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How do IT Competence, Organizational Agility and Entrepreneurial Actions Coevolve: The Case of Entrepreneurial Etailers on Ecommerce Platforms

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Abstract: Internet and IT have re-shaped the strategy logic of contemporary organizations. The new logic emphasizes business opportunity leveraging through constantly evolving entrepreneurial actions. The required business capabilities underlying such strategic logic, including organizational agility and IT competence, have also to be built and co-evolved. Based on Sambamurthy et al.^[1] conceptual framework and ten case studies of Small and Medium sized etailers on third party platform, this research explains what are entrepreneurial actions, enablers of organizational capabilities and IT competence (including IT capability and digital options) for SME etailers, as well as their evolution path and coevolution mechanisms. This research advances the literature by providing empirical evidence of the new strategic logic of internet firms as suggested by Sambamurthy et al.^[1], and systematically addresses the adaptive co-evolutionary mechanisms through real options and adaptive learning perspectives.

Keywords: IT capability, digital options, organizational agility, entrepreneurial action, adaptive coevolution

1. INTRODUCTION

The ecommerce industry has spawned many innovative entrepreneurial firms. Examples of these firms are the platform organizations such as Amazon and Alibaba, and many Small and Medium Sized Enterprises (SMEs) operating on the platforms. These organizations use a very different strategic logic to compete in the market and exhibit high dependence on IT.

First, due to the turbulent online environment, competitive advantage is no longer sustainable. So the strategic logic based on market positioning^[2] and resources^[3] to achieve sustained competitive advantage is not suitable. Sambamurthy et al.^[1] suggested market opportunity leveraging through constant changing entrepreneurial actions as firm strategic logic in the online environment. Entrepreneurial action refers to the behaviors through which firms explore and exploit market opportunities. Examples of entrepreneurial action are developing and announcing new products, entering new customer segments and distribution channels. Internet are enablers of the market opportunity leveraging strategy due to the low entry barrier on the Internet, rich channels available for customer interaction, sales and marketing.

Second, core to the entrepreneurial action strategy is organizational agility capability, which is an ability of firms to detect opportunities for innovation and seize those competitive market opportunities by assembling requisite assets, knowledge, and relationships with speed and surprise^[4]. It was also suggested that firm IT competence are in turn enablers of organizational agility.

Under the logic of market opportunity leveraging, firm entrepreneurial action, organizational agility and IT competence evolve and co-evolve constantly, which forms a muddle through process of Internet firm growth and success^[5].

However, what are the IT competence, business strategy and the underlying business capabilities in the ecommerce context are still not well studied. This research tries to address this research gap by studying ten

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entrepreneurial retailing firms, which are mostly Small and Medium sized organizations operating on EMs. To our knowledge, these firms' growth well illustrates the logic of entrepreneurial action and required technology and business capability co-evolution because their business models are mold in the Internet environment and their operations are very agile. By focusing on SME retailers, we are also able to understand why SMEs, despite limited in financial resources, are able to achieve rapid growth online.

Based on Sambamurthy et al. (1)'s research, we defined and identified the substance of the entrepreneurial actions, organizational agility, and firm IT competence in the online ecommerce industry. Then we explained their evolutionary path and coevolutionary process. Theoretically, this research enriches researchers' understanding of organizational agility in the ecommerce context, the role of IT in supporting online firm strategic logic and the adaptive coevolutionary mechanisms of the strategy and capabilities of the Internet based firms. The following section presents a brief review of Sambamurthy et al. [1]'s research and the key concepts involved in the research.

2. LITERATURE REVIEW

Because this research is based on the framework of Sambamurthy et al. [1], we offer a brief explanation of this research, its framework and key concepts. Sambamurthy et al. [1] study the strategic logic of firms in the turbulent environment, and depict a process model how IT capability support such a strategic logic through digital options and organizational agility.

First, as opposed to the market positioning [2,6] and resource based strategic logics [3,7,8] for sustained competitive advantage in the stable business environment, Sambamurthy et al. [1] suggest the logic of opportunity as a strategy logic in the turbulent business environment that emphasizes firms' ability to continuously innovate, develop superior market intelligence and coevolve assets, capabilities and knowledge [9]. Entrepreneurial action is represents firms' recognized meaningful market patterns, and the activities taken to capture the market opportunities and compete with others in the new market [10]. Entrepreneurial action can be evaluated through number of entrepreneurial actions and the complexity of action repertoire. Second, organizational agility, which is conceptualized as a three dimensional concept (market agility, operational agility and network agility), supports firm entrepreneurial action evolution and adaptation. Third, IT capability, as defined as firms' IT resources and the ability to use IT resources to support business process and strategy, supports organization agility indirectly by creating digital options. Digital options is a concept coined based on real options theory [11], and pertains to the IT enabled business process and knowledge management capital [1,12]. Digital options are further classified as process digital options and knowledge digital options.

Sambamurthy et al. [1] further emphasize that there is an adaptive coevolutionary relationships among entrepreneurial action, organizational agility, digital options and IT capability. Adaptive coevolution refers to the mutual influence between firm's strategy and capabilities in their evolution so as to achieve coevolution.

The mainstream literature on IT business value research focuses on how IT assets support business performance such as revenue, profit and cost [13]. How IT supports business strategy in a dynamic business environment is not well understood. Sambamurthy et al. [1]'s foresighted research offers a new perspective on IT business value research. However, Sambamurthy et al. [1]'s research is a conceptual framework. More field research is needed to enrich our understanding, validate and advance Sambamurthy et al. [1]'s framework.

3. RESEARCH METHOD

Our research target is to study (1) what are entrepreneurial action, organization agility, digital options and IT capability in the ecommerce context and (2) how firm entrepreneurial action and required business and IT capabilities coevolve. Case research method is selected since it is suitable for process based research. The

exploratory nature of the research also supports the selection of case study^[14,15] since the strategic logic of Internet retailers are not well understood.

Our research setting is the women's clothing industry on the Taobao platform, the biggest ecommerce platform in China. The women's clothing industry was selected for the following reasons: First, this industry is extremely dynamic, characterized by changing customer preferences and high customer preference diversity. Therefore fast fashion, a business model that emphasizes agility, is adopted by some companies such as Zara^[16,17]. Second, the women's clothing is the best selling product category on the Taobao platform. Many stores have grown from individual sellers to organizational sellers. The maturity of etailer operation provides a relatively stable view of organizational agility. Third, the fast fashion model is widely adopted by many etailers on this platform, since there is a natural fit between this business model and Internet. Focusing on this industry allows us to get access to a group of agile organizations with constant changing entrepreneurial actions.

Ten etailers are investigated. Table 1 provides the basic information of the etailers. Due to anonymous requirement, the companies are identified using codes such as MP and QQ. The etailers are entrepreneurial firms launched between 2003 and 2009. They are relatively large sellers on this platform.

We used multiple means of data collection. The main data collection method is interview. A total of 34 bosses and managers are interviewed (see Table 1) in 2011-2012. Each interview lasts 1-3 hours (see table 1). We asked information about organization growth, major strategic moves during the growth, operational details with special attention to three dimensions of agility and their use of IT. Other ways of data collection include: (1) We studied etailer websites, observing how they launched their new products and recorded the basic company information such as DSR score and number of products online. (2) We obtained the key performance data of etailers (such as annual sales) from the platform operator. (3) We also referred to public reports and company internal documents if available. However, this is not the main way of collecting data because SMEs have less media exposure and their management is less formal, so media reports and internal documents are not always available. To achieve more insights about information systems used in ecommerce, we also visited a third party ecommerce ERP system developer twice in 2011 and 2014.

The data about etailers were analyzed with the aid of Nvivo. The key constructs and categories were coded according to Sambamurthy et al.^[1]'s framework. The environmental factors as drivers for different strategic logic and organizational agility were also coded based on^[18]. However, due to paper length limitation, the coding results based on^[18] about the online environment dynamics is not provided in this version.

Table 1. Overview of the Etailers Interviewed

Company Code	Location	Year launched on the platform	Number of employee (end of 2011)	Store size ¹	Annual Sales (2011)	Sales employee ratio (million/employee)	Number of interviewees
MP	Wuhan	2004	193	3 GC	201.1m	1.04	9
AK	Hangzhou	2005	200	2 GC	194.8	0.974	2
HD	Jinan	2008	1100 ²	2 GC	240 m	0.218 ²	7
YB	Hangzhou	2004	50	1 GC	46.3m	0.926	3
AS	Beijing	2006	51	1 GC	25.5m	0.5	8
QQ	Beijing	2006	80	5 BC	64.9m	0.811	5
RS	Beijing	2006	32	4 BC	17.2m	0.538	2
ML	Beijing	2005	30	4 BC	20	0.667	2
YY	Hangzhou	2007	30	4 BC	9.9m	0.33	2
BC	Beijing	2009	30	2BC	7.3m	0.243	3

¹The etailer size is provided using the platform's criteria. The platform classifies etailers into 20 levels according to the

number of transactions an etailer has completed. Relevant to our study, an etailer needs to conduct more than 2000001, 1000001, 500001, 200001, 100001, 50001, 20001 transactions online to be accredited as a 3-1 golden crown(GC) and 5-2 blue Crown (BC) store, respectively.

² 2011 was a special year for HD since it recruited many new employees to prepare for expanding product groups, its innovative modular organization. Its employee sales ratio is also temporarily dropped.

4. CASE ANALYSIS RESULTS

The case analysis results are presented in two parts. First, we present the substances of entrepreneurial action, organization agility, digital options and IT capability coded according to Sambamurthy et al. ^[1]. The substances coded can enrich our understanding of relevant practices of SME etailers concerning each key construct. Especially, it is recognized in the literature that the organizational agility drivers vary widely with different contexts ^[19]. Second, we focus on explaining the adaptive coevolutionary relationships among four constructs. This explanation can advance Sambamurthy et al. ^[1]'s research by systematically explaining the mechanisms of adaptive coevolution.

4.1 Coding Result for Key Constructs in the Etailing Setting

4.1.1 Entrepreneurial Action

Table 2. Entrepreneurial Actions of Etailers

Sub-dimensions	Definition	Substances in the etailing setting
Number of competitive actions	Total number of competitive innovations in new products, services, distribution channels, or market segmentation by a firm	weekly launch of new products across different online channels/platforms and covering various brands
Action repertoire complexity	The variety and richness of competitive actions. It ranges from simple to complexity.	<ol style="list-style-type: none"> 1) Continuous launch of products through fast fashion and fast response model 2) Multi-channel (platform) expansion 3) Multi-brand expansion 4) Offline expansion 5) Cross border expansion

As shown in Table 2, etailers are observed to take the following entrepreneurial actions to capture the ecommerce market opportunity:

Continuous launch of products through a fast fashion and fast response model is the basic business model of the etailers we interviewed. It refers to an etailer's strategic actions of lunching new products weekly online in order to compete with competitors and keep customers return to the stores. In general, the new products are launched weekly and 15-30 new products are launched each time. Considering that products will not be launched during holidays, this equals to 500-1000 new products each year. Depending on the etailers' capability and business model, the number of new products launched differs. For example, HD is now the biggest etailer not only in our cases but also on the platform, and has the capability to launch more than 10000 new products each year. With this strategy, online customers' variety seeking behavior and quickly changing preferences can be greatly accommodated.

The continuous new product launch at the front end is supported by efficient back end operation. Higher product variety means higher production/procurement cost, and higher risk of wrong order quantity decisions. In order to further reduce the cost and increase inventory turnover, all etailers adopt a "small initial orders, frequent and quick re-ordering" supply chain strategy. Etailers order a small quantity of products (for example, 100-200 SKU for each product) to satisfy first several days' supply. This initial order quantity decision is made based on the experience and intuition, and normally conservative. At the end of the day a new product is launched, the

etailer can get a good sense of customer demand for this product based on web metrics such as page views, clicks and wishlist collection. Then the replenishment order is made immediately at the end of the day. In order to guarantee the near future supply, the working rhythm of the etailers is very fast, and the fast response from the supply chain partners is also emphasized.

Multi-channel expansion pertains to an etailer's strategic actions related to incorporating more online sales channels (e.g. other third party ecommerce platforms such as Paipai and vancel) into its operation. The underlying logic is that the above mentioned fast fashion, fast response business model can be replicated in other channels to achieve more sales. **Multi-brand expansion** refers to an etailer's strategic actions of building more product brands in order to tap into more customer bases. A brand normally targets one customer segment and satisfies their product requirements. The online market is featured by the long tail, with high product variety but small demand for each product. In order to tap into more customer segments, etailers create different brands and products for different customer segments. For example, company HD has 17 brands in 2014, covering clothing and accessories of different styles and for different customer demographics. After the domestic online market was saturated, some etailers targeted offline customers and foreign customers. However, the **offline expansion** into the physical market in our cases was at a very preliminary stage, with only one actually setting up the store for experiment and three considering setting up the store in the future. **Cross border expansion** refers to an etailer's strategic actions of selling products to foreign markets over the Internet. The cross border expansion is mainly inspired by the recent trend of online foreign trade in China, and facilitated by the availability of online foreign trade platforms.

The above depicts the major entrepreneurial actions we have observed during the interviews. They demonstrate etailers' efforts to explore and exploit the ecommerce market.

4.1.2 Organizational Agility

Table 3 shows the agility enablers of etailers. The following provides a brief explanation of these agility enablers/substances.

Table 3. Organizational Agility Practices of Etailers

Sub-dimensions	Definition	Substances in the Etailing Setting
Customer agility	The co-opting of customers in the exploration and exploitation of opportunities for innovation and competitive action moves	1) Multiple channel customer interaction 2) Internet enabled low cost experiments 3) Product group (organizational structure)
Operational agility	The ability to accomplish speed, accuracy, and cost economy in the exploitation of innovation opportunities	1) Integrated business model 2) Ambidextrous organizational structure and process 3) Human resource agility
Network agility	The ability to leverage the assets, knowledge, and competencies of relevant partners through alliances, partnerships, and joint ventures	1) Network diversity 2) Network flexibility

Customer Agility

For etailers, interacting with customers through multiple channels, low cost internet based experiments and product groups are agile practices used to involve customers in decision making and enhance customer agility.

Multiple channel customer interaction refers to etailers' ability to use multiple channels to get in touch with customers, learn customers and involve customers in activities such as product design and brand communication. Some observations are: (1) The internet and the platform offer a wide range of channels, which

provideetailers more options to interact with customers. These channels are either built by theetailers themselves, offered by the Taobao platform or provided by external websites, examples of which include such as Aliwangwang (an instant messenger software integrated with Taobao platform), online forums, social networks and social shopping websites.. (2) Etailers selectively use multiple channels to interact with online customers since each channel has its unique feature and serves different organizational purpose. (3) Largeretailers have a higher capability to interact with customers than smaller ones because they have more financial, technological and human resources devoted to manage multiple channel interactions and analyze customer behavior.

Low cost experiment refers toetailers' ability to experiment with product design and other strategic initiatives online by leveraging the low cost and quick feedback nature of the Internet. For example, *previewing* and *preselling* are two frequently used experimental approaches to learn the product popularity and decide order quantity in the fast fashion approach adopted byetailers. In *previewing*, sellers display the new products in either store or online community a few days without enabling the ordering capability before launching the products. In *preselling*,etailers enable the ordering functionality, but inform customers that the product is an advanced sale and they need to wait for the specified days for the products to be mailed. In the advanced selling, production is based on actual sales, further increasing the accuracy of sales prediction. However, in both previewing and preselling, sellers make commitment of the timing of product sales, so that fast response and operational agility are rendered necessary. Alletailers in our cases used low cost experiment approaches to understand online customers quickly to certain extent while keeping the cost low.

Product group is an innovative modular organization structure in which a company is divided into many small groups consisting of 3-4 employees which are responsible for products in their charge. Each group is in charge of the design, selection, marketing and sales of some products. It is provided initial financial aid, and also responsible for the profit of the products. The group with poor performance will be dissolved automatically and those with good performance will be rewarded with more operating resources according to the mechanisms designed by the company. The company becomes a platform, providing supply chain, payment, warehousing and delivery services to the product groups. Product groups can greatly enhance firms' product search and new product launch capabilities. Company HD is the only company in our cases that have practiced product groups. It has more than 200 product groups, and these product groups altogether search about 2500 clothing websites daily, to monitor product trend online and select the best products for imitation. The company is very sensitive to product trend changes, and owns strong internal clothing design capability.

Operational Agility

The practices we observed that can enhanceetailers' operational agility include integrated business model, ambidextrous organizational structure and process, and human resource agility.

Integrated business model refers toetailers' ability to orchestrate more activities in its operation in order to be more responsive to customer changing needs. Different from traditional retailers who assume a reseller business model,etailers assumes more roles in the supply chain: retailer, brand manufacturer, designer and supply chain coordinator. This adds to the complexity ofetailer operation, but enables better organizational agility. Etailers with higher business model integration capability even assume more roles in the supply chain. For example, company HD also controlled second tier fabrics suppliers because they found that the supply chain flexibility was limited by the first tier suppliers (manufacturers)' ability to obtain the supplies from the fabrics suppliers.

Ambidextrous organizational structure and process refers toetailers' ability to build organization structure and processes that can both enable fast and efficient response under the fast fashion model, and enable

superior innovations in various entrepreneurial actions. The modular organization introduced above (product group) is a typical example of this type of arrangement. The product groups greatly enhanced a firm's ability to explore the market, while positioning the firm as a platform and service provider enhances the efficiency of fast response and the ability to exploit the market opportunities.

Human resource agility (HR) refers to the ability to mobilize human resources in market opportunity exploitation. The ability can be achieved through flexible labor arrangement and agility mindset building. **Labor flexibility** refers to the extent to which the human resource arrangement can handle unexpected business requirements. Labor flexibility is important in ecommerce environment, which is featured by very high sales volatility. Before retailers build the new, higher level order fulfillment capacity, human agility is the most feasible solution. In our interviews, retailers use the following practices: asking the employees to work overtime, mobilizing all employees to package products and answer questions online no matter what their positions are, hiring temporary workers from households in the near regions or from housekeeping companies, or borrowing employees from other retailers with good relationships.

Agility mindset refers to the extent to which the employees embrace the change and time value. We observed that employees in companies with high agility capabilities are characterized by: (1) the high awareness to stick to the timelines and get things done as soon as possible, (2) high willingness to change job positions frequently and do extra jobs, and (3) being proactive in doing things. Cultivating such a mindset is not easy for some early movers since at early days ecommerce was still not recognized by most people. Managers hence needed to search for employees who share the ecommerce vision and were willing to grow with the company and the ecommerce industry.

Network agility

The retailer operation is highly dependent on external partners. The partner network of an retailer normally includes the ecommerce platforms, the logistics providers, various IT system developers, photographers, models, different online marketing platforms (such as search engine marketing and microblog marketing platform), and suppliers. The network agility capability of an retailer is normally enabled by network diversity and network flexibility.

Network diversity refers to the retailers' ability to work with more and diversified network partners. Diversified network implies that retailers can potentially leverage more assets to respond to environmental changes and therefore are more agile. Take supply chain network as an example. In our cases, Company BC builds its own factory and makes all the clothes in the factory. Company MP is a bigger retailer. It has its own factory, fully controls other three factories, and collaborates closely with 20 more factories. When comparing retailer BC and MP, the agility of BC is obviously lower than MP since the limited supply capacity of BC constrains its ability to launch new product despite that it can achieve faster response within its production capacity.

Network flexibility refers to the willingness of supplier partners to be cooperative and flexible in dealing with the retailers. Network flexibility is enabled by shared ecommerce value among partners. Again take supply chain network as an example. Retailing supply is characterized by small order quantity (100-200 SKU, and sometimes even smaller) and short production time, but traditional clothing manufacturers are used to take large orders (at least 1000 SKU per clothes) and most of them are not willing to accept ecommerce orders because the frequent shift between different clothes requires them to re-adjust the equipment, and requires workers to learn different and various skills, work in tight time constraints, and re-schedule production in ad hoc to accommodate the coming urgent orders. So most retailers experience a hard period to find suppliers who are willing to cooperate. In order to achieve agile operation, retailers normally collaborate with partners who are willing to

cooperate, share the same vision with etailers and work proactively.

4.1.3 Digital options

Table 4. Digital options built by etailers

Sub-dimensions	Definition	Substances in the etailing setting (exercised options)
Process reach options	The extent to which a firm deploys common, integrated, and connected IT-enabled processes	1) Front-end process support (visual design software) 2) Backend process support (ERP and warehouse management systems) 3) Inter-organizational process support (supply chain systems)
Process rich options	The quality of information collected about transactions in the process, and the ability to use that information to reengineer the process	1) Order oriented data (Collected rich information about query, visits and transactions) 2) Customer oriented data (CRM system) 3) Product oriented data (product life cycle management system)
Knowledge reach options	The comprehensiveness and accessibility of codified knowledge and the interconnected systems for knowledge transfer and sharing	1) Platform based data analytics products (web metrics) 2) Internal BI system
Knowledge richness options	The systems of interactions among organizational members to support sense-making, perspective sharing and development of tacit knowledge	1) Internal communication through Aliwangwang

Table 4 shows the process options and knowledge options used by etailers. Due to paper length limitation, rather than explaining each digital option in detail, we provide the brief conclusions drawn from this table. First, the etailer's operations are highly IT dependent. Most interviewed etailers are SMEs, but their-front and back-end processes are supported by digital options. This explains why the etailer sales employee ratio as shown in table 1 is higher than traditional stores. The ability to realize high IT dependent operation by SME etailers with limited financial support is probably because they can leverage the platform and outside third party software provider for IT solutions. (2) Compared to traditional stores, etailers have a higher ability to gather order and customer oriented data, and the ability to analyze the web metrics. (3) The knowledge richness options of etailers are limited, and heavily relies on the instant messenger tool provided by the platform.

4.1.4 IT capability

Table 5. IT capability of etailers

Sub-dimensions	Definition	Substances in the etailing setting
IT capability	A firm's level of investment in IT, including both IT asset and IT personnel	1) Software purchaser (low IT capability) 2) Software purchaser and influencer (Medium IT capability) 3) Inhouse developer (High IT capability)

As shown table 5, the etailers' IT capability can be manifested through their way of developing and using information systems. Etailers with low IT capability are purchasers who use third party software developer systems without hiring special IT staff. Etailers with medium level of IT capability not only purchase third party software, but also hire special IT staff. The IT staff is in charge of software selection, monitoring IT market trend and business requirements. IT staff also negotiates with third party developers or the platform and pushes them to add more functionalities in the commercial systems when the existing software can not satisfy company business requirements. Etailers with high level of IT capability are in-house developers who have their own

system development capability and have IT teams. They also have higher business requirements than smalletailers. For example, both company HD and MP complained that the existing systems could not satisfy their order fulfillment needs since their transaction volume surpassed the processing capacity of existing system design provided by the third parties, the systems became instable, and sometimes orders were lost from the systems. Etailers with high IT capability are able to develop and implement more customized systems to address their advanced business requirements such as better ERP, CRM and BI systems.

4.2 Adaptive co-evolutionary process and mechanisms

There is an adaptive coevolution relationship among entrepreneurial action, organization agility and IT competence, as suggested by Sambamurthy et al. ^[1]. Adaptive coevolution refers to firm's strategy and capability mutually influencing each other's evolution and therefore achieve coevolution. Figure 1 depicts the evolutionary path of IT competence, organization agility and entrepreneurial action as well as their coevolution mechanisms.

4.2.1 Evolutionary path of entrepreneurial action, organization agility, digital options and IT capability

First, firm entrepreneurial action, organization agility, and IT competence evolve along two dimensions: within domain and across domain. Within domain evolution refers to the evolution of each sub-dimension of the main constructs through continuous adaptation. For example, in entrepreneurial action, continuous launch of new products is a continuous adaptation process in response to changing customer needs. In agility capability building, building customer agility is also a continuously evolving process by incorporating new web media to interact with customers.

Cross domain evolution refers to the evolution of entrepreneurial action, organization agility, and IT competence themselves, respectively. In Figure 1, the number before each dimension indicates the approximate sequence each dimension appears in general. For example, the evolution of entrepreneurial action typically proceeds this way: an etailer first launched one online store on the Taobao platform, and used the fast fashion style to sell products. Then in an effort to capture more ecommerce market share, the etailer started the multi-channel and multi-brand expansion based on the more mature fast fashion, fast response model. Then with the saturation of the domestic ecommerce market, some etailers started to leverage the its clothing selling capability to sell in the offline domestic market or foreign markets. The same applies to organizational agility, digital options and IT capability.

One characteristics of the evolution of each firm capability and strategic action is that the experimental, phased expansion approach is widely adopted, which can be consider as growth real options ^[11]. This suggests that we can use the real option lens to analyze the coevolution among entrepreneurial action, organization agility, digital options and IT capability.

4.2.1 Co-evolutionary mechanisms between entrepreneurial action, organization agility, digital options and IT capability

The entrepreneurial action, organization agility, and IT competence (including IT capability and digital options) coevolve through real option enabling and adaptive learning process.

First, from IT capability, to digital options, to organization agility, and then to entrepreneurial actions, each prior capability can support the detection and formation of subsequent capability/strategic action options. The enabler of wide use of real options strategy is because the unique nature of the Internet and external orientation of etailer business model lower the cost of experiments and shorten the time of experiments.

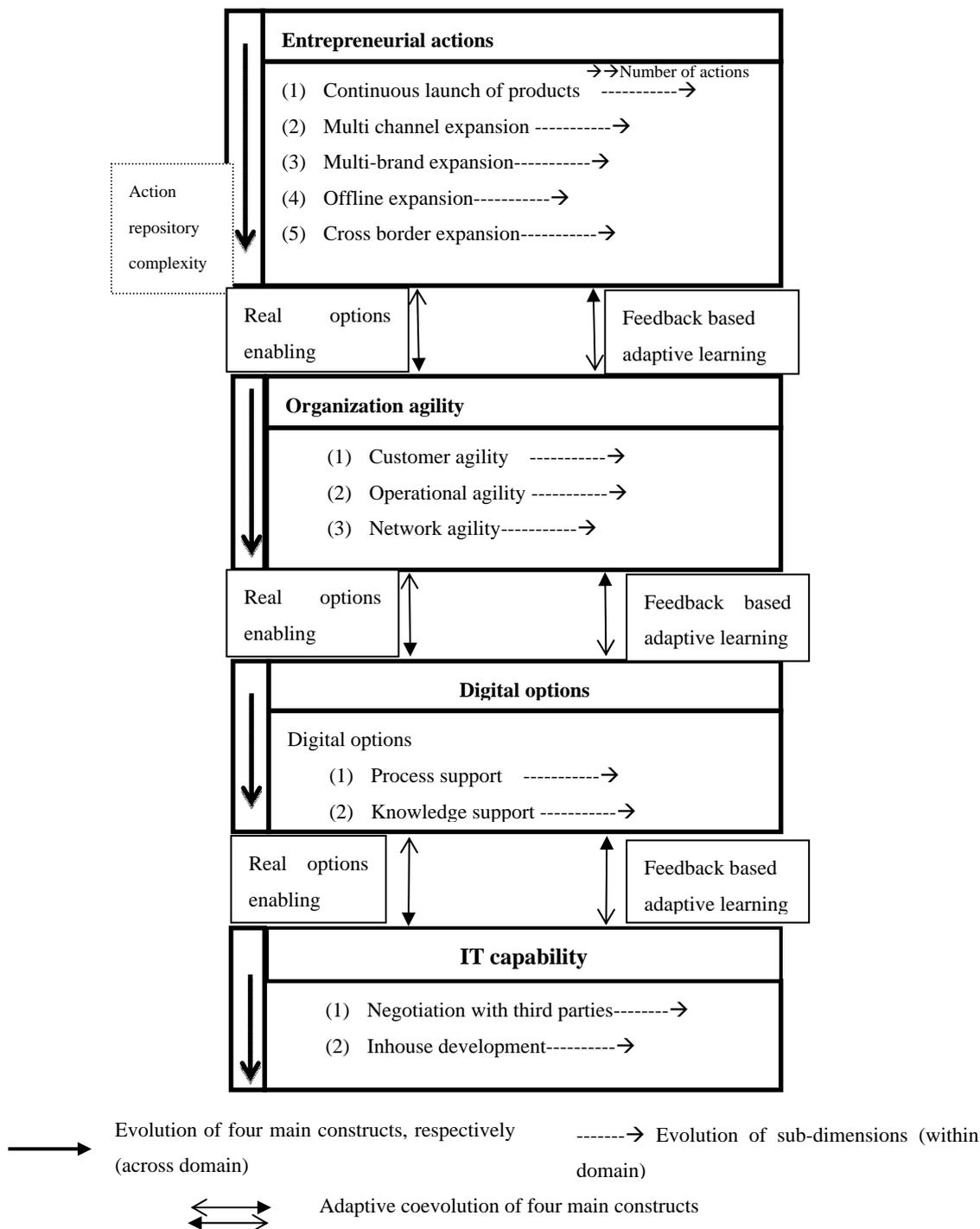


Figure 1. The coevolution of IT competence, entrepreneurial actions and organization agility

Second, adaptive learning occur during the real option detection, formation and exercising. From entrepreneurial action to IT capability, each capability/strategic action (the effect factor) serves as the outcome of prior capability building (the cause factor), which provide feedback for the cause factor. Agents (etailers) learn from the feedbacks and adapt their subsequent behavior related to the cause construct.

In short, this two-way, iterative process results in the coevolution of entrepreneurial action, organization agility and IT competence. Due to paper length limitation, we are unable to provide more detailed account of coevolution between entrepreneurial action, organizational agility, digital options and IT capability, but propose that:

Proposition 1: there is an iterative, co-evolutionary relationship between organizational agility capability and firm entrepreneurial actions.

Proposition 2: there is an iterative, co-evolutionary relationship between firm digital options capability and organizational agility capability.

Proposition 3: there is an iterative, co-evolutionary relationship between firm IT capability and digital options.

5. DISCUSSION

This research addresses what areetailers' entrepreneurial actions, organization agility and IT competence in theetailing environment, their evolution path and co-evolutionary mechanisms. This research makes the following contributions. First, this research contributes to the entrepreneurship and strategic management literature because ecommerce company strategy has not been well studied. Sambamurthy et al. ^[1] argues that the Internet and IT have reshaped contemporary organization strategy, but this phenomenon has not been well studied.

Second, it also contributes to the organization agility literature by exploring the particularities of ecommerce company agility. Organization agility literature has suffered from criticism for the lack of empirical research due to the lack of real agile organizations in the traditional world ^[20]. As identified by Goldman et al. ^[4], implementing agility is extremely context dependent and firms implement a variety of specific strategic practices to achieve agility. So our research contributes to the empirical research about organization agility and can help enhance our understanding about organization agility in the ecommerce context.

Third, this research contributes to our understanding of the role of IT in enabling organizational agility and entrepreneurial action. IT competence (including IT capability and digital options) coevolves with organizational agility and entrepreneurial actions through real options enabling and adaptive learning, rather than playing a passive supporting role suggested by the literature.

This research offers important managerial implications foretailers and even some other types of ecommerce companies on how to respond to environment dynamics. The agility practices introduced in this research can be adopted by otheretailers.

6. RESEARCH LIMITATION AND FUTURE RESEARCH OPPORTUNITIES

This research is limited in its methodology. Although we used the case study method due to the exploratory nature of the research, the generability of the results may be limited since we focused on women's clothing industry. For example, this research offers a preliminary explanation of ecommerce company agility. We believe women's clothing industry is the most agile industry online we have ever observed. However, more research should be done to confirm whether some of the practices and characteristics of agility are valid for other industries as well.

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