

## Non-R&D-based Innovation and the Growth of SMEs in China: A Case Study of Hangzhou FC Company

Zheng Qingqing, Guo Yanting, Lei Mingtianzi, Zheng Gang  
School of Management, Zhejiang University, Hangzhou, China

**Abstract**—Recently, a growing number of academic research shows that this R&D-focused view of innovation ignores the other popular innovation activities in SMEs, which cannot explain that some SMEs with weak R&D capability still be innovative. Further, relevant studies have indicated that absorptive capacity is closely related to the degree of benefit SMEs can get from non-R&D-based innovation. Non-R&D-based innovation provides newly innovative ideas for the enterprise, while absorptive capacity helps enterprises to adapt to the diverse actual situations, which further improves the innovation performance. Therefore, this paper is trying to reveal the pervasive non-R&D-based innovation practices in Chinese SMEs basing on a case study of Fashion in China (FC in short). It shows that non-R&D-based innovation activities, namely technology adoption, imitation and reverse engineering, design, innovative implication of existing knowledge, etc., have positive effects on innovative performance, and the enterprise's absorptive capacity also has a positive moderating effect on the relationship between non-R&D-based innovation activities and innovation performance. This research argues that, non-R&D-based innovation activities are very effective and popular for SMEs' survival and growth and the continuous investment in absorptive capacity can help to further enhance the effects of non-R&D-based innovation.

### I. INTRODUCTION

It has long been acknowledged that research development (R&D) is the main or even the only method of innovating in innovation researches. However, enterprise practices have shown that this single source of innovation perspective ignored the importance of other innovative methods in enterprise practices [1]. Furthermore, an analysis of the third Community Innovation Survey (CIS-3) and CIS-4 results finds that over half of innovative European firms that engaged in product innovation and process innovation did not conduct intramural or extramural R&D. In addition, there is no significant difference in the performance between firms conducting R&D and firms without R&D [2]. Therefore, non-R&D-based innovation has drawn increasingly attention.

Since China's reform and opening-up, small-and-medium-sized enterprises (SMEs) have increasingly become an important impetus for innovation in China. SMEs have become the foundation for promoting technical innovation, and play a significant role in social and economic development in China [3]. However, most innovative SMEs have little R&D investment or even no formal R&D activities because of limited resource. For example, according to the National Industrial Enterprise Innovation 2007 survey, 84.0% of small enterprises do not

performing R&D, but the proportion of SMEs performing innovation activities is up to 78.2% [4]. Based on the evidence, the non-R&D-based innovation may be a more effective innovation strategy for many SMEs in the growth stage.

However, since existing academic research and innovation policies are mainly focusing on enhancing R&D capabilities and innovative practices of large enterprises, there are limited guidelines for SMEs with no formal research institution and weak R&D capability. And in contrary to the large amount of mainstream research focusing on R&D innovation, research on non-R&D-based innovation and SMEs in the Chinese context is very scarce [5-9].

So far, it has essential theoretical and practical significance to study how Chinese SMEs enhance innovation capability to build up the sustainable competitive advantage by effective and diverse non-R&D-based innovative activities. From the non-R&D-based innovation perspective, this study reveals the growth of SMEs in China through a single case study on Fashion located in Hangzhou, which explores the theoretical framework related to non-R&D-based innovation.

### II. LITERATURE REVIEW AND THEORETICAL FRAMEWORK

Non-R&D-based innovation has been mentioned in many literature and studies. But former studies just mention some specific activities that belong to non-R&D-based innovation, focusing on specific mode of enterprises practices [10]. However, there is no unified definition of the concept on non-R&D-based innovation. Based on exiting literature, we define non-R&D-based innovation as a variety of other types of innovation excluding R&D-based innovation activities [11]. The key point is that innovation comes mainly from sources outside the enterprise or the company's existing stock of knowledge, instead of internal systematic R&D activities; Non-R&D-based innovation-oriented enterprises with low or nearly no investment in R&D can also achieve satisfactory innovation performance through non-R&D-based innovation activities [12]. And R&D refers to a systematic, creative work increasing the total amount of knowledge, including the human, cultural and social knowledge, as well as creating new applications with the use of such knowledge [13].

In the early ninety's, scholars have already explored the relationship between the non-R&D-based innovation activities and performance, and the main findings are as follows:

TABLE1. SELECTED RESEARCH ON NON-R&D-BASED INNOVATIVE ACTIVITIES AND PERFORMANCE

Authors	Source of data	Non-R&D-based innovative activities	Performance
Hansen & Serin [8]	Danish packaging industry	Learning by doing, design and process optimization	
Brouwer et al [7]	Community Innovation Survey 7784 firms from all sectors of the manufacturing and service industries of the Netherlands	Patents and licenses, design, trial production, tooling-up, manpower training, market research, investment in fixed assets	Product innovation, service innovation
Sterlacchini [9]	143 Italian manufacturing SMEs	Design, engineering, pre-production developments	A significant and positive impact on the share of exports on sales
Santamaría et al [1]	1300 Spanish manufacturing firms	Design, adopting advanced equipment, training, consultants, hiring talent, cooperation agreements, external R&D, etc.	Product innovation, process innovation
Huang et al [14]	Community Innovation Survey, 14931 firms distributed in 15 European Union countries	Incremental improvement of a product or process, imitation and reverse engineering, user innovation, innovative application of the existing knowledge, adopting external technology and knowledge	Product innovation, process innovation
Barge-Gil et al [15]	Spanish Business Strategies Survey (1998-2002) 1300 firms	Technology forecasting, design, advanced manufacturing technology, training	Product innovation, process innovation
Hervas-Oliver et al [16]	Spanish Business Strategies Survey (2005-2006); 1900 firms in low-medium tech industries	Value-adding non-R&D activities (design, marketing effort), other non-R&D activities (the existence of a formal plan for innovation, PAI; the existence of a technology monitor committee, DCT)	Product innovation, process innovation

Although scholars have begun to focus on innovation activities that are not based on R&D, there are still some limitations in current studies. First, there is a lack of systematic studies on non-R&D-based innovation. Second, the existing research on SMEs in the context of China is still rare. So far, Systematic research on the innovation activities is done by Arundel et al. [2, 18], but their researches non-R&D-based innovation activities are all focusing on technical aspects, lacking in concern for non-technical aspects.

Although there is no clear classification on non-R&D-based innovation activities, both the fourth European Community Innovation Survey and the third edition of the Oslo Manual OECD published in 2005 find marketing innovation and organizational innovation vital types of innovation inside firm, apparently these two are not based on R&D innovation activities [17]. Thus, in the context of relatively immature theoretical framework of non-R&D-based innovation, this paper reveals non-R&D-based innovation in Chinese SMEs modes and their relationship with innovation performance by an exploratory case study.

In order to reveal the impact of non-R&D-based innovation activities on the innovation of SMEs in China, we classified the existing activities into two types, namely, technical non-R&D-based innovation activities and non-technical non-R&D-based innovation activities.

### III. PRELIMINARY THEORETICAL FRAMEWORK

Based on literature review, we propose that it is more

scientific and reasonable to do research on non-R&D-based innovation activities concerning both technical and non-technical aspects, integrating them into the same framework.

#### A. Technical non-R&D-based innovation activities

According to preliminary classification on technical non-R&D-based innovation activities proposed by Arundel et al. [2], combining with case studies of initial Chinese context and empirical researches, this paper initially classifies technology adoption, imitation innovation, minor modifications or incremental changes, combining existing knowledge in new ways as technical non-R&D-based innovation activities.

**Technology adoption** means that firms can acquire innovative products and processes from sources external to the firm, including the acquisition of new machinery and equipment, as well as acquiring new processes, technology and tacit knowledge from other firms [18]. Studies have shown that, in some research situations, there exists a complementary relation between internal R&D and technology purchase [19-21], while in other studies of different situations, there is a substitute relation between internal R&D and technology purchase [22,23]. Therefore, we define technology purchase as an innovative activity that is not based on R&D, and combination of technology purchase and internal R&D can actually improve the firms' output [20], also the innovation capability. Comparing with R&D activities, the technology purchase can also promote internal innovation activities [14], and enhance its ability to innovate.

**Imitation and reverse engineering** means that firms absorb and master the core technology secret of the first innovation by the means of purchase, reverse decoding or attracting investment. Basing on this, firms make some modification and improvement on the first innovation, further develop and produce competitive products. Many imitative innovation activities, including some reverse engineering, are not based on R&D [24]. This study focuses on imitation including reverse engineering, which mainly refers to the enterprise innovate more advanced products after absorbing the core technology by analyzing existing leading innovative products, as well as deciphering core technology and production processes[25]. Such reverse engineering activity frequently occurred in the SMEs, and is one of the important innovative activities.

**Minor modifications or incremental change** refers to the incremental innovation based on the accumulated knowledge. Incremental innovation is more dependent on incremental improvement or minor modifications on product and the process [26]. In the 1980s and 1990s, incremental innovation has already interested some scholars, and is considered as important innovative activity other than R&D activities [27, 28]. Comparing with R&D based radical innovation with high investment and high risk, incremental innovation activity is relatively low in costs and risks, which was tend to be conducted by low-cost strategy-oriented enterprises frequently [29].

**Innovative implication of existing knowledge**, by which firms implicate existing knowledge in new ways, includes some types of industrial design and engineering projects [2]. Based on the definition, this concept is quite similar to the concept of integrated innovation, though, still is different from it. Integrated innovation stresses creative thinking during the process of combining various elements, and has a broader range, including strategic integration, organizational integration and knowledge integration etc [30-31]. While former innovation method only innovates by implicating the existing knowledge in new ways.

#### *B. Non-technical non-R&D-based innovation activities*

According to European Community Innovation Survey conducted by OECD, marketing innovation and organization innovation is defined as non-technical non-R&D-based innovation activities.

Marketing innovation is defined as the achievement of new marketing methods, which includes significant changes in product design, product packaging, distribution, products promotion and pricing, in order to better solve the needs of users, open up a new market, and reposition their products to expand the sales scale [17]. Studies have shown that the relationship between non-technological innovation and technological innovation is closely related, product innovation is often accompanied by marketing innovation [32]. Arundel et al [2] found that the market sector is one of the most commonly used creative sources for firms with R&D innovation and firms conducting non-R&D innovation.

In OECD, organization innovation is defined as the implementation of a new organizational method in the enterprise's business activities, the workplace, external relations, by means of reducing management fees, supply and transaction costs, improving job satisfaction, accessing to tacit knowledge, to improve the performance of enterprises. Organization innovation is very common innovation activities in enterprises, and it plays a promoting role in firm's innovation performance. Bakan & Yildiz [33] divided innovation into four types, including products, processes, marketing and organization innovation, and found that 42.6% of the sample reported that they conducted organization innovation in the past five years. Based on the fourth CIS survey, Martin [34] finds that process innovation, organization and marketing innovation are more important than R&D-based product innovation on LMT industries. Thus, organization innovation activities have a certain role in promoting innovation for enterprises, especially for SMEs without performing R&D. To some extent, organization innovation makes up for the weak R&D capability of SMEs.

#### *C. Absorptive capacity*

For SMEs with limited resources, the external knowledge and resources may be quite important for firm growth. However, only accessing to resources does not necessarily bring benefits, firms need to have the ability to obtain, absorb and transform of external knowledge, namely the absorptive capacity. Cohen & Levinthal [35] suggested that the absorptive capability of a firm is the ability to recognize the value of new, external information, assimilate it, and apply it to commercial ends is critical to its innovative capabilities. The absorptive capability is largely a function of the firm's level of prior related knowledge, which is crucial for enterprises' innovation ability. Zahra & George [36] defined absorptive capability as a set of organizational routines and process by which firms acquire, assimilate, transform, and exploit knowledge to produce a dynamic organizational capability. And the concept of absorptive capacity was reconstructed. The absorption capacity is divided into the potential absorptive capacity and realized absorptive capacity. And the former includes the knowledge acquisition capacity and knowledge assimilation capacity, the latter one includes knowledge transformation capacity and knowledge exploitation capacity. Based on above 4 detailed dimensions, Jansen et al [37] developed the scale and published it in the "Academy of Management Journal". Most Chinese scholars have adopted this scale, and then do some modification according to their own research purposes. Knowledge acquisition capacity includes scales like frequent interaction with corporate headquarters to acquire new knowledge, collection of industry information through informal means (e.g. lunch with industry friends, talks with trade partners), and organizing special meetings with customers or third parties to acquire new knowledge. Knowledge assimilation capacity includes scales like quick recognition of shifts in our market (e.g. competition, regulation, demography, and quick

understanding of new opportunities to serve our clients. Knowledge transformation capacity includes scales like quick understanding of the new knowledge application to present knowledge, integration of newly acquired knowledge and existing knowledge, and seizing external opportunities brought by new knowledge. Knowledge exploitation capacity includes that we can quickly find the new knowledge that has been internalized and converted by the enterprise when it is needed, and enterprises can use new knowledge for technological innovation and improve enterprise management, etc [38].

Former studies have indicated that the formation of absorptive capacity is closely related to R&D investment. A company's ability to use external knowledge is often a byproduct of its R&D [35]. Chen Jin et al [39] find that the intensity of R&D activity plays an important role in enhancing the potential absorptive capacity and the actual absorptive capacity of the enterprises. However, less attention is paid to the relationship between absorptive capacity and non-R&D activities. Existing evidence reveals that absorptive capacity has the potential to promote the acquisition and transfer of marketing knowledge, production know-how, and so on [40]. In summary, based on characteristics of SMEs, this paper focuses on how enterprise absorptive capacity influences non-R&D-based innovation activities effect.

IV. METHODOLOGY

A. Case study

In this paper, we choose to conduct a single case study mainly for the following considerations: First, case study is particularly effective in answering the question of "how" and "why" in the unexplored research field [41]. Single case study is systematic and comprehensive, which helps to concrete enterprise practices and abstract theory. Second, single case study can provide an initial verification for the proposed theoretical framework, further makes subsequent amendments to the research model. Case studies can be constructed to explore the "what" and "why" and "how" [42, 43]. In this paper, we do specific and deep analysis on non-R&D-based innovation of Fashion in China case,

initially proposed a theoretical framework for non-R&D-based innovation in the verification basing on relevant theoretical assumptions

B. Case selection

This study selects Hang Zhou Fashion in China hand weaving Development Co., Ltd. (hereinafter referred to as the "FC") as a case, which is a small SME in the textile industry. And we choose FC for several considerations. Firstly, Zhejiang Province is relatively developed in terms of economic development, and SMEs play an important role in promoting the economic development. Therefore, SMEs in Zhejiang Province has a strong representative. Secondly, the literature shows that the non R&D innovation is more widely exists in the low and medium technology industries, and the textile industry which FC belongs to is a typical traditional low technology industry. Finally, FC is one of the best SMEs in the textile industry, and we found that it meets the purpose of this paper for innovative activities basing on the preliminary data collection and field research.

Hangzhou Fashion in China hand weaving Development Co., Ltd., set up in January 2005, registered the brand "Fashion in China" and Chinese cloth net, after recent years of exertion and innovation, it has developed into a professional and experienced clothing company, mainly uses pure hand-made cloth as raw material, and has a full set of design, production and sales, combining the traditional hand weaving techniques and modern fashion. The company's main product is children's clothing and baby wear, product line covering clothing (mainly for children's clothing, women's clothing, maternity wear), bedding, home accessories, crafts, etc. The market share of its main product is very high in the market of similar products, and the consumer recognition is relatively high. Since the beginning, the FC has always attached importance to innovation, and most of the new product design is completed independently. The innovation investment has accounted for 15% of the total cost of ~ 20% in the past two years alley find three can be regarded is forerunner in infant hand weaving clothing industry. Key events in the development process of FC as shown in table 2.

TABLE 2.KEY EVENTS OF FASHION IN CHINA HAND WEAVING DEVELOPMENT CO., LTD.

Time	Key Events
2005	The initial hand weaving clothing company was founded.
2006	Participating in the formulation of the first standard in Chinese hand weaving industry, and got the enterprise standard certification issued by Quality Supervision Bureau in Zhejiang Province
2007	Won the Outstanding Innovation Award in China International maternity & children Industry Exposition
2008	Won the Silver Award in Hangzhou excellent agricultural products Spring Exhibition
2009	The founders won the "China list - the most pioneering new cultural mission of pioneering new award"
2012	The hand weaving technique was included in the Zhejiang Province non-material cultural heritage list.
2013	Zheng Fenlan, the initial founder, was awarded as the fourth batch of representative inheritor of non-material culture in HangZhou.
2014	The FC was selected as the first batch of exhibition base for non-material culture. And the FC registered as Zhejiang Fashion in China cultural and Creative Development Co., Ltd; The FC get a patent of portable ribbon machine (201430423584.4); The FC homespun Experience Center, Cloth Dyeing Base, Crafting Pavilion, Handicrafting Training Institute, Weaving Experience Center in QIUZHI primary school opened together;The FC has become the benchmark enterprise for the inheritance and protection of intangible cultural heritage in Hangzhou City.
2015	The FC won the "2015 next city intangible cultural heritage protection outstanding unit" honorary title; The FC designed the first route of traditional handmade by corporating with the Ningbo Cicheng Pavilion.

Source: <http://www.chinatubu.com/>.

### C. Data collection

In this paper, data sources from research interviews, internal documents and public source. And the use of multiple data sources is to improve the reliability and validity of the study [42, 44]. Firstly, research interviews can intuitively understand the real situation of enterprises, and it is an important way to get the case study data. Secondly, data collected from internal documents provides supplemental information not covered in the interview survey. Finally, FC has been highly concerned by the media, government departments, which offers relatively abundant public secondary sources.

First, based on the data from interviews and internal documents, we distinguish the key events of the firm (see TABLE 2). Therefore, basing on the proposed research model and data obtained from the comprehensive analysis, this study tries to answer the question of How can Chinese SMEs promote innovation performance through the development of non-R&D-based innovation activities, and how can absorptive capacity affect the relationship between non-R&D-based innovation activities and firm performance?"

## V. CASE ANALYSIS AND FINDINGS

### A. Non-R&D-based innovation activities

#### 1. Technology adoption

Since FC mainly focuses on the design and production, then the company adopts external technology to innovate when it comes to technical problems difficult to be solved. Two examples are given below.

Firstly, FC solved the problem of the filler that cannot be machine washed. After washing, the filler will not be warm as before, but the long-time unwashed clothing will damage the health of infants and young children.

Secondly, the FC solved the problem of rough feeling of hand weaving, uneven force in weaving and poor stress resistance when in textile. On the one hand, the FC continued to improve hand weaving cloth. On the other hand, the FC actively sought external cooperation, and conducts innovation in products through technology adoption. In 2005, the FC cooperated with Wensli Silk Science & Technology Co., Ltd. in Hangzhou, together developed a new kind of fabrics—the new cloud cloth, integrating hand weaving technique into silk technique, through continuous exploration, modification. This new kind of cloth weaved by the traditional manual weaving method, combining the merits of both silk and cotton.

#### 2. Incremental innovation

Raw material that the FC used was hand-woven clothing, which was quite coarse and shortage of fashion due to its relatively single color and pattern, and traditional weaving method yields a lower level of amount than modern techniques do. How to combine traditional hand weaving and

modern fashion together, to satisfy consumers, is an obstacle that FC was facing with.

Technically, all hand-woven clothing should at least go through 24 procedures into fabric, and clothing with a pattern even needed go through 72 steps. Complex weaving procedures resulted in single hand-woven patterns and monotonous color types. To solve the above problems, the company's technical staffs jointly worked with weaving artists in raw material base, to explore possible weaving method by trial and error, and achieved the ultimate success of improving existing weaving methods. In addition, through gradual improvement activities, FC enriched the species of fabric patterns, such as square, fluid water shape and other complex fabric patterns.

Traditional hand-woven cloth was purely hand-woven. And the production was constrained by looms and labor, especially loom. In the beginning, the FC adopted southern looms in its raw material base. The low productivity and weavers' frustrated enthusiasm resulted in a raw materials shortage. Although the labor intensity of the northern looms was low, its height was unsuitable for southern workers. Thus, the company hired experts in loom, to improve traditional northern looms. After the incremental improvement, the company launched a new loom with 30%-50% speed increase and significantly reduce in labor intensity. Meanwhile, to make better protection of homespun textile technique and heritage, the FC modified the original loom, and the improved new loom is easy to carry and operate, and the weaving machine has been patented, and is completely owned by the FC.

#### 3. Innovative implication of existing knowledge

Design philosophy of the FC is fresh, simple, and to design good products for consumers to pay attention to details. Design-driven innovation in the FC is very common, and creativity often derives from designers, chief executives and even other ordinary employers. On the one hand, designers determined the design theme based on past experience, combining with market trends and pop elements. Then company needed to determine fabric according to different themes, and negotiated with raw material base. Ultimately, new or improved products came out. For example, based on the original pastoral series of children's clothing, Jin Zhouzhou, the chief designer, launched a more fashionable campus series of children's wear by integrating the hand weaving cloth with modern fabric colors, patterns and other popular elements. And after that, its franchise stores open to cities like Beijing, Shanghai, Nanjing, Nanchang and Hong Kong.

On the other hand, since the FC mainly focuses on infant and children's products, female employees' parenting experience is an important source of creative design. For instance, the urine backflow prevention in infant pants design, and more convenient and comfortable buttons made of edible

coconut shell, both in order to keep stylish and enhance protection. According to the female employees' parenting experience, children's clothing crotch is more than the normal length of 2 cm, for easy change of diapers. After appearance of improved children's wear in the fair, the FC has received many orders.

However, after a wide range of data collection and repeatedly confirmation, we did not find typical examples and products of the FC's non-R&D-based innovation through reverse imitation. Given this, we believe it lies in following reasons: Firstly, the FC is leader in hand-woven clothing industry, often being the object of reverse imitation; the second is that in the clothing design, people generally pursue novelty of style. We found in the interview, the FC would learn and refer to other companies' style and appearance design, not through direct reverse imitation.

#### 4. Marketing innovation

Marketing innovation signaling cultural characteristics is representative of the FC's brand image. Firstly, the company created a new sales method-"buy clothes donated a story", integrating products with cultural elements, and attached animation cards with classic stories on dress, to increase the added value of the product. The company also emphasizes much on cultural innovation. Finland Cheng, the initial founder, believes that "homespun is a kind of Chinese traditional clothing materials, environmentally friendly, also particularly good permeability, so I do the homespun business, not only to produce goods, more important is to inherit culture, China's thousands of years of textile culture." In addition, the FC selected the West Lake as a field publicity site, showing portable new loom, to shape the enterprise image as a traditional cultural heritage of the enterprise image. Secondly, the FC expands its market by selling cotton, the raw material, so as to satisfy the needs of hand enthusiasts. In addition, the FC organized some activities with cultural meaning, such as DIY activities on children's Day and organizing lessons to introduce weaving skills, to the school to weaving skills, to build brand and shape corporate image, spreading Chinese hand weaving culture. At the same time, the FC also opened the online sales, like its online store in Tmall, which reduces both administration costs and staff costs.

#### 5. Organizational innovation

In terms of organizational innovation, the FC has its own innovative approaches. In order to find a better development platform for the FC, the FC joined Hangzhou Wensli silk technology corporation, which was known as the homespun "Weaver" married silk "Cowboy." Person in charge in the FC holds that collaboration with Wensli benefits the company, because the FC can not only retain the homespun culture, but

also infiltrate the silk culture, so that it will bring about new opportunities for the development of homespun. In addition, the FC used diverse methods to reduce costs and improve product quality. For example, the FC sought cooperation with fixed fabric suppliers, and built up a long-term supply relationship, which improved the bargaining power of the company and to some extent reduced product costs.

#### B. Absorptive capacity

For innovation in fashion firms, quick access to internal and external information and knowledge is very important, and innovation success largely depends on firm's capability of quickly applying this knowledge to product design, production and promotion. The FC, as one of the most outstanding fashion firms, has continually focused on absorbing external knowledge and made full use of internal and external knowledge for product and process innovation in its business operation and innovation practices. Detailed examples are given below.

Firstly, the FC was also good at collecting information from the communication with customers, in which they had identified growth opportunities that benefit the company. For example, the cotton-padding clothes would be deformed after washing clothes and heat retention property would be lowered. But no washing for a long time would affect infants' and young children's health. Once customers reflected above dilemma, the firm immediately organized personnel to solve the problem, seeking external technical cooperation to develop a washable cotton children's clothing for customers, and also accumulate technical skills and know-how knowledge in the process.

Secondly, in the process of cooperation with the raw material bases, the FC regularly enquired weavers about their fresh ideas of existing fabric and pattern and good practices. Then, the firm applied collected good ideas and practices to other raw materials production base, which promoted a synergetic development of raw material bases. Meanwhile, designers frequently participated in relevant commodities fair, product launches and so on, in order to obtain latest industrial trend, by which they can combine the latest pop elements with the FC's own style in product design.

In addition, in order to track the latest market information, designers attended product introduction meetings and trade fairs. By integrating the latest fashion elements into product design, the FC launched new or improved products.

In conclusion, multi channel acquisition and fast application of internal and external knowledge contribute to a better effect of non-R&D-based innovation activities, and improve the performance and sales of new products (see Table 3). Therefore, absorptive capacity is closely related to the degree of benefit SMEs can get from non-R&D-based innovation.

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TABLE 3. NON-R&D-BASED INNOVATION ACTIVITIES, ABSORPTIVE CAPACITY AND INNOVATION PERFORMANCE OF THE FC

Non-R&D-based innovation activities	Potential absorptive capacity	Realized absorptive capacity	Innovation performance
Technology adoption	Get information from customer communication: The problem of the filler that cannot be machine washed.	Quick response, active learning: Organizing internal employees and adopting external technology to solve the problem.	Developing the washable cotton, and got the patent of utility model.
	Get information from characteristics of raw material: The problem of rough feeling of hand weaving, and the product is not comfortable and soft enough.	Cooperative exploration and exploitation: Cooperating with Wensli company, integrating homespun technology with silk technology.	Developing a new fabric —the new cloud cloth. Improvement in product novelty, expansion of market recognition.
Incremental innovation	Get information from production monitoring: The low productivity of textile equipment, the lack of textile technology, low incentive of workers.	Cooperative exploration, active learning: By organizing the internal Textile Technology Specialist and hiring external weaving machine experts, together improved the north loom.	Launched a new loom, which speed increases by 30% -50%, and significantly reduces labor intensity.
	Get information from employees: Collecting the latest ideas of the existing hand woven fabrics, pattern design and the best practices.	Cooperative exploration, active learning: Organizing internal technical employees and weaving artists in raw material base to explore possible ways to improve weaving methods.	Successfully improved the existing weaving methods, to solve the problem of rough homespun fabrics, enriched types of fabric patterns.
Innovative implication of existing knowledge	Get information from exhibitions: Designers' participation in Product Introduction Meeting and Trade Fair to stay up on the latest issues and trends.	Effective combination of knowledge: Combining traditional handicraft techniques and the concept of modern fashion design	Launched a stylish campus series children's wear. The number of franchised stores subsequently increased significantly.
Marketing innovation	Get information through social media marketing means: Promoting the hand weaving culture through friends circle, WeChat public, etc., and test new products in popularity, interactive learning with fans and potential users.	Effective combination of knowledge: Combining cultural stories with products.	Expanding sales, but also set up the enterprise image as a cultural heritage.
Organizational innovation	Get information from partners: Cooperation with fabric suppliers.	Expansion of information advantage: To establish a long-term massive supply relations.	Improving the bargaining power of the FC, and reducing product costs.

### C. Innovation performance

As the first domestic hand-woven children brand, the FC gradually improves traditional homespun, retaining softy of hand woven fabric and creating boutique clothing, creates a new path of innovation in the combination of traditional craftsmanship and modern clothing concept. Now it has become a leader in homespun clothing industry.

Over the years, though the FC has almost no formal R&D investment, and there is no formal research institution, the firm still maintained a strong, innovative capability and good market performance. From the case analysis, we observe that the FC preferred to innovate by means of technical adoption, incremental improvement, design, marketing, organizational

innovation, etc. Furthermore, the capability of fast acquisition, understanding and application to market information, as well as the ability to internalize external textile techniques, allow the firm to get a better performance. Since 2005, the company has average annual sales growth of over 100 percent, and has a practical patent, a growing number of branches.

Since 2005, the company has achieved an average annual sales growth rate of more than 100% and a growing number of the FC's, also owns a utility model patent. In 2009, Zheng Fenlan, the initial founder, won the award of the most cutting-edge entrepreneur with culture mission. In 2012, its hand weaving techniques are included in the list of non-material cultural heritage in Zhejiang province.

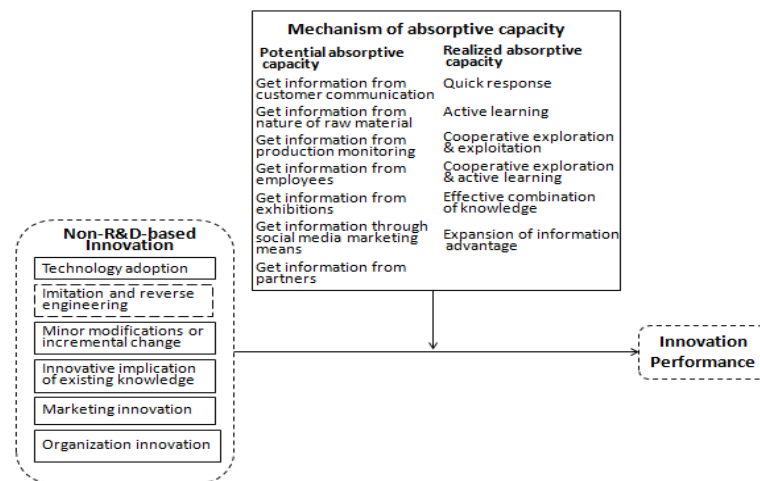


FIGURE 1 Non-R&D-based innovation, absorptive capacity and innovation performance of SMEs

## VI. DISCUSSION AND CONCLUSIONS

SMEs are in a weak position in the market competition, and the long-term emphasis on R&D-based innovation makes this more obvious. And most of the SMEs in China don't have adequate resources to R&D-based innovation activities.

Based on the existing literature review, we first propose non-R&D-based innovation patterns and a framework of relationship between non-R&D-based innovation patterns and innovation performance, and conduct a preliminary exploration for non-R&D-based innovation theory. Then, considering the development of SMEs in Chinese context, we do a case study on Hangzhou Fashion in China to analyze how the majority of SMEs make up for R&D weakness by non-R&D-based innovation, so as to improve their competitive advantage, and achieve business growth.

In this paper, the results show that the technology and knowledge adoption, marketing innovation, organization innovation activities and other non-R&D innovation activities, have a significant positive influence on innovation performance. On the one hand, SMEs make up for their own weak technical R&D capabilities by actively acquiring external advanced equipment and technology. Learning external knowledge and make full use of existing internal knowledge of to enhance technology leadership and accumulate innovation capability, so as to improve the innovation performance. And through continuous improvement of existing products and technological innovation, to enhance the product heterogeneity and achieve continuous innovation, in order to achieve final long-term development. On the other hand, non-R&D-based innovation activities like market promotion, channels, organizational activities and other aspects of innovation, can help to expand product sales and reduce costs, so as to achieve effective innovation.

In addition, the case shows that the absorptive capacity of SMEs is closely related to the degree of benefit from non-R&D-based innovation. Non-R&D-based innovation provides the new and innovative ideas for the enterprise, and absorptive capacity of enterprises offers means in the actual situation, which positively influences the innovation effect. Enterprise engages in non-R&D-based innovation activities, meanwhile adopting external technology, collecting market and customer information. Then the technology and knowledge is combined with the existing internal knowledge after digestion, transformation, to produce new knowledge, thereby reduces the innovation risk and difficulty.

And there exists some limitations of this study. The above conclusions are based on the results of a single case study, requiring a large sample data and more typical case studies to further verification.

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