial performance at a certain stage (cf. Lu and Beamish 2006, Banerjee 2014, Larsson and Möller 2020). For instance, companies may want to offer a relatively low price to stimulate demand and

increase market share when they enter a new market. Companies may have fewer profits at an early stage, but the growth in market share and customer size may help them gain more profits in the long run. Besides, growth as a measure of non-financial performance is also more accurate and accessible than archival measures of financial performance for SMEs (cf. Wiklund and Shepherd 2005, Helm *et al.* 2017).

## 5.2 Propositions

We have identified five EKA mechanisms that SMEs often use to assimilate external knowledge (see Subsection 3.4.2). They are (1) consulting personal networks, (2) purchasing products or services, (3) recruiting new talents, (4) referring to free sources, and (5) collaborating with value-chain partners. In this section, we detail each of the five EKA mechanisms and formulate our hypotheses on their relations with the firm performance.

### 5.2.1 Consulting Personal Networks

Personal networks have long been recognized as one of the most strategically important resources of entrepreneurs and owner-managers (cf. Assimakopoulos and Yan 2006, Fayolle *et al.* 2011, Hernández-Carrión *et al.* 2020). Many owner-managers in our interview perceive personal sources of information to be more important than impersonal ones. Prior schoolmates, alumni, former colleagues, friends, relatives, and other acquaintances of the owners or other employees of SMEs are important sources of new knowledge.

Trust, which is often developed through prior interactions, makes personal networks a reliable and effective communication channel for knowledge sharing. It is particularly important in the Chinese business context, which emphasizes Guanxi or personal relationships when conducting formal business (cf. Chen and Chen 2004, Burt and Burzynska 2017, Bian 2019). Guanxi serves as a substitute for official institutional support, especially for private and small companies. By consulting personal networks for knowledge, SMEs can get access to knowledge beyond their direct business contacts. The contacted individuals serve both as a communication channel to the firms and as a direct knowledge source.

Personal networks facilitate the knowledge absorbing process involving knowledge evaluation, assimilation, and utilization. When owner-managers are not sure where to find a technology or what the actual value of a technology is, they often first refer to their personal networks. Unlike formal business networks, personal networks emphasize personal reciprocity. The owner-managers do not necessarily pay for knowledge-sharing activities among personal network members but are personally obliged to share their knowledge when required. Strong personal involvement allows the transfer of tacit knowledge through personal networks. By choosing appropriate communication mechanisms, such as face-to-face meetings or telephone calls, assimilating external knowledge from personal networks could be very fast and cheap for SMEs. Hence, we hypothesize that contacting former classmates, colleagues, friends, relatives, or other members within our personal networks for new knowledge positively affects the organizational performance of SMEs.

**Hypothesis 1a**: *Assimilating external knowledge through personal networks has a positive influence on the financial performance of SMEs.*

**Hypothesis 1b**: *Assimilating external knowledge through personal networks has a positive influence on the growth performance of SMEs.*

### 5.2.2 Purchasing Products or Services

Assimilating external knowledge through purchase refers to getting access to specific technology or knowledge through contracts and market arrangements. It often involves activities such as purchasing a product or outsourcing research and development (R&D) services in which the required knowledge is embedded. Although it involves direct financial costs, purchasing it directly can help firms gain specific knowledge quickly. In fast-changing environments, firms become increasingly more specialized and complex. Their core resources and expertise should focus on their knowledge niche. When external complementary technology is available at an acceptable cost, firms often decide to purchase the technology from external sources so that they can focus on internal

resources and expertise in developing core competencies (cf. Milberg and Winkler 2013, Kim *et al.* 2019).

Knowledge embedded in purchased products and services can be seen as enclosed in a "black box". Firms can utilize it and combine it with existing internal knowledge without fully understanding it. Knowledge assimilation in the form of products and services is influenced by the extent of how much the products or services can be modularized. External knowledge assimilated in the form of products and services connect internal knowledge through pre-designed interfaces. A well-designed interface can significantly reduce or preempt the needs to alter both internal or external structures in the assimilation process (cf. Langlois 1992, Bennett and Flach 2011, Ezzat *et al.* 2019)

Purchasing is different from collaborating with existing suppliers for knowledge sharing. Gaining access to new knowledge through purchase is based on market arrangement and payment. Compared to collaborating with existing suppliers and customers, "purchase" is a one-time transaction and builds new provider-customer relationships. Some studies suggest that well-managed knowledge purchasing activities will lead to positive firm performance (e.g., Luzzini *et al.* 2015, Schütz *et al.* 2020). Therefore, we predict that assimilating purchasing a product or outsourcing R&D services positively affects the organizational performance of SMEs.

**Hypothesis 2a**: *Assimilating external knowledge through products or services has a positive effect on the financial performance of SMEs.*

**Hypothesis 2b**: *Assimilating external knowledge through products or services has a positive effect on the growth performance of SMEs.*

### 5.2.3 Referring to Free Sources

Owners-managers or employees of SMEs often search free sources to acquire various new knowledge. Online sources such as search engines, open-source websites, internet technical forums, conferences, and exhibitions are among the frequently used free sources. Knowledge sharing online has become a trend since the internet boom in the

early 2000s. Individuals and organizations are willing to share knowledge in various free and open forms, which were previously considered proprietary. For instance, Tesla Motors announced that it would share all its patents with anyone who would use them properly (see Ramsey 2014). Knowledge can achieve a higher overall value if it is freely available to everyone, and the contributor can benefit from peer recognition and enhanced business reputation. Such benefits can translate into financial returns in the long run. Riding such waves, SMEs can find valuable knowledge from many open sources. Utilizing free open source software and sharing knowledge online is popular in the IT and software industry (cf. Lerner and Tirole 2001, Sowe *et al.* 2008, Hwang *et al.* 2015, Kalyvas *et al.* 2017).

Free sources are particularly important for SMEs because they often lack the resources and relations to get access to other sources. For instance, collaborating with suppliers and customers involves management attention and is time-consuming. Purchasing knowledge and recruiting new talents for new knowledge involve relatively high costs. With new technology available, individuals and organizations can access knowledge residing in open sources quickly and free of charge. We predict that relying on free sources such as search engines, open sources, online technical forums, conferences, and exhibitions positively affects the organizational performance of SMEs.

**Hypothesis 3a**: *Assimilating external knowledge through referring to free sources has a positive effect on the financial performance of SMEs.*

**Hypothesis 3b**: *Assimilating external knowledge through referring to free sources has a positive effect on the growth performance of SMEs.*

### 5.2.4 Recruiting New Talents

Existing studies on knowledge assimilation mechanisms rarely consider recruiting new talents as a means of assimilating external knowledge. However, in practice, both big and small firms emphasize that recruiting new human capital is an important means of KM (cf. Rappaport *et al.* 2003, Al-Laham *et al.* 2011, Gope *et al.* 2018). In the

previous interviews, many SMEs express that they perceive recruiting new employees as the most effective way to transfer knowledge from the outside. Big firms sometimes acquire a team of experts to build competencies in certain areas. Compared to assimilating external knowledge through Mergers and Acquisitions (M&A), seeking new knowledge through recruiting individuals is more affordable and faster for SMEs. M&A activities are not common to SMEs as they do not have the required financial resources. Particularly when SMEs plan to open new business areas and need new knowledge, recruiting new talents is an effective strategy. Newly recruited members could bring their expertise immediately to SMEs, and help interpret, assimilate, and utilize relevant new knowledge according to what they already know.

However, comparing to collaboration with suppliers and customers or learning from free open sources, developing new capabilities and knowledge through recruiting new talents involves relatively more costs. SMEs with limited resources and business reputations may find it challenging to attract, motivate, and retain new employees with needed expertise (cf. Baublyte 2010, Krishnan and Scullion 2017, Cui *et al.* 2018). Hence, the overall impact of utilizing recruiting new employees as a knowledge assimilation mechanism on SMEs' performance may not be guaranteed. To test it, we hypothesize that hiring external expertise or recruiting new employees to assimilate external knowledge positively affects the organizational performance of SMEs.

**Hypothesis 4a**: *Assimilating external knowledge through the recruitment of new talents has a positive effect on the financial performance of SMEs.*

**Hypothesis 4b**: *Assimilating external knowledge through the recruitment of new talents has a positive effect on the growth performance of SMEs.*

### 5.2.5 Collaborating with Value-chain Partners

The role of collaboration with value-chain partners, such as suppliers and customers, in innovation and knowledge transfer has been confirmed by many researchers (cf. Kaufman *et al.* 2000, Brettel and Cleven 2011, Fossas-Olalla *et al.* 2015). Transferring valuable knowledge between supplier and buyer has become a key competitive

advantage for a vertical relationship (cf. Paton and McLaughlin 2008, Liu *et al.* 2017, Whitehead *et al.* 2019). As they are relatively small and often lack resources, SMEs often find it challenging to collaborate with other organizations without a direct business connection. Our prior study shows that SMEs in China rarely collaborate with big firms, research institutes, or universities for knowledge assimilating purposes. However, collaboration with suppliers and customers for new knowledge is frequent in SMEs. With existing business relations and shared interests between SMEs and their customers and suppliers, it is easier for SMEs to exchange knowledge and resources with direct suppliers and customers. A stable, high-trust customer-supplier relationship facilitates the creation and transfer of organizational knowledge, particularly tacit knowledge (cf. Lincoln *et al.* 1998, Holste and Fields 2010, Saini *et al.* 2019).

Due to the shared interests of creating value for end-users, knowledge absorption from supplier-customer relationships can get strong organizational support from both sides. Such support is important for both organizational and individual level learning. SMEs can get easier access to R&D facilities, human capital, technical document, and other intellectual property of their suppliers and customers. The existing transactional and relational connection enables a faster and more effective transfer of knowledge compared to other channels (cf. Cavusgil *et al.* 2003, Liu *et al.* 2017). Hence, we predict that collaborating value-chain partners for new knowledge positively affects the organizational performance of SMEs.

**Hypothesis 5a:** *Assimilating external knowledge through collaborating with value-chain partners, such as suppliers and customers, has a positive effect on the financial performance of SMEs.*

**Hypothesis 5b:** *Assimilating external knowledge through collaborating with value-chain partners, such as suppliers and customers, has a positive effect on the growth performance of SMEs.*

Figure 5.1 illustrates the overall theoretic framework of this chapter.

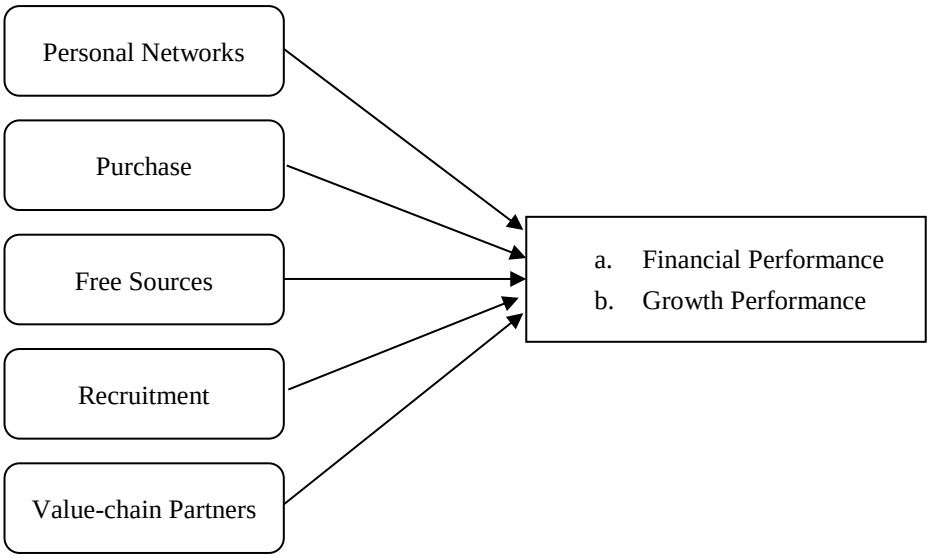


**Figure 5.1: Hypothesis between EKA Mechanisms and Performance**

## 5.3 Research Methodology

In the section, we present how the study is designed and conducted. We use the survey and questionnaire as the research method for data collection and analysis. Subsection 5.3.1 describes how the questionnaire of the survey is designed and the data collection process. Subsection 5.3.2 describes how different variables in our theoretical model are measured. In Subsection 5.3.3, the descriptive statistics of the collected data are provided. Subsection 5.3.4 describes the data analysis process.

### 5.3.1 Questionnaire Design and Data Collection

We used a questionnaire to measure the variables in the theoretical model. The questions regarding each of the variables were decided according to existing literature or theory (see Subsection 5.3.2). We first designed a pilot questionnaire and sent it to four managers. They were asked to check whether the questions in the survey were clear and understandable. Changes were made to the texts according to their feedback. The survey was then sent randomly through a professional data collection website. A total of 109 completed questionnaires were returned. Ninety-three questionnaires were valid and were used to test the reliability of the combined variables and distribution of all the variables. Based on the preliminary analysis, we improved our measurement of some of the variables. A detailed description of the survey questions and measurements can be found in Appendix 3.

We used the professional data collection service from a survey company to send questionnaires electronically. Qualified respondents were above 25 years old, had held a managerial role in an SME for the last two years, and were the general manager or had an executive-level role in the company. These top managers are often SME owners. They are believed to be directly involved in the overall operation of their business and have comprehensive knowledge about business performance and many other aspects. We refer to SMEs as the firms employing up to 300 workers, with the following breakdown: micro (1 to 10), small (11 to 100), and medium (101-300).

**Table 5.1: Questionnaire Screening Process**

| **Questionnaire screening processes** | **Phase 1:** Receiving completed cases | **Phase 2:** Deleting unqualified cases | **Phase 3:** Deleting inconsistent cases |
|---|---|---|---|
| Number of the kept cases after each phase | 314 | 228 | **221** |

Finally, 314 completed questionnaires were returned. We exclude questionnaires from firms that employ more than 300 employees (86 cases) as our study is focused on SMEs. A trap question was designed to control the quality of the answers. Respondents are asked to rate the importance of the growth in the number of employees for firm performance twice in different sections of the questionnaire. The two answers were compared, and seven cases with a different score of two or more were considered inconsistent and deleted. For those with a discrepancy score of one, we averaged the two as the final score of the indicator and used the average for the calculations. Finally, 221 observations from firms that employ fewer than 300 employees were used for the analysis.

### 5.3.2 Measures

This section presents how the variables were measured concerning (A) EKA mechanisms, (B) performance, and (C) control variables.

In a similar study, Lin and Wu (2010) measured two external knowledge assimilating mechanisms, external acquisition, and R&D alliance, with firms' archival data in which the two formal external sourcing strategies usually are documented. However, other EKA mechanisms, particularly informal ones in small firms, are usually not recorded. Some authors measure the extent of applying specific knowledge assimilating mechanisms by the perceived importance of each source (e.g., Escribano *et al.* 2009, Kang and Kang 2009, 2014). They consider different sources and ask respondents to rate the relative importance of each source. The total or average scores of each source are then used to indicate the intensity of respective knowledge sourcing strategies in the firm. As the authors have admitted, such measures may not fit the purpose of studying the effects of different knowledge assimilations as their data are second-hand and are not explicitly designed for this purpose (see Kang and Kang 2009).

Our research is based on two fully different assumptions. The first assumption is that the higher the top managers' (a) intention toward a specific EKA mechanism and (b) their belief that it is effective, the more intensively they may use that mechanism in their daily operation. The intention and belief are measured by five-point Likert scales. According to Ajzen's (1991) Theory of Planned Behavior, people's behavior can be predicted by their intentions towards their behavior and their perceived confidence in how effectively they can execute the behavior. We extend the theory to an organizational context by assuming that the extent of a firm's utilization of specific EKA mechanisms can be predicted by top managers' intentions towards applying each of the mechanisms and their perceived effectiveness of them. The two measures are multiplied to indicate the intensity of each EKA mechanism in firms.

The second important assumption of this study is that the preferences or intentions of SME owner-managers regarding EKA mechanisms are stable over time. Different EKA mechanisms may have different influences on performance. Existing studies have shown the stability of cognitive preference over time-related learning studies (e.g., Barbosa *et al.* 2007, Reynaud and Couture 2012, Schildberg-Hörisch 2018). Based on this

assumption, this study does not consider the potential time-lag effects between the EKA mechanisms and firm performance. It allows us to use cross-sectional data to measure the intensity of assimilation mechanisms and firm performance and circumvent the fact that SMEs often lack accurate records on performance and data on how they assimilate external knowledge.

B: Performance

Business performance is usually measured in one or a combination of the following three ways: subjective financial, subjective non-financial, and archival financial (cf. Rauch *et al.* 2009, Taticchi *et al.* 2010, Samaeemofrad and van den Herik 2018). However, many SMEs do not have archival performance data, and SME owners may not be willing to reveal real archival performance data to researchers (cf. Bamford *et al.* 2000, Chung-Wen 2008). Hence, we use subjective measures of performance. Although subjective measures of performance of SMEs can be disadvantageous in that they rely on the owners' ability to rate the performance of their firm accurately, many studies have suggested that these subjective measures may have equal accuracy and reliability as archival indicators (cf. Wall *et al.* 2004, Zulkiffli and Perera 2011).

This study distinguishes financial performance and growth performance. The measurement of SME performance is adapted from Kraus *et al.* (2012) and Zahra *et al.* (2017). We measured financial performance by four indicators, including (1) cash flow, (2) profitability ratios, (3) gross margin, and (4) return on assets. SMEs' growth performance was measured by three indicators: (1) sales growth, (2) market share growth, and (3) growth in the number of employees (cf. Kraus *et al.* 2012, Zahra *et al.* 2017). We asked the owner-managers to rate the relative importance of each item on 5-point Likert-type scales to the overall firm performance and their satisfaction with their firm's achievement regarding each indicator. We then multiplied the relative importance of each item and the owner-managers' satisfaction score. The financial performance was calculated by adding the scores of the four financial indicators, and the growth performance by adding the scores of the three growth indicators.

C: Control Variable

The number of employees, firm age, and annual sales are used as control variables. Firm age influences performance in many studies (cf. Majumdar 1997, Loderer and Waelchli 2010, Coad *et al.* 2018). Organizational performance may benefit from economies of scale (cf. Lambrecht 2004, Wells 2016) and economies of scope (cf. Helfat and Eisenhardt 2004, Roest *et al.* 2018). Hence, the number of employees and annual sales are frequently used as control variables. A description of the control variables and their coded value are shown in Table 5.2.

**Table 5.2: Description of the Samples**

| Variable | Category | Coded Value | Frequency | Percent |
|---|---|---|---|---|
| Number of Employees | Micro firms | 1 | 4 | 1.8% |
| | Small firms | 2 | 120 | 54.3% |
| | Medium-sized | 3 | 97 | 43.9% |
| Firm Age | <5 years | 1 | 16 | 7.2% |
| | 6～10 | 2 | 88 | 39.8% |
| | 11～15 | 3 | 77 | 34.8% |
| | 16～20 | 4 | 27 | 12.2% |
| | 21～25 | 5 | 11 | 5.0% |
| | 26～30 | 6 | 1 | 0.5% |
| | >30 years | 7 | 1 | 0.5% |
| Annual Sales in Yuan[7] | <5 million | 1 | 50 | 22.6% |
| | 5～10 | 2 | 34 | 15.4% |
| | 10～15 | 3 | 19 | 8.6% |
| | 15～20 | 4 | 30 | 13.6% |
| | 20～25 | 5 | 22 | 10.0% |
| | 25～30 | 6 | 24 | 10.9% |
| | >30 million | 7 | 42 | 19.0% |

### 5.3.3 Descriptive Statistics of Measured Variables

This study focuses on Chinese SMEs. We include a total of 221 observations from 25 provincial administrative regions of China. Guangdong, Jiangsu, Shanghai, Zhejiang, and Beijing together contribute more than 50% of the total sample. More than half of

[7] 1 Chinese Yuan≈0.144 US Dollar when (2018.11) the analysis was conducted

the surveyed firms have fewer than 100 employees and 80% fewer than 200. About 81% of the firms have annual sales of less than 30 million Chinese yuan (equal to about 4.2 million US dollars). These firms are from 23 industries. The top five are mechanical equipment, light industry, electrical equipment, computer, and electronics. Together, these five industries account for about 50% of all the companies. Table 5.3 presents the descriptive statistics of all the variables included in the analysis.

**Table 5.3: Descriptive Statistics of the Samples**

| Variable | N | Minimum | Maximum | Mean | Std. Deviation |
|---|---|---|---|---|---|
| Financial Performance | 221 | 28 | 91 | 61.42 | 12.11 |
| Growth Performance | 221 | 13 | 68 | 37.94 | 11.60 |
| Employee number | 221 | 1 | 3 | 0.02 | 0.13 |
| Firm Age | 221 | 1 | 7 | 2.71 | 1.02 |
| Annual Sales | 221 | 1 | 7 | 3.81 | 2.23 |
| Personal Networks | 221 | 1 | 25 | 9.34 | 5.57 |
| Purchase | 221 | 2 | 25 | 14.00 | 6.06 |
| Free Sources | 221 | 2 | 25 | 14.32 | 5.87 |
| Recruiting | 221 | 2 | 25 | 16.80 | 6.07 |
| Value-chain Partners | 221 | 1 | 25 | 12.09 | 5.98 |

Table 5.4 shows the result of the Spearman correlation (rank-order correlation) analysis between all the variables. To better understand the correlations between the dependent and independent variables, we also run the partial correlation analysis in which the effect of each independent variable on the dependent variable is assessed while the effects of the other independent variables are controlled.

Table 5.5 shows the result of partial correlations analysis. It indicates that both EKA 3 and EKA 4 positively correlate with both of the two aspects of SME performance. The correlations between the other three EKA mechanisms and SME performance are not significant. Based on the results, we proceed to test their relations with linear regression analyses.

**Table 5.4: Correlations (Spearman) between Measured Variables**

| Variable | 1 | 2 | 3 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1.Financial Performance | 1 | | | | | | | | | |
| 2.Growth Performance | 0.402** | 1 | | | | | | | | |
| 3.Employee Number | 0.047 | 0.139* | 1 | | | | | | | |
| 5.Firm Age | 0.140* | 0.111 | 0.247** | 1 | | | | | | |
| 6.Annual Sales | 0.126 | 0.065 | 0.390** | 0.293** | 1 | | | | | |
| 7.Personal Networks | 0.012 | -0.105 | 0.039 | -0.007 | -0.13 | 1 | | | | |
| 8.Purchase | 0.017 | 0.04 | -0.017 | -0.042 | 0.077 | 0.048 | 1 | | | |
| 9.Free Sources | 0.276** | 0.143* | -0.04 | 0.015 | 0.038 | -0.035 | 0.178** | 1 | | |
| 10.Recruiting | 0.203** | 0.187** | 0.074 | 0.086 | 0.071 | -0.126 | -0.016 | 0.041 | 1 | |
| 11.Value-chain partners | 0.025 | 0.02 | 0.091 | 0.109 | 0.04 | 0.169* | 0.109 | -0.058 | -0.048 | 1 |

[c] N=221 * p<0.05 ** p<0.01

**Table 5.5: Partial Correlations between Dependent and Independent Variables**

| Variables | 1.Financial Performance | 2.Growth |
|---|---|---|
| 1.Employee Number | 0.011 | 0.139[8] |
| 2.Firm Age | 0.119 | 0.040 |
| 3.Annual Sales | 0.062 | -0.031 |
| 4.Personal Networks | -0.030 | -0.051 |
| 5.Purchase | 0.017 | 0.018 |
| 6.Free Sources | 0.250** | 0.142* |
| 7.Recruitment | 0.222** | 0.172* |
| 8.Value-chain partners | 0.025 | 0.044 |

[c] N=221 * p<0.05 ** p<0.01

[8] The correlation coefficient is significant too but not labeled as significant for that the *Growth* is measured partially by an increase of *Employee Number* and the two variables are correlated in nature. And, as the relationship between Growth and Employee Number is not the focus of our investigation, we exclude the discussion of their relationship in the following analysis too.

### 5.3.4 Data Analysis

We run two linear regression analyses with SPSS to test the relation between the five EKA mechanisms and two dimensions of SME performance: (A) financial performance and (B) growth performance.

#### A: EKA Mechanism and Financial Performance

We first conducted a linear regression analysis to test if each of the five EKA mechanisms has an impact on the financial performance of SMEs. We first ran linear regression analysis between the variable *Financial Performance* and our independent variables, including *Employee Number*, *Firm Age*, *Annual Sales*, *Personal Networks*, *Purchase*, *Free Sources*, *Recruitment*, and *Value-chain Partners*. The result shows values of all the variance inflation factors (VIF) of the independent variables are smaller than 1.3, indicating that they do not suffer from a severe collinearity problem. The normal probability plot (Figure 5.2) and Scatterplot of the regression standardized residual of *Finance Performance* (Figure 5.3) indicate that the standardized residual is approximately normally distributed, and there are no apparent signs of heteroscedasticity. The model summary indicates that the Durbin-Watson (D-W) statistic is 1.872. D-W statistic ranges typically from 0 to 4. A D-W value close to 2 indicates that the observations are independent of each other. Casewise diagnostics show no results, which indicates no obvious unusual cases beyond three standard deviations. The regression model is significant (Sig 0.000) at the significance level of 0.01.

Among the relations between each of the independent variables and the dependent variable, *Free Sources* (Sig 0.000) and *Recruiting* (Sig 0.001) are significant at the significance level of 0.01. Their coefficients are positive, which indicates that assimilating knowledge through referring to free sources and recruiting new talents both have a positive impact on the financial performance of SMEs. Our hypotheses 3a and 4a cannot be rejected. Knowledge assimilation through personal networks, purchase, and collaboration with value-chain partners have no significant impact on organizational performance. Hypothesis 1a, 2a, and 5a must be rejected.

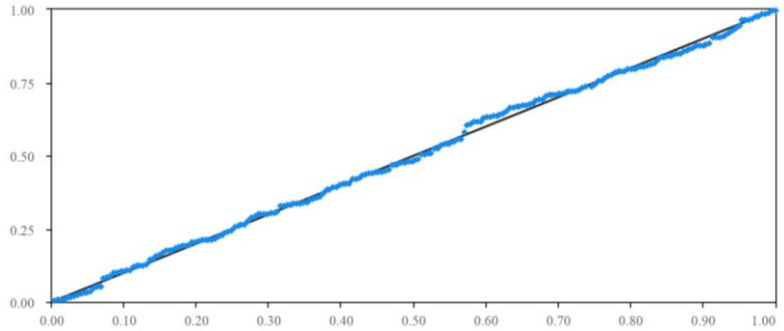


**Figure 5.2: Normal Probability Plot (Finance Performance)**

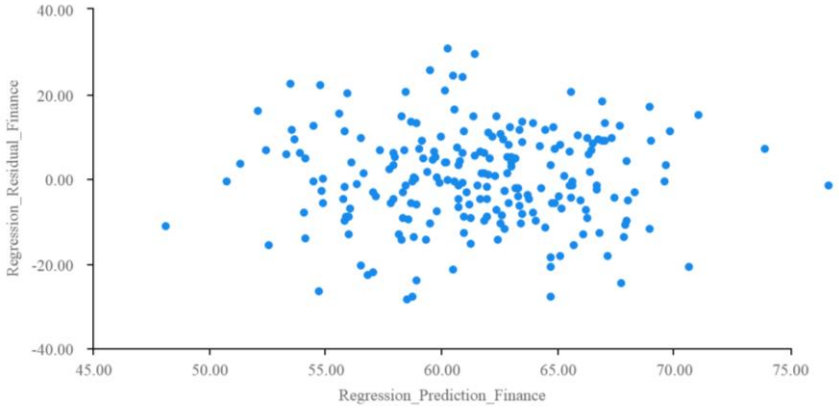


**Figure 5.3: Scatterplot of the Regression Residual (Finance Performance)**

B: EKA Mechanism and Growth Performance

Similarly, we conducted a regression analysis between *growth performance* and our independent variables. A check on the normal probability plot (see Figure 5.4) and a scatterplot of the regression standardized residuals (see Figure 5.5) shows that the standardized residual is approximately normally distributed. Hence, there are no apparent signs of heteroskedasticity. The model summary shows that the D-W statistic is 1.967. Casewise diagnostics show no result. We detected no obvious unusual cases beyond three standard deviations. The f value of the model indicates that the regression model is significant (0.015) at the 0.05 significance level.

Among the relations between each of the independent variables and the dependent variable, *Micro Firms* (Sig 0.029), *Free Sources* (Sig 0.039), and *Recruiting* (Sig 0.012) are significant at the significance level of 0.05. The coefficient of Micro Firms is negative. It shows that the growth performance of micro firms is significantly lower

compared to that of small companies. The coefficients of Free Sources and Recruiting are both positive, which indicates that assimilating knowledge from free sources and recruiting new talents has a positive impact on the growth performance of SMEs. Our Hypothesis 3b and 4b cannot be rejected. Knowledge assimilation through personal networks, purchase, and collaboration with suppliers and customers have no significant impact on organizational performance. Hypothesis 1b, 2b, and 5b must be rejected.

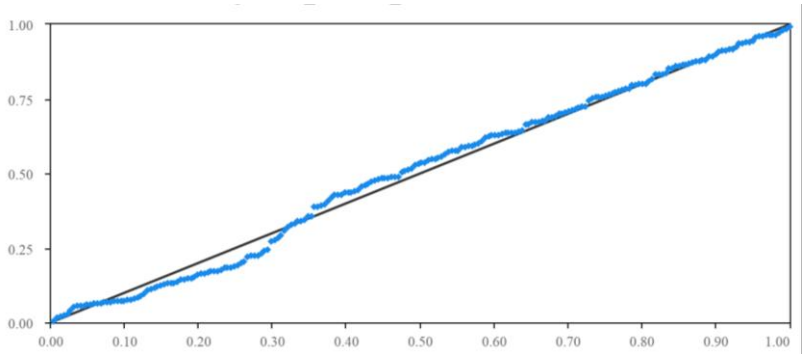


**Figure 5.4: Normal Probability Plot (Growth Performance)**

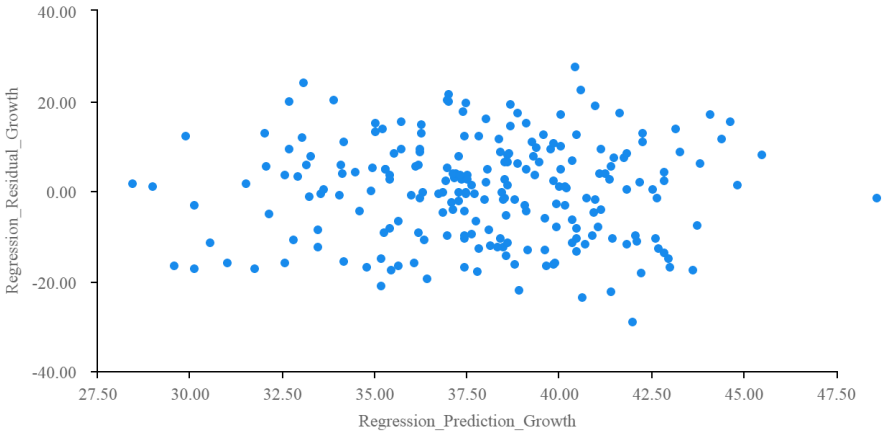


**Figure 5.5: Scatterplot of the Regression Residual (Growth Performance)**

Table 5.6 provides a summary of the regression models. Table 5.7 gives a detailed description of the results of our regression analysis.

**Table 5.6: Summary of the Two Regressions Models**

| Financial Performance | | | | Growth Performance | | | |
|---|---|---|---|---|---|---|---|
| Adj. $R^2$ | D-W | F | Sig. | Adj. $R^2$ | D-W | F | Sig. |
| 0.101 | 1.872 | 4.080 | 0.000** | 0.050 | 1.967 | 2.438 | 0.015* |

**Table 5.7: Results of Regressions Analyses**

| | | Financial Performance | | | Growth Performance | | |
|---|---|---|---|---|---|---|---|
| | VIF | Beta | t | p | Beta | t | p |
| (Constant) | - | - | 7.541 | 0.000** | - | 3.632 | 0.000** |
| Employee number | 1.241 | 0.011 | 0.157 | 0.876 | 0.161 | 2.2 | 0.029 |
| Firm Age | 1.137 | 0.119 | 1.747 | 0.082 | 0.040 | 0.578 | 0.564 |
| Annual Sales | 1.259 | 0.064 | 0.898 | 0.37 | -0.033 | -0.45 | 0.653 |
| Personal Networks | 1.079 | 0.077 | 1.156 | 0.249 | -0.050 | -0.737 | 0.462 |
| Purchase | 1.061 | -0.029 | -0.444 | 0.657 | 0.018 | 0.261 | 0.794 |
| Free Sources | 1.044 | 0.247 | 3.790 | 0.000** | 0.140 | 2.082 | 0.039* |
| Recruiting | 1.035 | 0.220 | 3.379 | 0.001** | 0.170 | 2.536 | 0.012* |
| Value-chain partners | 1.068 | 0.029 | 0.436 | 0.712 | 0.044 | 0.642 | 0.522 |

* p<0.05 ** p<0.0

## 5.4 Findings and Discussions

This section presents the overall findings and discussions. Subsection 5.4.1 describes the overall results of the quantitative analysis, and it briefly discusses the three EKA mechanisms that are not tested to affect SME performance. Subsection 5.4.2 is focused on the two EKA mechanisms that are tested to have a positive effect on SME performance.

### 5.4.1 Effects of External Knowledge Assimilation Mechanisms

This quantitative study attempts to test 5 groups of hypotheses concerning the relations between five EKA mechanisms and SME performance. A comparison of the two regression analyses indicates that all five EKA mechanisms seem to have similar effects on the financial performance and growth performance of SMEs. An implicit assumption of this study that EKA mechanisms may affect the two dimensions of firm performance differently is rejected. The reason could be that growth and profitability in the surveyed SMEs are correlated, which is evidenced by our correlation analysis (see table 5.2). Hence, the trade-off effect between the two dimensions of the performance is

not significant for SMEs (cf. Cowling 2004, Kachlami and Yazdanfar 2016). It leads to that the five EKA mechanisms have similar effects on them.

According to our linear regression analysis, the hypotheses that (C) referring to free sources and (D) recruiting new talents for new knowledge have positive impacts on both the financial performance and growth of SMEs are not rejected. The hypotheses that (A) consulting personal networks, (B) purchasing products or services, and (E) collaborating with value-chain partners have positive impacts on SME performance must be rejected.

The finding that not all the EKA mechanisms have a positive effect on SME performance indicates that managing the knowledge absorbing process is not an easy task. The process entails various challenges and costs (see Chapter 4). There are internal and external challenges, such as organizational culture and appropriation regime, that can affect whether absorbing external knowledge can improve organizational performance. Therefore, taking into account possible benefits, challenges, and costs, the overall impacts of different EKA mechanisms on the performance may not always be positive or significant.

For instance, EKA through consulting personal networks can help SMEs gain access to new knowledge that they cannot gain through official channels with relatively fewer costs. However, the whole process is not legally binding. The individuals that provide the knowledge may lack the commitment to make sure the knowledge be transferred to the SMEs successfully, and the knowledge they share is not always something the SMEs want to get. In contrast, EKA through purchasing products or services provides SMEs more certainty in getting the specific knowledge they want to absorb, but it entails direct financial costs that small companies usually do not want to spend. Collaborating with value-chain partners as an EKA mechanism also has both advantages and disadvantages. Due to the shared interests of creating value for the same end-users, knowledge absorption from supplier-customer relationships may get strong organizational support from both sides. The existing transactional and relational connection enables a faster and more effective transfer of knowledge compared to other channels, but managing the

collaboration takes much effort from top managers and management attention. Such collaboration often requires both internal and external arrangements to support the process, which is usually not established in SMEs.

There are other possible reasons that a potential positive relationship between an EKA mechanism and SME performance is rejected in the regression analysis. For instance, a reduced validity of the quantitative study caused by small sample sizes may reject a valid hypothesis incorrectly. Or, the effects of specific EKA mechanisms on firm performance are highly industry-specific. For example, in some industries, an EKA mechanism may affect firm performance positively, while in some other industries, the effects are adverse. If we consider such industry differences and test our hypotheses with data from specific industries, we may find that the effects of the three EKA mechanisms (viz. consulting personal networks, purchasing products or services, and collaborating with value-chain partners) on SME performance are significant.

### 5.4.2 Referring to Free Sources and Recruiting New Talents

The linear regression analysis supports two of the five, which indicate that EKA through (A) referring to free sources and (B) recruiting new talents have positive effects on their financial performance and growth performance. The following discussion will be mainly focused on the two EKA mechanisms.

#### A: Referring to Free Sources

According to this study, a greater extent of utilizing free sources such as search engines, open-source websites, internet technical for, conferences, and exhibitions, leads to better SME performance. Referring to free sources is one of the most frequently mentioned EKA mechanisms by Chinese SMEs. Comparing to other EKA mechanisms, such as purchase and collaboration with suppliers and customers, to search for needed knowledge from free open sources is relatively informal and involves fewer costs. SMEs are often in a disadvantageous position when building up big business networks comparing to large firms. It reflects in our previous interview that SMEs rarely have an official partnership with other organizations such as universities or research institutes.

Some small companies rely on a limited number of customers and supply chain partners when doing business. When they need to develop new capabilities for new business opportunities, existing customers and suppliers may not possess the needed knowledge for SMEs. Even if SMEs can find a potential partner that has the relevant knowledge they need, the high costs involved in obtaining and assimilating it may prevent them from choosing it. For instance, purchase or licensing existing technology from others may be costly. Collaboration with partners for R&D involves not only high investment but also managerial attention and necessary capabilities. These resources and capabilities are often something SMEs do not have.

Searching for needed knowledge from free sources provides SMEs with opportunities of gaining new knowledge with the least costs. Thanks to new information technology (IT) infrastructure and growing trends in knowledge sharing across the globe, SMEs can get access to many technologies and new knowledge once considered proprietary with no or limited costs.

The process of obtaining such knowledge is almost instant. However, some scholars argue, from the resource-based perspective, that knowledge gained from the free sources is available to everyone and may not be able to contribute to organizational competitiveness. The finding of this study indicates that the advantages of low financial costs and time costs in obtaining new knowledge from free open sources could compensate for the disadvantages and make referring to free open sources for new knowledge conducive to the overall performance.

B: Recruiting New Talents

This study also underscores the importance of recruiting new talents as a means of assimilating external knowledge as it has positive effects on both the financial performance and the growth performance of SMEs. As new technology such as AI or cloud computing has been slowly spread to many organizational processes, it leads to an increasing fear that future machines will soon replace human resources in many tasks (see Jarrahi 2018). However, when talking about learning from others, knowledge

assimilation through recruiting new human capital is still an effective measure, particularly when the needed knowledge is tacit. Tacit knowledge can only be shared and transferred through direct experience and human interaction. Successful assimilation of tacit knowledge requires the exchange of crucial personnel (cf. Nonaka *et al.* 2000, Park *et al.* 2015, Lee 2020).

By recruiting new employees with the required knowledge, SMEs can quickly fill the knowledge gap, spread, and embed their knowledge into the existing knowledge base of the firms. Prior studies on HRM also indicate that a carefully designed and implemented HRM practice has a positive influence on firm performance (cf. Bowen and Ostroff 2004, Bhattacharya *et al.* 2005, Gahlawat and Kundu 2019). Adding to the discussion today of whether artificial intelligence (AI) or machines can replace humans (cf. Kolbjørnsrud *et al.* 2016, Makridakis 2017, Jarrahi 2018, Wilson and Daugherty 2018), the result of this study underline the fact the human resources are still relevant and hard to replace today when dealing with external knowledge.

The recruitment of new talents represents an important source of knowledge inflow. It could help increase the capabilities of SMEs to learn new skills, develop new technological capabilities, and overcome competence traps (cf. Rosenkopf and Nerkar 2001, Tzabbar 2009, Jøranli 2018). In a study focused on examining the relations between foreign knowledge acquisition mechanisms and firm performance, Chen and Tan (2016) focused on two mechanisms through which emerging market firms acquire foreign technological and managerial knowledge: collaborating with foreign firms and recruiting returnees. Their study suggests that entrepreneurial firms in China benefit more from recruiting returnees from foreign countries than collaborating with foreign companies. Recruiting former employees from big companies or more technologically advanced ones benefit SMEs through knowledge spillovers and enhancing their AC of them (cf. Liu *et al.* 2010a, Leiva *et al.* 2017). For example, Chinese tech giant Huawei has successfully boosted its technology capabilities by actively recruiting former employees from its competitors and scholars in world-renowned research institutes (see Gifford *et al.* 2015).

Recruiting new talents can also help SMEs alleviate the Not-Invented-Here (NIH) syndrome. Unlike other EKA mechanisms, such as purchase and M&A, in which the new knowledge can be easily viewed as "external", the new knowledge embedded in the new employees may be seen as incumbent members as "internal", as the new employees belong to the same team though their knowledge could is new to others.

## 5.5 Chapter Conclusion

Based on a survey collected from 221 SMEs in different industries and areas in China, we adopted a quantitative research method to test the potential effects of five EKA mechanisms on the performance of SMEs. The results of our linear regression analysis suggest that the hypotheses that (C) referring to free sources and (D) recruiting new talents for new knowledge have positive impacts on both the financial performance and growth of SMEs cannot be rejected. The hypotheses that (A) consulting personal networks, (B) purchasing products or services, and (E) collaborating with value-chain partners have positive impacts on SME performance must be rejected. The summary of the findings is shown in Table 5.8.

**Table 5.8: Summary of the Chapter Findings**

| Research Question | Hypothesized Positive Effects of Five EKA Mechanisms on Performance | Tested Results | |
|---|---|---|---|
| | | a. Finance | b. Growth |
| Which external knowledge assimilation (EKA) mechanisms do have an impact on the performance of SMEs? | H 1: Consulting personal networks | Rejected | Rejected |
| | H 2. Purchasing products or services | Rejected | Rejected |
| | H 3. Referring to free sources | Not Rejected | Not Rejected |
| | H 4. Recruiting new talents | Not Rejected | Not Rejected |
| | H 5. Collaborating value-chain partners | Rejected | Rejected |

Our findings corroborate the suggestions of some scholars that different EKA mechanisms may have different impacts on firm performance (cf. Lin and Wu 2010, Kang and Kang 2014, Santoro *et al.* 2017), and higher AC may not always lead to better performance (cf. Zahra and George 2002, Wales *et al.* 2013, Lichtenthaler 2016). It also enhances our understanding of how SMEs use different external knowledge assimilating mechanisms and whether these differences influence business performance. The findings of the study may help CEOs or owners of SMEs to identify and prioritize the

EKA mechanisms that are positively related to firm performance, such as referring to free sources and recruiting new talents.