SUPPLY CHAIN STRATEGY, CORE OPERATIONS AND PERFORMANCE: LEARNING FROM INDIA AND PAKISTAN

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ABSTRACT

This paper, drawing from literature, seeks to develop and empirically validate a theoretical model to link the supply chain strategy, core operational functions and performance on data from 296 companies from India and Pakistan using structural equation modeling. The study discusses empirical findings and concludes with future research directions.

Keywords: Supply Chain Strategy, Core Operational Functions, Organizational Performance, Empirical Study, Structural Equation Modeling

INTRODUCTION

This paper attempts to understand the relationship of supply chain orientation with core operational functions. The paper argues that supply chain strategy has positive impact on key operational functions of an organization. Further, the study makes an argument for a positive impact of the operational functions on performance. The following section reviews the background literature. The next section presents the research framework and develops hypotheses. The paper describes the research methodology and reports and discusses the research findings in the following sections. The final section concludes the research and presents possibilities for future research.

RESEARCH GAP

The literature on supply chain strategy diverges into two main orientations: supply chain strategy responsiveness and for physical efficiency (Qi, Zhao, & Sheu, 2011). Responsiveness or agile strategy, on one hand, emphasizes on flexibility and delivery reliability of supply chain whereas supply chain strategy for physical efficiency, referred to as lean supply chain strategy, focuses at reducing wastes in the supply chain. Quality and cost are the two main drivers of lean supply chain strategy (Kristal, Huang, & Schroeder, 2010).
There are a number of frameworks linking supply chain strategy, management functions, and performance measures. Ketchen Jr., Rebarickb, Hultc, and Meyer (2008) argues for supply chain strategy to encompass efficiency as well as responsiveness focus. While, Fantazy, Kumar, and Kumar (2009) define three separate aspects of strategy and link them with various dimensions of flexibility in the supply chain. They argue, innovation, customer orientation, and follower strategy have a positive impact on flexibility dimension of new product development, supply sourcing and product delivery. Also, they find that flexibility dimensions have positive impact on net profit, sales growth, lead time and customer satisfaction.

In spite of considerable research on SCM, the literature indicates gaps in frameworks and testing of theory. (Power, 2005; Akyuz & Erkan, 2010). These supply chain research gaps provide motivation to propose and empirically investigate a theoretical framework linking supply chain strategy, core operational functions, and comprehensive measures of performance.

**SUPPLY CHAIN STRATEGY RESEARCH FRAMEWORK**

**Le-Agile Supply Chain Strategy**

The supply chain literature highlights two main aspects of strategy - lean management and agility. Considering emphasis of the literature on a combination of leanness, agility, and top management support this study considers lean focus, responsiveness focus and top management support as three important components of le-agile supply chain strategy (LASCS) (Mason-Jones, Naylor, & Towill, 2000; Qi, Boyer, & Zhao, 2009; O'Reilly, Caldwell, Chatman, Lapiz, & Self, 2010).

**Organizational Performance**

This study presents a comprehensive performance construct to include financial as well non-financial indicators of organizational performance: operational performance; quality and market performance; and financial performance.

**Customer Focus**

Understanding customer needs and wants is very important in pursuance of being agile and lean. Supply chain focused firms setup a range of practices for customer relationship management including customer information gathering, appropriate use of customer information, complaint handling and resolution, development of long-term trust and improving customer satisfaction. Cai (2009) observes a positive correlation between customer focus, customer satisfaction and retention, and business performance. Hence:

*Hypothesis 1a: LASCS positively impacts customer focus.*

*Hypothesis 1b: Customer focus positively impacts organizational performance.*
Product Development

Supply chain focused organizations create extensive product development process to achieve leanness and responsiveness. Participation of key functional departments and supply chain partners increases the chances of timely resolution of quality and cost related issues along the supply chain. Product development process effectiveness has a positive correlation with cost and quality related performance indicators (Zu, Fredendall, & Douglas, 2008). Hence:

Hypothesis 2a: LASCS positively impacts product development.

Hypothesis 2b: Product development positively impacts organizational performance.

Process Management

Management of process is a key to deliver lean and responsive products. Quality, cost and responsiveness focused supply chain firms build strong process management systems (Hopp, Iravani, & Xu, 2010). Process management aspect of multi-skilled workers and clarity of work instructions reduces operational cost. Process focus including control charts and six-sigma decrease cost of production and increase product quality (Zu et al., 2008). Hence:

Hypothesis 3a: LASCS positively impacts process management.

Hypothesis 3b: Process management positively impacts organizational performance.

Production Technology

Development of modern production technology is a key step towards materializing quality oriented, cost effective, flexible, and responsive supply chain strategy (Kotha & Swamidass, 2000). Flexible manufacturing supply chain companies can offer variety of products with short lead time. The capability to deliver a variety of products at low price increases target customers, while reliable delivery of quality products increases customer satisfaction and retention, which in turn impact financial performance positively.

Hypothesis 4a: LASCS positively impacts production technology.

Hypothesis 4b: Production technology positively impacts organizational performance.
Use of Information Technology

Organizations setup IT based management system in order to integrate supply chain partners and achieve strategic supply chain objectives of cost, quality and timeliness (Zhou & Benton Jr., 2007; Xu, 2010). Quick flow of information on purchasing orders from selling points to manufacturing facility plays an important role in reducing manufacturing lead time. Inter and intra organization communication using e-business technologies is another mean to improve operational and quality related performance indicators (Sanders, 2007).

Hypothesis 5a: LASCS impacts use of IT positively.

Hypothesis 5b: Use of IT impacts organizational performance positively.

RESEARCH METHOD

Questionnaire

The research questionnaire consists of four sections. Section one collects general demographic information about the company and respondent. Sections two to four estimate direct and indirect measures of the constructs in the study. Section two contains questions related to the supply chain strategy of firm. Questions in section three seek to measure operational functions. Finally, section four seeks information about performance measures.

Data Collection

The target respondents are supply chain and operations managers from various industrial segments of India and Pakistan. Total design methodology of Dillman (2007) guides the data collection process from companies listed on stock exchanges of Lahore, Karachi, and Islamabad in Pakistan. Similarly the study collects data from companies listed on Chamber of Commerce and Industries of Andra Pradesh and Bangalore in India. The non-response bias is tested using guidelines of Armstrong and Overton (1977).

RESULTS

Measurement Model Results

The final model retains only the items with more than 0.70 factor loadings for improving convergent and discriminant validities. The study uses guidelines of Segars and Grover (1993) for testing convergent and discriminant validity of all constructs. All constructs satisfy the reliability test of showing alpha values greater than 0.70 (Nunnally & Bernstein, 1994). The study tests and satisfies common method bias requirements recommended by Podsakoff, MacKenzie, Lee, and Podsakoff (2003).

The confirmatory factor analysis (CFA) of all variables finds acceptable overall model fit (Chi-square = 1121; d.f. = 847; Chi-square/d.f. = 1.324; RMR = 0.036; RMSEA = 0.033; CFI = 0.970; TLI = 0.966; IFI = 0.970; NFI = 0.89).
Structural model results

Full structural model test incorporating four control variables is run on AMOS, a structural equation modeling software. The control variables are: company age; annual revenue; number of employees; and production process (process based = 0 and non-process based = 1) as well. The full structural model finds a satisfactory fit ($\chi^2 = 1355; \text{df} = 1023; \chi^2/\text{df} = 1.324; \text{CFI} = 0.965; \text{TLI} = 0.961; \text{IFI} = 0.965; \text{RMSEA} = 0.033; \text{and RMSR} = 0.045$) (Segars & Grover, 1993).

Results of the full structural model including the control variables are shown in Table 1. All hypotheses find support from the data at p-level=0.001 except the hypotheses related to use of IT.

<table>
<thead>
<tr>
<th>No</th>
<th>Statement of hypothesis</th>
<th>Support at p-level (Y/N)</th>
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<tbody>
<tr>
<td>1a</td>
<td>LASCS positively impacts customer focus</td>
<td>Y Y</td>
</tr>
<tr>
<td>2a</td>
<td>LASCS positively impacts product development</td>
<td>Y Y</td>
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<tr>
<td>3a</td>
<td>LASCS positively impacts process management</td>
<td>Y Y</td>
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<tr>
<td>4a</td>
<td>LASCS positively impacts production technology</td>
<td>Y Y</td>
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<tr>
<td>5a</td>
<td>LASCS positively impacts information technology</td>
<td>Y Y</td>
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<tr>
<td>1b</td>
<td>Customer focus positively impacts organizational performance</td>
<td>Y Y</td>
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<tr>
<td>2b</td>
<td>Product development positively impacts organizational performance</td>
<td>Y Y</td>
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<tr>
<td>3b</td>
<td>Process management positively impacts organizational performance</td>
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DISCUSSION

Support for the Proposed Framework

The study finds literature support for supply chain strategy constructs. The supply chain strategy construct developed here presents a concept balanced approach adapted from earlier studies supporting order winner and order qualifier philosophy. Many studies argue for cost and quality as order qualifier and responsiveness as an order winner. Moreover, a large number of empirical studies find top management support as a critical factor for the success of a strategic plan. Clearly, the data in the current study supports the three constructs.

The study finds supply chain strategy has a positive impact on customer focus, product development, information technology, process management, and production technology. This implies supply chain focused firms seem to develop core operational capabilities to achieve supply chain goals. These findings are congruent with an understanding that strategically focused firms are better at developing their core capabilities to achieve long term competitive advantage.
Moreover, the paper finds a positive impact of core operational capabilities, with the exception of information technology, on multiple attribute organizational performance. The findings strengthen the earlier studies bidding to link core capabilities with a single performance dimension. In addition, the study finds positive impact of investment in core operational capabilities on various aspects of organizational performance.

**Possible Explanation of the Unsupported Hypothesis**

The conventional understanding of the positive impact of use of IT on performance comes from developed economies with advanced IT infrastructure, which serve as a pre-requisite for in-house capability incubation. The IT infrastructure in emerging economies is not strong enough to provide the background support (Hassan, 1994). Moreover, slow knowledge sharing systems, cultural misfits and limited industry and academic interaction in emerging economies may be contributing towards a less conducive environment for IT (Rajapakse & Seddon, 2005). Therefore, the lack of significant relationship (p-level=0.05) of use of IT with performance measures is explainable.

**Managerial Implications**

Findings of the study bear implications for supply chain managers. Alignment of supply chain strategy with core operations is vital as they account for a significant impact on organizational performance in most companies. This study’s data from managers finds an indirect positive impact of le-agile supply chain strategy on organizational performance through the core operational capabilities. Hence the findings encourage supply chain managers to develop core operational functions for achieving supply chain objectives and increased organizational performance.

**CONCLUSION**

The study finds alignment in supply chain strategy and internal operational functions can lead to better performance. The data supports an overall positive impact of le-agile strategy on multiple performance measures through internal operational functions except for the relationship of use of information technology with performance. The paper discusses implications of the proposed model from theoretical and managerial standpoint. Moreover, the paper attempts to reduce managerial ambiguity on the composition of supply chain strategy and explains its relationship with operational capabilities in an organization.

The research provides a platform for future research on few fronts. The future research may take advantage of qualitative data as it can provide in depth understanding on the linkage of supply chain strategy with operational and other management functions. Also, in depth analysis of how organizations develop the related competencies to attain outstanding performance can be interesting. Moreover, the future research can seek to understand the impact of supply chain strategy on development of the capabilities of supply chain partners, such as suppliers and distributors, and organizational performance.
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