EXPLORATION AND EXPLOITATION IN SUPPLIER DEVELOPMENT:
DETERMINANTS, OUTCOMES, AND DIFFERENCE

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ABSTRACT

Based on the organizational ambidexterity theory, this study identifies two classes of supplier development: explorative and exploitative. Additionally, this study introduces a research model for examining their determinants and outcomes. Furthermore, this study advances a set of propositions regarding variations in determinants and outcomes across the two classes of supplier development.

Keywords: Ambidexterity, exploitation, exploration, supplier development, supply chains

INTRODUCTION

Supplier development, as a critical strategy of a buying firm (i.e., buyer) to improve suppliers’ capability or performance, has been intensively used in practice. Many good supplier development practices have been invented and/or used in many famous companies, including Toyota (Dyer & Hatch, 2006; Dyer & Nobeoka, 2000; Sako, 1999; Langfield-Smith & Greenwood, 1998; Marksberry, 2012), Italtel (Colombo & Mariotti, 1998), Honda (MacDuffie & Helper, 1997), Kodak (Ellram & Edis, 1996), and Volkswagen (Erasmus, 2006). Additionally, many studies find that supplier development leads to better performance of the buyer and/or supplier (e.g., Curkovic et al. 2000; Cusumano & Takeishi 1991; De Toni & Nassimbeni 2000; Dyer et al. 1998; Ghijsen et al., 2010; Heide & John 1990; Humphreys et al. 2004; Krause, 1997; Krause et al. 2000; Krause & Ellram 1997; Monczka et al., 1993; Sanchez-Rodriguez, 2009; Wagner, 2010, 2011; Watts & Hahn, 1993).

In the supply chain management (SCM) area, supplier development has been also identified as an important topic. After summarizing more than 774 articles published in Journal of Supply Chain Management during its first 35 years (from 1965 to 2000), Carter and Ellram (2003) find that supplier development is one of the 15 important topics in SCM research. Recently, Giunipero et al. (2008) review 405 articles published in nine leading academic journals from 1997 to 2006 and demonstrate that supplier development is one of the 13 key SCM research topics.

Despite many studies on supplier development, three key shortcomings still exist. First of all, existing studies fail to show why some activities are more frequently used than others. For instance, Trent and Monczka (1998, 1999) find SDAs (supplier development activities) vary greatly in adoption rates: some activities such as increasing performance goals are adopted by 87% of sample firms, while some others such as providing suppliers with financial capital are adopted in a very limited rate (i.e. 38%). Second, supplier development, like other organizational strategies, could serve for either exploration or exploitation (He & Wong, 2004; Simsek et al.,
2009), but extant studies fail to classify SDAs based on this dimension. Without distinguishing between exploitive and explorative supplier development, both buyer and supplier has great difficulty to achieve the expected performance in practice. Thirdly, extant studies have not examined whether some supplier development activities are more associated with certain determinants and outcomes.

In order to resolve the three shortcomings above, we apply the concept of ambidexterity to supplier development and classify it as explorative and exploitative SDAs. Based on this classification, we lay out a research model to answer the following questions, which correspond to the shortcomings above, respectively:

1) What factors influence the adoption of explorative and exploitative SDAs?
2) How explorative and exploitative SDAs impact supply chain performance?
3) Are explorative and exploitative SDAs equally associated with certain determinants or outcomes?

In addition, we attempt to examine whether explorative SDAs are more highly associated with firm and inter-firm determinants and whether they are more highly associated with innovation performance while less highly associated with productivity performance.

The answers to these questions above are valuable for both practitioners and researchers. First, through structuring our research model, this study contributes to the literature by demonstrating that supplier development can serve for both exploitation and exploration. Additionally, we conjecture that explorative and exploitative SDAs are influenced by different determinants and in turn lead to different outcomes. Accordingly, based on what factors they have (determinants) and what performance they expect (outcomes), practitioners could choose their appropriate strategies: explorative SDAs, or exploitative SDAs, or both (simultaneously implementing both types).

The remainder of this research proposal is organized as below. In the second section, we review supplier development and ambidexterity strategies in supply chains, and introduce exploitative and explorative supplier development. Drawn from prior studies, the following section presents our research model, which consists of six hypotheses and four propositions. The next three sections briefly deliver our research method, present our expected outcomes, and make discussions including academic and practical implications, along with future research directions.

LITERATURE REVIEW

Supplier Development

We define supplier development as “any initiative undertaken by a buying firm to improve supplier performance, to harness supplier capabilities, and/or to meet the buying firm’s short- and/or long-term supply needs” (Krause, 1999, p. 206). Supplier development is first used by Leenders (1966) to describe efforts by manufacturers to increase the number of viable suppliers and improve suppliers’ performance. In the past 37 years, many empirical studies have found that supplier development improves the performance of both buyer and supplier, including the following dimensions: productivity (e.g., Carr et al., 2008; Kaynak, 2005), agility (e.g.,
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Humphreys et al., 2004; Li et al., 2007), innovation (e.g., McGovern & Hicks, 2006; Wagner, 2006a), reputation (e.g., Chen & Paulraj, 2004; Dyer and Hatch, 2006), satisfaction (e.g., De Clercq & Rangarajan, 2008; Ghijsen et al.; 2010), and financial improvement (e.g., Kim, 2006; Sanchez-Rodriguez & Hemsworth, 2005). Accordingly, a large number of theories have been employed to show the link between SDAs and supply chain outcomes: the transaction cost theory (e.g., Dyer, 1996), the resource dependence theory (e.g., Cai &Yang, 2008), the resource-based view (e.g., Carter, 2005), the knowledge management theory (e.g., Modi & Mabert, 2007), the social exchange theory (e.g., De Clercq & Rangarajan, 2008), and the social capital theory (e.g., Krause et al., 2007).

However, most of these studies above only consider supplier development as a set of homogeneous activities or programs initiated by a buyer to improve its supplier’s performance. Actually, SDAs could be classified using different approaches. For instance, Krause et al. (2000) classify supplier development into externalized SDAs and internalized SDAs. Later, Wagner (2006a, 2006b, 2010) categorizes supplier development as indirect SDAs and direct SDAs. Recently, based on knowledge resource theory, Chen et al. (2011) categorize SDAs as two groups: knowledge-sharing activities and knowledge-sharing enablers. Putting them together, we find SDAs are heterogeneous and therefore, we should consider such diversity when we study supplier development, either determinants or outcomes.

Ambidexterity Strategies in Supply Chains

Ambidexterity refers to “an organization’s ability to perform differing and often competing, strategic acts at the same time” (Simsek et al., 2009, p.865). It usually involves one pair of concepts “exploitation” and “exploration” (He & Wong, 2004; Patel et al., 2012; Raisch & Birkinshaw, 2008; Raisch et al., 2009; Simsek et al., 2009; Uotila et al., 2009). Duncan (1976) first proposes the concept of an ambidexterity strategy, which suggests that exploitation and exploration be complemented to achieve superior performance. He & Wong (2004) point out that exploitation refers to firm’s behaviors characterized by refinement, efficiency, production, and selection, while exploration refers to firm’s behaviors characterized by search, discovery, experimentation, risk taking, and innovation. Nowadays, both researchers and practitioners use this term to describe the firms which are able to exploit and explore (Simsek et al., 2009).

Recently, ambidexterity has been introduced to the SCM discipline. Im & Rai (2008) classify inter-organizational learning (i.e., between buyer and supplier) as explorative knowledge sharing and exploitative knowledge sharing, and find that they have different influence on long-term interorganizational relationship performance. Later, Kristal et al. (2010) use the term ambidextrous supply chain strategy to refer to “a manufacturing firm’s strategic choices to simultaneously pursue both supply chain exploitation and exploration” (p. 415). They find positive effects of an ambidextrous supply chain strategy on combinative competitive capabilities and business performance. Furthermore, using a sample of 852 manufacturing firms, Patel et al. (2012) find that firm’s ambidexterity in pursuing both exploration and exploitation activities strengthens the relationship between manufacturing flexibility and firm performance. All these studies above indicate that more and more SCM researchers realize the significance of firm’s ambidexterity in supply chains.
Explorative and Exploitative Supplier Development

From its definition, we can clearly know that supplier development can serve for both exploitation and exploration. As such, supplier development involves two sets of activities or behaviors: exploration and exploitation. Some SDAs such as supplier evaluation, supplier base reduction, competitive pressure, supplier certification, supplier training, and daily information sharing generally serve for exploitative purposes. In contrast, other SDAs such as supplier involvement in new product development (NPD), joint actions in exploring new market opportunities, and plant visit to seek new solutions usually serve for explorative purposes. Moreover, many extant studies find SDAs lead to long-term outcomes (e.g., Abdullah et al., 2008; De Clercq & Rangarajan, 2008; Kim, 2006; Oh & Rhee, 2008) and/or short-run outcomes (e.g., Carr et al., 2008; Modi & Mabert, 2007; Narasimhan et al., 2008; Sanchez-Rodriguez, 2009). To sum up, exploration and exploitation could be applied to the context of supplier development.

Accordingly, we classify supplier development as explorative SDAs and exploitative SDAs. In order to define the two new terms, we follow the definitions of exportation and exploitation given by prior studies (He & Wong, 2004; Raisch & Birkinshaw, 2008; Raisch et al., 2009; Simsek et al., 2009; Uotila et al., 2009) and apply them to supplier development. Explorative SDAs refers to those supplier development activities which seek long-run rewards, focus on the survival of the buyer’s supply chain as a whole, and pursue risk-taking behaviors. Explorative SDAs include some activities such as exploring new market opportunities, discovering new product or process, seeking new solutions, creating current procedures, and experimenting new systems. In contrast, exploitive SDAs refers to those supplier development activities which seek short-run rewards, focus on the survival of the buying firm itself, and pursue risk-averse behaviors. Exploitive supplier development typically includes some activities such as refining product delivery process, increasing competitive pressure to keep suppliers vigorous, evaluating suppliers regularly to keep them efficient, and providing necessary training.

Therefore, both explorative and exploitative SDAs are more based on the buyer’s purposes or strategic orientation to supplier development. Some SDAs such as supplier involvement and plant visit could serve for both exploration and exploitation. For instance, supplier involvement in NPD is considered as an explorative SDA while supplier involvement in implementing quality control program is considered as an exploitative SDA.

**RESEARCH MODEL**

This section introduces our research model, in which both firm factors and inter-firm factors influence the use of explorative and exploitative supplier development (H1-H4), and in turn, supply chain performance (H5-H6). These six hypotheses, depicted in Figure 1, will answer the first two research questions in the introduction section. Additionally, we also put forward four exploratory propositions to examine whether each determinant has different impact on the use of explorative SDAs and exploitative SDAs (P1-P2), and whether both of them have different influence on supply chain performance measures (P3-P4). The four propositions here will help us
understand how explorative SDAs and exploitative SDAs are different, which could facilitate our understanding on the third research question.

![Figure 1. Research Model](image)

**Determinants of Explorative and Exploitative Supplier Development**

Both firm factors and inter-firm factors have been found to influence the adoption of supplier development. Although environmental factors such as market competition, technical change, and environmental uncertainty in the buyer’s industry may impact the adoption of supplier development, we do not include environmental factors as determinants in our model. Contingency theory (Steiner, 1979) indicates that firms could respond to any changes in their environment and the view of dynamic capabilities (Teece et al., 1997) suggests that firms can “integrate, build, and reconfigure internal and external competences to address rapidly changing environment” (p.516). Accordingly, we think environmental factors influence both firm factors and inter-firm factors, and in turn affect the adoption of supplier development. Actually, Krause (1999) find that market competition and technical change affect the use of supplier development directly through buyer’s attitude to suppliers. Therefore, environmental factors are not included in our model.

Firm factors such as buyer’s top management support, attitude toward suppliers, and organizational culture influence the adoption of explorative and exploitative supplier development. Top management support refers to the commitment from top management to provide a positive environment including direction, authority, and resources to encourage supplier development strategy (Krause, 1999). Existing studies have found that supplier development implementation requires sufficient top management support (Krause, 1999; Modi & Mabert, 2007).

Attitude toward suppliers refers to the buyer’s tendency to pursue cooperative buyer-supplier relationships as compared to arms-length relationships. Extant studies further reveal that good attitude toward suppliers promote the use of supplier development (Krause, 1999; Oh & Rhee, 2008).
Organizational culture is defined as “the set of shared, taken-for-granted implicit assumptions that a group holds and that determines how it perceives, thinks about, and reacts to its various environments” (Schein, 1996, p.236). However, there are many dimensions of organizational culture. Denison & Mishra (1995), for instance, identify four underlying sub-types of organizational culture (involvement, consistency, adaptability, and mission). They further indicate that the four sub-types could be mapped in the value set framework provided by Quinn & Rohrbaugh (1983), which includes two dimensions orientation types (external or internal) and structure preference (change/flexibility or stability/direction). We think supplier development involves external orientation and faces with the environmental with change/flexibility, so we choose the adaptability as the dimension to measure the organizational culture. An adaptable organization culture eliminates barriers of implementing supplier development especially for those activities with high degree of knowledge sharing (Sako, 2004). Thus, we suggest:

H1: Buyer’s firm factors lead to higher adoption of explorative supplier development.

Specifically, this hypothesis includes three sub-hypotheses as below:

H1a: Buyer’s top management support leads to higher adoption of explorative supplier development.

H1b: Buyer’s attitude toward suppliers leads to higher adoption of explorative supplier development.

H1c: Buyer’s adaptable organizational culture leads to higher adoption of explorative supplier development.

Similarly,

H2: Buyer’s firm factors lead to higher adoption of exploitative supplier development.

H2a: Buyer’s top management support leads to higher adoption of exploitative supplier development.

H2b: Buyer’s attitude toward suppliers leads to higher adoption of exploitative supplier development.

H2c: Buyer’s adaptable organizational culture leads to higher adoption of exploitative supplier development.

Inter-firm factors including interdependence, relationship quality, and resource complementarity affect the adoption of supplier development, either explorative or exploitative. Interdependence represents how buyer and supplier depend on each other. Cai et al. (2009) find that interdependence promotes the use of supplier development, either exploitative (e.g., legal contract and collaborative communication) or explorative (e.g., joint planning and joint problems solving).

Relationship quality describes the depth and climate of inter-firm relationships (Johnson, 1999). Based on Lahiri et al. (2012) and Wu & Cavusgil (2006), Srinivasan et al. (2011) present that buyer-supplier relationship quality is associated with “mutual sharing of business risks, trust,
commitment, mutual adaption, reciprocity, and durability” (p.262), which is required by both explorative and exploitative SDAs.

Resource complementarity “exists between two sets of resources when a joint use of them can potentially yield a higher total return than the sum of returns that can be earned if each set of resources are used independently of the other” (Chi, 1994, p. 274–275). High resource complementary motivates buyer and supplier to interact via long-term relationships (Janda & Seshadri, 2001; Wilson & Mummalaneni, 1986) and build up reciprocal commitment (Sarkar et al., 2001), and thus promote the use of supplier development.

To sum up, higher interdependence, better relationship quality, and greater resource complementarity promote supplier development, either explorative or exploitative. Accordingly, we posit:

\[ H3: \text{Inter-firm factors lead to higher adoption of explorative supplier development.} \]

Specifically, this hypothesis includes three sub-hypotheses as below:

\[ H3a: \text{Interdependence between buyer and supplier leads to higher adoption of explorative supplier development.} \]
\[ H3b: \text{Relationship quality between buyer and supplier leads to higher adoption of explorative supplier development.} \]
\[ H3c: \text{Resource complementarity between buyer and supplier leads to higher adoption of explorative supplier development.} \]

Similarly,

\[ H4: \text{Inter-firm factors lead to higher adoption of exploitative supplier development.} \]

\[ H4a: \text{Interdependence between buyer and supplier leads to higher adoption of exploitative supplier development.} \]
\[ H4b: \text{Relationship quality between buyer and supplier leads to higher adoption of exploitative supplier development.} \]
\[ H4c: \text{Resource complementarity between buyer and supplier leads to higher adoption of exploitative supplier development.} \]

The four hypotheses above do not distinguish between explorative and exploitative SDAs in determinants, that is, those determinants influence the adaption of both explorative and exploitative SDAs. However, we still want to examine whether each determinant has different impact on explorative and exploitative supplier development. Here, we expect that the influence of each factor varies with explorative supplier development and exploitative supplier development. Compared to exploitative supplier development, explorative supplier development seeks long-run rewards and risk-taking options, and thus requires higher levels of firm factors and of inter-firm factors. No prior studies have examined such a difference, and therefore, we raise two exploratory propositions here:
P1: Compared to exploitative supplier development, explorative supplier development is more strongly influenced by firm factors including top management support, attitudes towards suppliers, and adaptable organizational culture.

P2: Compared to exploitative supplier development, explorative supplier development is more strongly influenced by inter-firm factors including interdependence, relationship quality, and resource complementarity.

Effects of Explorative and Exploitative Supplier Development

As we reviewed before, supplier development results in many performance dimensions for both buyer and supplier. Among those dimensions, we choose productivity and innovation because they are more often measured by extant studies. In addition, some studies such as Tangpong et al. (2008) use the pair of productivity and innovation to measure supply chain performance. Here, we define productivity performance as operational performance, including delivery time, product quality, flexibility, and cost. Innovation performance includes product innovation, process innovation, and service innovation (Kirner et al., 2009). Productivity performance represents firm’s current position, while innovation represents firm’s future position. Therefore, it is reasonable for us to choose the two dimensions of supply chain performance.

Kristal et al. (2010) find a very significant effect of an ambidextrous supply chain strategy on combinative competitive capabilities. Their results further show that both exploration practices (e.g. seeking novel approaches) and exploitation practices (e.g. improving current technologies) have significant correlation with productivity measures such as product quality and delivery speed. Supplier development is recognized as a supply chain strategy, and therefore we argue that both exploitative and explorative supplier development contributes to productivity performance for both buyer and supplier.

First of all, explorative SDAs such as supplier involvement in NPD, joint action, and cross-functional teams can improve operational performance of both supplier and buyer. Suppliers can acquire knowledge to improve their technical capabilities and to understand buyer’s product requirements and they can reduce waste, improve the product quality, and reduce manufacturing and delivery cost (Carr et al., 2008; Chung & Kim, 2003). Meanwhile, through joint action with suppliers or cross-functional teams involving suppliers, buyer can acquire more knowledge on materials components and make better decisions, and thus improve operational performance (Chen & Paulraj, 2004; Li et al., 2007).

Secondly, exploitative SDAs such as supplier evaluation, supplier training, and information sharing enhance supplier and buyer operational performance. Supplier evaluation motivates suppliers and provides them the improvement directions, and thus increases their operational performance (Modi & Mabert, 2007). Suppliers can attain tactic and explicit knowledge from the training and assistance provided by the buyer (Carr et al., 2008; Dyer & Hatch, 2006). Due to suppliers’ operational improvement, the buyer also benefits from exploitative supplier development through increasing delivery efficiency and reducing purchasing cost and inventory (Carr & Kaynak, 2007; Humphreys et al., 2004; Krause et al., 2007).
Both explorative and exploitative SDAs lead to better innovation performance of both buyer and supplier. Exploitative SDAs such as supplier evaluation and competitive pressure motivate suppliers to discover their own weakness in their process or product and further to create some new process and product. Some other exploitative SDAs such as supplier training and information sharing provide suppliers with sufficient knowledge to improve their current process or product. Meanwhile, buyer also can benefit from information sharing with suppliers and gain better access to new product/process technologies (Monczka et al., 1998).

Explorative SDAs such as supplier involvement in NPD and joint actions to solve new problems directly enhance both buyer and supplier innovation capabilities. Using case studies, MacDuffie & Helper (1997) find Honda use explorative SDAs such as helping the supplier with technical assistance, sharing tacit knowledge with suppliers, teaching suppliers to be lean, involving suppliers in its BP team (best practice, best process, and best performance) and working together with suppliers, and then both Honda and it suppliers greatly improve their innovation capabilities. McGovern & Hicks (2006) also find both supplier and buyer improve their product innovation performance through exploitative SDAs such as assessing supplier’s performance, providing product (technical) specification, and conveying information on upgrading of products to suppliers.

In addition, both Groves & Valsamakis (1998) and Tan (2001) find buyer improves its product innovation performance through supplier assessment and supplier involvement in the early stage of new product development. Usually, with buyer’s help in supplier development, suppliers can rapidly improve their innovation capabilities. Observing from several cases, Choi & Choi (2002) find that buyer can help the supplier ramp up new production lines. Thus, we put forward:

**H5:** Explorative supplier development leads to higher innovation and productivity performance of both buyer and supplier.

**H6:** Exploitative supplier development leads to higher innovation and productivity performance of both buyer and supplier.

According to the definition of exploration and exploitation, we think explorative supplier development is more focused on innovation while exploitative supplier development is more focused on productivity. Motivated by short-run rewards, exploitative SDAs are more likely to improve operational performance; oriented by future opportunities, explorative SDAs are more likely to promote innovation capabilities. However, none of extant studies defines explorative and exploitative supplier development, and let alone compare their relationships with productivity and innovation performance. Interestingly, our argument could be supported by Wagner (2010), who presents that direct SDAs, which are similar to explorative SDAs, are more highly associated with supplier capabilities (one of them is product development capabilities) and less highly associated with product and delivery performance (i.e., productivity performance) than indirect SDAs, which are similar to SDAs. Thus, we expect:

**P3:** Compared to exploitative supplier development, explorative supplier development less strongly influences productivity performance.
P4: Compared to exploitative supplier development, explorative supplier development more strongly influences innovation performance.

METHODOLOGY

Data Collection

Data for this study come from a survey which will be conducted the manufacturing industries in mainland China. As most supplier development research, we collect data only from the buying firms. Questionnaires will be sent to managers in any department which conduct transactions with suppliers, including operations management, supply chain, supply management, purchasing, and supplier relationship management. Like prior studies, we expect that we can collect around 200 valid samples and that our estimated response rate will be 40 percent, so we plan to send out about 500 surveys (either mailed hardcopy or online) at the first stage.

Measurement

The measures of our constructs except explorative and exploitative supplier development in the research model are adopted from extant studies: top management support and attitudes toward suppliers from Krause (1999), organizational culture from Denison & Mishra (1995), interdependency from Cai et al. (2009), relationship quality from Srinivasan et al. (2011), resource complementarity from Janda & Seshadri (2001), productivity performance from Chen & Paulraj (2004), and innovation performance from Kirner et al. (2009). For performance variables, besides subjective measures, we follow the approach given by Tangpong et al. (2008) to develop objective measures as well. Explorative supplier development and exploitative supplier development are two new constructs, and thus, like He & Wong (2004), we list 12 items related to supplier development and reduce them through factor analysis to two factors. In addition, some controlled variables such as firm size, relationship length, and industry are also measured in this study.

Data Analysis

We will use four statistic approaches for data analysis: exploratory factor analysis (EFA), structure equation modeling (SEM), cluster analysis, and multiple comparisons. First of all, we will use EFA to extract explorative and exploitive supplier development and verify reliability and validity of all constructs. We use SEM to test the six hypotheses from H1 to H6, and multi-SEM to test four propositions (compare the chi-square between the model setting two path coefficients equal and the model setting them free).

Expected Outcomes

We expect our hypotheses and propositions are supported totally or partially. Both firm and inter-firm factors affect the use of explorative and exploitative supplier development. Meanwhile, explorative supplier development is more highly influenced by those factors. Both explorative supplier development and exploitative supplier development lead to positive performance. In
addition, explorative supplier development more strongly influences innovation performance, while exploitative supplier development more strongly influences productivity performance.

**DISCUSSIONS**

Our study is first to classify supplier development from the dimension of exploration and exploitation, and to examine determinants and outcomes of explorative and exploitative supplier development. Thus, our study contributes to literature in both supply chain management and ambidexterity strategies. Moreover, our study guides practitioners to choose appropriate supplier development strategies based on their situations and implement supplier development from the perspective of exploration and exploitation. Finally, our study solves the conflicting observation in supplier development area and distinguishes between exploration and exploitation in supplier development.

Future research could test explorative and exploitative supplier development in some other industries and some other performance variables such as buyer-supplier relationship performance. In addition, performance improvement in the first stage could promote the use of supplier development in the next stage, and therefore, we can examine such a reciprocal effect in our model.

**References**


