Ambidextrous supply chain in an emerging market: impacts on innovation and performance

Susita Asree
Faculty of Business,
Winston Salem State University,
601 S. Martin Luther King Jr. Drive,
Winston Salem, North Carolina, 27110, USA
Email: asrees@wssu.edu

Abstract: The purpose of this study is to investigate the impact of an ambidextrous supply chain strategy on innovation and the firm’s performance. This study also investigates the role of innovation as a mediating construct between ambidextrous supply chain and firm’s performance. Drawing upon March’s (1991) concept of exploration and exploitation, ambidextrous supply chain is conceptualised as the combination of an exploration and exploitation strategy. A web questionnaire survey was used in this work. Structural equation modelling was applied to test proposed hypotheses on the associations between variables. The findings show that an ambidextrous supply chain has a positive impact on innovation and firm’s performance. Additionally, the impact of ambidextrous supply chain on firm’s performance is higher when innovation is included as a mediator. This work seminally examines the effects of ambidextrous supply chain on firm’s performance and the mediating role of innovation in the relationships between ambidextrous supply chain and firm’s performance.

Keywords: ambidextrous supply chain; mediating effect; supply chain management; innovativeness; performance.


Biographical notes: Susita Asree is an Assistant Professor at Winston Salem State University. She received her PhD from the University of Toledo, Ohio, USA. She has worked in Malaysia, Singapore and the USA for several years. Her research interests are in the areas of global supply chain strategy and global management.

1 Introduction

Markets extending beyond national boundaries have brought the hitherto absent customer base into the fore, and created a vast demand base necessitating ever increasing production of goods and services. Unpredictable customers’ demand and uncertain markets have forced firms to pay additional attention to tailor supply chain strategy that satisfy customers’ demand. In addition, firms have to focus on customer needs by
leveraging either existing product or developing new resources (Rudberg and Martin West, 2008). As the competition concept has changed from firm level to supply chain level, the development of a new product is likely to be more successful if it is supported by innovation efforts in supply chain strategy (Arlbjørn et al., 2011; Busse and Wallenburg, 2011; Azadegan et al., 2008). Companies like Dell and Unilever have successfully demonstrated that innovation in the supply chain is as important as ‘innovation in products or services’, as well as the fact that the strategy of the supply chain can be a powerful competitive differentiator that can have a significant impact on a firm’s top or bottom line growth. Being innovative alone is not enough to be a key player in a competitive market. In order to maintain competitiveness in a global market, the strategy of a supply chain requires a combination and balance between being innovative and efficient (Skinner, 1971; Tokman et al., 2007). The combination of these two concepts is known as ‘ambidexterity’. The concept of ambidexterity derives from a simultaneous pursuit of both exploration and exploitation concept (Duncan, 1976; March, 1991; Kristal et al., 2010). Researchers argue that firms cannot survive with exploration or exploitation strategy alone. March (1991) states that the exploitation activity alone leads to a suboptimal stable equilibrium. Two reasons can be attributed to this: First, Any firm that focuses on repeating an idea, albeit with better and better processes, essentially creates a lower competitive barrier for itself. As more competitors enter the markets, and learn process improvements, the firm loses any super normal profits arising out of standardisation and process improvements. The firm will continue to look inwards, focusing on further reducing manufacturing costs by bringing in efficiencies, leading to a sub-optimal equilibrium in a stable state. Second, firms adopting an exploitative strategy with a focus on improving a repetitive manufacturing process, move away from creating brand new products, services and customer needs, and lose sustainable competitive advantage that can arise only from these core innovation activities. Hence, exclusive exploitation mainly focuses on the current production activities, and may not have a positive relationship with innovation activities (Yalcinkaya et al., 2007). Exploitation and exploration alone are inadequate to support firms competing in a dynamic environment; maintaining appropriate balance between exploration and exploitation is the primary reason for a firm to sustain success in its supply chain (March, 1991; Andriopoulos and Lewis, 2009). The conventional thought of exploration and exploitation concept argues that both concepts cannot be combined together (Burgelman, 2002), due to the different goal setting in the manufacturing industry. There are less empirical studies on this new view of complementary strategy of exploitation and exploration impact on innovation and performance in an emerging market. We will address this research gap with the present study.

This study investigates the impact of ambidextrous supply chain on innovation and firm’s performance in an emerging market. The rest of the paper is structured as follows: Section 2 lays out the theoretical foundation of the conceptual model. Section 3 presents the proposed model and hypotheses development. Section 4 presents the methodology, analysis, and results. Section 5 concludes the paper.
2 Theory development: the dimension of ambidextrous supply chain strategy

This study co-relates the exploitation and exploration theory (EET) and the rational search theory (RST) to the more traditional SCM concepts of lean and responsive. March (1991) developed the theory of exploitation and exploration in the context of learning gained by the organisation. While explorative and exploitative theories look at a firm’s business strategy from the kaleidoscope of learning, several other strategies such as lean and responsive arrive at remarkably similar conclusions, albeit set in the context of a supply chain.

Rational choice theory postulates that the decision to choose an appropriate type of global supply chain is essentially a rational process in which firms make a choice based on the objective needs of business, the capability and the willingness to invest in the global supply chains. The choice of the supply chain strategy depends on the type of resources firms possess at their disposal, and how these resources are allocated amongst often competing needs. The optimal growth of the firm involves a balance between exploitation of existing resources and exploration of new opportunities (Becker, 1976; Wernerfelt, 1984). Exploration and exploitation compete for scarce resources; if more resources are allocated for exploitation, it means that fewer resources are available for exploration. While research on lean and responsive supply chain strategy focuses on the business needs of firms to choose either of these strategies, the rational choice theory throws light on the process by which a decision is taken to make this choice (Radner and Rothschild, 1975). Firms that take a rational decision to balance exploitation and exploration needs are expected to perform better than their peers in the same industry.

2.1 Exploitation concept (lean-based concept)

Similar to the exploitative strategy, a lean supply chain (LSC) employs continuous improvement in efforts that focus on eliminating waste or non-value steps along the chain. It pays attention to the efficiency of product and process development; hence it could reduce the duration of product execution. March (1991) postulated that the ‘learning gained’ from exploitation concept could derive from various sources such as local search, experiential refinement, selection and re-use of existing resources and the exploitation itself would be characterised by refinement, efficiency, choice, production, selection, implementation, and execution (Gupta et al., 2006; Holmqvist, 2004; Benner and Tushman, 2002; March, 1991). What it simply meant was that the firms, after having identified a particular product to be manufactured or a service to be provided, would focus on refining the same idea over and over again through several processes aimed at deriving efficiencies. What this also meant was that industries, in which a manufacturing process could be broken up into several discrete, easily learnt steps, were more amenable to standardisation and were better candidates for an exploitative supply chain strategy. On the other hand, when an exploitative strategy was applied in the context of a supply chain, the main focus is on standardised processes and as a result it requires less skilled workers at low labour costs.
2.2 Exploration concept (responsive-based concept)

The main focus in the exploration strategy is on innovation (March, 1991; Tushman and O’Reilly, 1996). Industries in which innovation is the main element, in which manufacturing or services cannot be easily broken up into standardised processes or steps, tend to adopt explorative strategies (Katila and Chen, 2008; Azadegan et al., 2008). These industries also enjoy a sustainable competitive advantage by creating new products or services and often creating new customer needs and experiences (King and Tucci, 2002; Katila and Ahuja, 2002).

Exploration encompasses behaviour that increases variance in the organisational activities (Chen and Katila, 2008). The labour force utilised by such industries is typically highly paid and highly skilled (Leiponen, 2005), and goods or services cannot be easily copied by competitors. This strategy also imposes a significant investment in R&D activities, often with long gestation periods. For example, companies in the pharmaceutical industry invest very heavily in creating new drugs and patents to cure illnesses from various diseases. Companies that invest in such activities are rewarded by patents or copy rights or royalties and are thus protected from competitive pressures. Hence the profit margins in such industries would be high, the competitive differentiation sustainable and more likely to create optimal equilibrium in the stable state. The exploration strategy matched with responsive supply chain (RSC) method. A successful adaptation of the RSC would be determined by the willingness of the firms to respond quickly to the various stimuli arising from the market place on a continuous basis. The supply chain needs to adapt to the ever changing, dynamic needs of a growth-oriented, typically buyer- driven market. Innovation in products often with very little shelf life would necessitate lesser lead times and faster, shorter supply chains. In this constantly changing competitive atmosphere, firms adopting an RSC tend to leverage technology for taking snap decisions, managing risks and shortening the supply chain. The RSC encourages firms in deploying new technologies, methods, tools, and techniques to solve unexpected problems.

3 Model and hypotheses development

The study proposes two set of models; mediation and direct effects. In a mediation model (model 1), it is expected that innovation mediates the relationship between ambidextrous supply chain and firm’s performance. Supply chain is a network of firms that has the capability of creating wealth, by responding to the market effectively (Gunasekaran et al., 2008). When firms are responsive and efficient, they are able to manage and fulfil customers’ requests timely and effectively. Because customers are demanding, unpredictable and uncertain; they want fast reactions for their requests and firms have to be responsive and timely to address these requests. In addition, customers also want the product to be different and unique. As a result, firms need to constantly work on finding new ideas and developing new products, not only to satisfy customers’ needs, but also to develop their products before the competitors’ products reach the market. Innovativeness often strengthens the competitive positions of organisations. This imposes the need for firms to apply a comprehensive supply chain strategy that focuses on being both efficient and responsive. Ambidextrous supply chain is a supply chain strategy that focuses on being effective and efficient. The performance of the firm is predicted to increase when
innovation mediates the relationship between ambidextrous supply chain and firm’s performance.

H1 Innovation mediates the relationship between ambidextrous supply chain and firm’s performance.

Figure 1 Model 1 – mediation model

Mediation Model

Ambidextrous Supply Chain Design → Innovation Performance → Supply Chain Performance

Model 2 predicted that ambidextrous supply chain and innovation will have independent, direct effect on a firm’s performance. Ambidextrous supply chain strategy will contribute to increase internal capabilities such as improvement in cost and generate better external capabilities, such as being more innovative (Kristal et al., 2010). Since the characteristic of exploration in ambidextrous supply chain focuses on experimentation and exploitation focuses on efficiency, combination strategies could lead to a better product that is innovative and less costly. Thus,

H2 Ambidextrous supply chain and innovation have independent, direct effects on firm’s performance.

Figure 2 Model 2 – direct model

Direct Model

Ambidextrous Supply Chain Design → Firm’s Performance → Innovation Performance

4 Methodology

The first stage of the study involved defining the constructs, and developing of the initial items with the support of the theory and the relevant literature. A comprehensive and extensive review of the literature was conducted to ensure the correct definition of the construct. This also ensured that the instrument fulfilled the requirements of content validity and face validity. The step of the validation process involved consultations with
the experts in supply chain management, i.e., academicians and practitioners. First, the items and definition of each construct were reviewed by two academicians. At this stage, the items sentence structure and definition of the constructs were clarified and, if necessary, modified. To strengthen the content and face validity of the instrument, items and definition of each construct were also reviewed by two practitioners. The practitioners were asked to evaluate the clarity of the construct definition and the items that represent each construct. Based on the practitioners’ comments, the items were reanalysed; the ambiguous and unclear items were modified.

The second stage was a pilot study using the Q-sort method. The purpose of the Q-sort method is to pre-assess the convergent and discriminant validity of the scales (Moore and Benbasat, 1991). Each Q-sorting method involved two judges. In each round, judges were given a list of items and were asked to read the definition of each construct. Then they were asked to sort the item in its representative construct based on the construct definition, and to their best knowledge.

The third stage of instrument validation was large scale data collection. A large scale web survey was used for the data collection. Since the study was related to the global supply chain, one of the characteristics that firms needed to possess was exposure to the international market. All the participating firms in the survey should have been players in the international markets for at least one year. The focal point of the survey were the Malaysia-based international firms, as that country has emerged as a preferred destination for international investors. Malaysia has more than 5,000 foreign companies from more than 40 countries. In this study, a web survey was used to collect data. The survey using a web survey had several challenges. First, e-mail addresses had to be filtered by a server program to guarantee that the e-mail addresses were valid. Second, the undelivered e-mails were not counted in the final sample size since the respondents never received the survey, which resulted in the removal of 347 names from the list. The final mailing list contained 2153 names.

To ensure a reasonable response rate, the survey was sent in two waves and with two reminders. There were 58 automated e-mail replies mentioning that the person was out of office, or no longer with the company, and these responses were not counted in the final sample size. A total of 225 respondents participated in the survey, out of which 21 respondents did not complete the survey. Hence, the total usable respondents for this survey were 204 representing a response rate of 9.47%.

4.1 Measurement result

Valid and reliable instruments were developed to measure AMX, INV, and PFS. Validity and reliability of the constructs were analysed through corrected item total correlation (CITC), as recommended by Churchill (1979), Cronbach’s alpha, factor analysis, and discriminant validity were analysed. Items loading for CITC below 0.5 were removed from the dataset. All purification scores were above 0.5. All items were submitted for factor loading analysis, loading above 0.5 is considered acceptable. Result shows that one of the items (PFS4) was cross-loading. Cronbach’s alpha values for all three constructs were above recommended value. The Kaiser-Meyer value for factor analysis was 0.814, above 0.60 acceptable value. Table 1 shows the result of measurement model.
Ambidextrous supply chain in an emerging market

Table 1  Measurement model result (correlated item total correlation, Cronbach’s alpha and factor loading result)

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Items</th>
<th>CITC</th>
<th>α</th>
<th>Factor loadings</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>F1</td>
</tr>
<tr>
<td>Ambidexterity supply chain</td>
<td>AMX1</td>
<td>0.653</td>
<td>0.909</td>
<td>.699</td>
</tr>
<tr>
<td></td>
<td>AMX2</td>
<td>0.751</td>
<td></td>
<td>.798</td>
</tr>
<tr>
<td></td>
<td>AMX3</td>
<td>0.708</td>
<td></td>
<td>.731</td>
</tr>
<tr>
<td></td>
<td>AMX4</td>
<td>0.684</td>
<td></td>
<td>.721</td>
</tr>
<tr>
<td></td>
<td>AMX5</td>
<td>0.584</td>
<td></td>
<td>.671</td>
</tr>
<tr>
<td></td>
<td>AMX6</td>
<td>0.763</td>
<td></td>
<td>.800</td>
</tr>
<tr>
<td></td>
<td>AMX7</td>
<td>0.716</td>
<td></td>
<td>.813</td>
</tr>
<tr>
<td></td>
<td>AMX8</td>
<td>0.709</td>
<td></td>
<td>.760</td>
</tr>
<tr>
<td></td>
<td>AMX9</td>
<td>0.672</td>
<td></td>
<td>.692</td>
</tr>
<tr>
<td>Innovation performance</td>
<td>INV1</td>
<td>0.678</td>
<td>0.797</td>
<td>.884</td>
</tr>
<tr>
<td></td>
<td>INV2</td>
<td>0.731</td>
<td></td>
<td>.853</td>
</tr>
<tr>
<td></td>
<td>INV3</td>
<td>0.538</td>
<td></td>
<td>.572</td>
</tr>
<tr>
<td>Firm’s performance</td>
<td>PFS1</td>
<td>0.772</td>
<td>0.875</td>
<td>.813</td>
</tr>
<tr>
<td></td>
<td>PFS2</td>
<td>0.783</td>
<td></td>
<td>.589</td>
</tr>
<tr>
<td></td>
<td>PFS3</td>
<td>0.668</td>
<td></td>
<td>.873</td>
</tr>
</tbody>
</table>

Discriminant validity was tested using a pair-wise comparison using structural equation modelling (SEM). The pair-wise comparison follows three steps:

1. analysis of two dimensions in one construct was constructed in a correlated model, and the value of chi-square was recorded
2. the two dimensions were tested in one single model, and the value of chi-square was recorded
3. the discriminant validity is supported if the difference between the two chi-square scores (step 1 and 2) is significant at 0.05 level (Bagozzi and Yi, 1988).

In our study, all the differences between the correlated and the unconstrained model were significant at 0.05 levels. Table 2 shows discriminant validity result.

Table 2  Pair-wise discriminant validity result

<table>
<thead>
<tr>
<th>Pair-wise discriminant validity</th>
<th>Unconstraint</th>
<th>Constraint</th>
<th>Differences</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>CS</td>
<td>DF</td>
<td>CS</td>
<td>DF</td>
</tr>
<tr>
<td>AMX-PFO</td>
<td>623</td>
<td>54</td>
<td>480</td>
<td>53</td>
</tr>
<tr>
<td>AMX-INV</td>
<td>621</td>
<td>54</td>
<td>460</td>
<td>53</td>
</tr>
<tr>
<td>PFS-INV</td>
<td>224</td>
<td>14</td>
<td>94</td>
<td>13</td>
</tr>
</tbody>
</table>

Notes: Ambidextrous supply chain (AMX), innovation performance (INV), firm’s performance (PFS) and ***p < 0.001
4.2 Structural modelling results

The first step in testing the hypotheses was to run model 1. Model 1 is a mediating model. Model 1 has two relationships (or links), first is between ambidextrous supply chain design and innovation performance and the second one is between innovation performance and supply chain performance. Model 1 first relationship link result is supported with a significant level at 0.001 and the regression weight is 0.49. Model 1, second relationship link is also supported with as significant level at 0.001 and regression weight is 0.27. Model 1 fit indices for model are 0.91 (GFI), 0.89 (NFI), 0.92 (CFI), and 0.04 (RMR). The second step was to run model 2. Model 2 is a direct model or also known as additive model. Model 2 has two paths (links), first is between ambidextrous supply chain and innovation performance and the second link is between ambidextrous supply chain and firm performance. Both links significant value were at 0.005. Both paths are supported with significant level at 0.005. Regression weights for paths are 0.15 and 0.18. Table 3 shows the summary the path analysis result. Model fit indices for model 2 are 0.90 (GFI), 0.89 (NFI), 0.92 (CFI), and 0.06 (RMR). Based on these results, Hypothesis 1 and 2 are supported.

Table 3  Path analysis results

<table>
<thead>
<tr>
<th>Model</th>
<th>Structural path</th>
<th>Beta coefficient (significant)</th>
<th>Model fit</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>GFI</td>
</tr>
<tr>
<td>Mediating model</td>
<td>Ambidextrous SC – innovation performance</td>
<td>5.67 (***))</td>
<td>0.91</td>
</tr>
<tr>
<td>(model 1)</td>
<td>Innovation performance – firm’s performance</td>
<td>3.79 (***))</td>
<td></td>
</tr>
<tr>
<td>Direct model</td>
<td>Ambidextrous SC – innovation performance</td>
<td>2.35 (*)</td>
<td>0.90</td>
</tr>
<tr>
<td>(model 2)</td>
<td>Ambidextrous SC – firm’s performance</td>
<td>2.13 (*)</td>
<td></td>
</tr>
</tbody>
</table>

Notes: *p < 0.05, ***p < 0.001

5 Discussion

5.1 Theoretical and managerial contributions

This study empirically investigates the impact of ambidextrous supply chain on innovation and performance. Building upon exploration and exploitation theory (March 1991) and rational choice theory (Radner and Rothschild, 1975), this study developed a mediation and direct model where the study formally hypothesised that an ambidextrous supply chain strategy would have a positive effect on innovation and firm’s performance. This study also investigates the role of innovation as mediation between ambidextrous supply chain and firm’s performance.

In line with the exploration and exploitation and rational choice theory, the findings indicate that firm’s performance needs both responsive and efficient supply chain effort. We named our complementary supply chain as an ambidextrous supply chain. Building on the exploration and exploitation theory, this study fills a research gap in the supply
Ambidextrous supply chain in an emerging market

Chain management literature by providing empirical support for the theorised links between ambidextrous supply chain and firm’s performance. The study reveals that innovation plays a significant role in mediating the relationship between ambidextrous supply chain and performance. A strong support of mediation constructs reveals that innovativeness will increase with the effort of being responsive to customers’ demand through ambidextrous supply chain.

The result of the study indicates that ambidexterity increases innovation and performance. This result is consistent with an earlier finding by Kristal et al. (2010), who found that ambidextrous supply chain has a substantial influence on business performance. However, previous innovation literature indicated that the trade-offs view of exploration and exploitation is the best method to maintain competition. Contradicting the previous literature, this study provides empirical evidence of the complementary view of exploration and exploitation in the context of supply chain. Since ambidextrous supply chain has the characteristic of being ‘responsive’ to customers’ demand, it could be one of the drivers of innovativeness (Hult et al., 2004). Compared to the direct impact model, the result of the mediation model has a higher impact on the firm’s performance. This implies that while innovativeness is an important direct driver of performance, it also appears to be a necessary mediator of the link between ambidextrous supply chain and performance. It also indicates that innovation is a necessary factor to achieve a higher performance.

5.2 Limitation and future research

This study has several limitations. First, the data for this study was collected from Malaysia, which may possess cultural differences vis-a-vis the western part of the world. Second is the respondent global experience. While the survey was conducted on ostensibly global organisations, some of the organisations responding to the survey had less than five years of global experience. Even though there is no indication of respondent bias based on global experience, it might have been beneficial if this research could include companies that have higher global experience.

Third, there is only a single respondent for each organisation involved in this survey and leads to an issue of how the individual perceived the survey and whether this single individual would represent a collective organisational standpoint. Even though there is no indication of single response bias based on Harmon’s single response bias testing, the survey could be more strongly supported if more than one person in an organisation responded to the survey as comparisons could have been made if this survey had more than one respondent for one organisation.

References


Ambidextrous supply chain in an emerging market


