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EVALUATING THE IMPACT OF SUPPLY CHAIN CAPABILITIES ON THE BUSINESS SUCCESS: A CASE STUDY IN SMALL AND MEDIUM FOOD COMPANIES IN THE MEKONG DELTA

Tran Thi Tham, Tran Thi My Dung

College of Engineering Technology, Can Tho University, Vietnam

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ABSTRACT

In the competitive environment, organizations need to find ways to improve their performance even better by ensuring that all key drivers are being developed and utilized effectively. The aim of this study is to examine the impact of supply chain capabilities on competitive advantages and business performance in small and medium food companies in the Mekong Delta. The data gathered from surveys of 68 small and medium food companies in the region were analyzed using Structural Equation Modeling (SEM). The empirical results showed that supply chain capabilities play an important role in the business improvement. They have direct effects on competitive advantages and indirect effects on business performance through competitive advantages.

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1 INTRODUCTION

The Mekong Delta is one of the important regions contributing to Vietnam's economy. According to the International Centre for Environmental Management, the Mekong Delta contributes 27% of Vietnam's GDP, in which the most important sector is the food-related industry, especially in the processing of food. This region produces 50% of the nation's rice, 80% of the nation's fruit, and 60% of the nation's fish according to Can Tho University's estimates. Overall, 46% of the total amount of food produced in Vietnam comes from the Mekong Delta.

The long-life agricultural sector has provided a huge amount of annual food sources for the food industry in Mekong Delta. However, obsolete technologies, limited skilled employees, and low integration level among partners in the food supply chain cause challenges for manufacturers, especially small and medium sized companies. As competition becomes more intensified, to increase competitive advantages, business performance, and satisfy customers' expectations, one of the key success is understanding about supply chain, supply chain capabilities, and how they should be implemented. They enable increasing sustainable competitive advantages and making companies become different from competitors in the competitive business environment.

The potential analysis and assessment in this study sought for relationships between supply chain capabilities and competitive advantages towards business performance in the small and medium food companies in the Mekong Delta. Based on the findings, managers should be able to identify important supply chain capabilities and significant competitive advantages, which contribute to their business success.

1.1 Supply chain capabilities

In this study, supply chain capabilities include Supply Chain Integration (SCI), Supply Chain Op-

eration (SCO), and Human Resource Management (HRM).

– SCI is referred as a group of capabilities that help to increase the coordination between partners in the supply chain. Several studies examined the relationships between SCI, competitive advantages, and business performance. The results provide empirical evidence that SCI has a positive effect on competition capabilities and leads directly or indirectly to improved business performance (Kim, 2006; Li *et al.*, 2006; Özdemir and Aslan, 2011; Prajogo and Olhager, 2012).

– SCO is referred as a group of capabilities that help to increase the efficiency of manufacturing and distribution systems. A common result of poor operation management can cause product flow imbalances, bottleneck, high inventory, long cycle times, and reduced customer service. Law and Pujawan (2009) reported that a better internal operation would eventually lead to a better operational performance.

– HRM is referred as a group of capabilities that help to strengthen the human resource ability in a company. The importance of HRM has been recognized by previous studies that the effective management of human resources would help organizations achieve sustained competitive advantages (Barney and Wright, 1998).

1.2 Competitive advantage

According to Porter (1985), competitive advantage is the extent to which a company is able to gain and retain a dominant position over its competitors through creating value for its customers. The competitive advantages include four competitive priorities, namely quality, delivery, flexibility, and cost. Numerous studies found that competitive advantages lead directly to enhanced business performance (Özdemir and Aslan, 2011; Rosenzweig *et al*., 2003; Ward and Duray, 2000).

The cumulative model, used to test relationships among competitive advantages were proposed by Ferdows and De Meyer (1990). In this model, the typical sequence recommended focuses on quality, delivery, flexibility, and cost efficiency. Quality is a precondition for all lasting improvements in manufacturing. While the efforts to improve the quality continue to expand, some efforts should be focused on making the production process more dependable, and improvement of speed should be added next. Cost is the last improvement in the sequence; ultimately the company will be able to enjoy improved performance in quality, dependability, flexibility, and cost efficiency simultaneously.

1.3 Business performance

Business performances refer to how well an organization achieves its market-oriented goals as well as its financial goals. A number of prior studies have measured organizational performance using both financial and market criteria, including Return on Investment (ROI), the growth of market share, the growth of sales, and profits as percentage of sales (Chiadamrong and Suppakitjarak, 2008, 2010).

Hence, to test relationships between supply chain capabilities, competitive advantages and business performance, the following hypotheses are proposed (Figure 1):

– H1a - H1d: SCI has positive impacts on competitive advantages (quality, delivery, flexibility, and cost).

– H1e - H1h: SCO has positive impacts on competitive advantages (quality, delivery, flexibility, and cost).

– H1i - H1l: HRM has positive impacts on competitive advantages (quality, delivery, flexibility, and cost).

– H2a - H2c: Supply chain capabilities (SCI, SCO, and HRM) have significant influences on business performance.

– H2d - H2g: Competitive advantages (quality, delivery, flexibility, and cost) have significant influences on business performance.

– H3a - H3c: Improvement in quality has direct and positive impacts on delivery, flexibility, and cost.

– H3d - H3e: Improvement in delivery has direct and positive impacts on flexibility and cost.

– H3f: Improvement in flexibility has a direct and positive impact on cost.

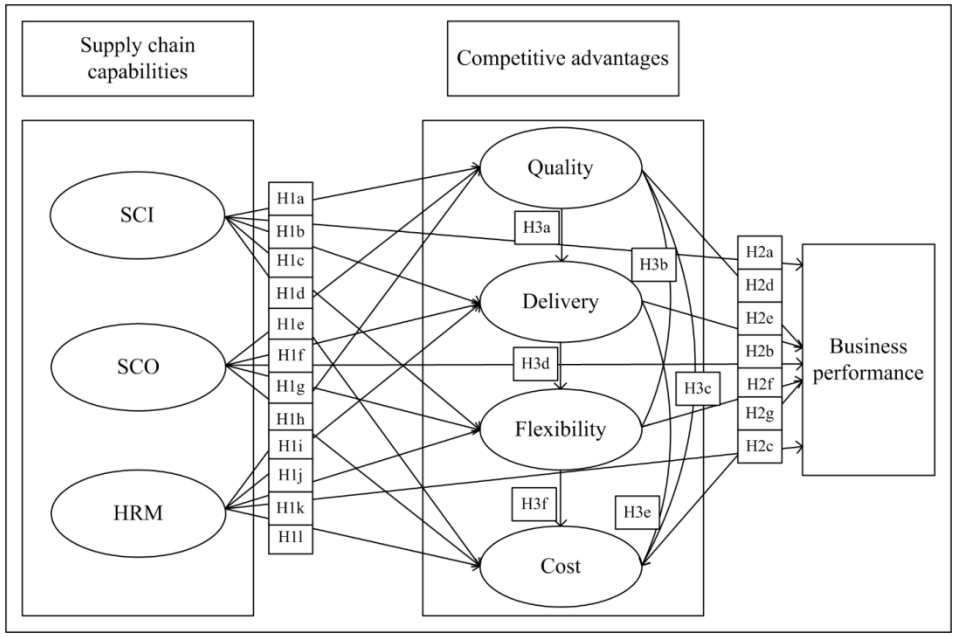

Fig. 1: Theoretical framework

2 METHODS

The survey was conducted from January to May 2015. The five-point Likert-scale was used in the record (1 = strongly disagree to 5 = strongly agree) for eight groups of questions, representing each factor of the hypotheses. Questionnaires were distributed to 300 small and medium food companies in the Mekong Delta by mail, e-mail, questionnaire website, and direct interviews. From 300 surveys in the target sample, 68 responses were used for analysis, indicating a response rate of 22.67%. The non-response bias was also evaluated by comparing early responses and late responses (Armstrong and Overton, 1977). The results from *t*-test analysis showed that there is no significant difference with regard to all variables analyzed, so the non-response bias is not a problem in this study. The profile of respondents can be seen in Table 1.

The Structural Equation Modeling (SEM) with SAS program is used to test the null and research hypotheses. SEM is performed by using a two-step procedure that allows the simultaneous analysis of both measurement and structural models. In the first step, the measurement model is developed with the objective of setting an observed variable by using Confirmatory Factor Analysis (CFA). In a second step, the structural model is developed and tested, including the relationships between latent variables. The measures underlying the constructs are shown in Table 2.

Table 1: Profile of respondents

	Number of companies	Percentage
Number of employees (persons)		
Under 50	9	13.24
Over 50-100	22	32.35
Over 100-200	29	42.65
Over 200	8	11.76
Total	68	100
Registered capital (VND)		
Under 1 billion	11	16.18
Over 1-10 billion	24	35.29
Over 10-20 billion	28	41.18
Over 20 billion	5	7.35
Total	68	100
Product type		
Meat and meat products	7	10.29
Cereal products	10	14.71
Fishery products	20	29.41
Beverage	18	26.47
Fresh and processed fruits and vegetables	6	8.82
Others	7	10.29
Total	68	100

Table 2: The measures underlying the constructs

	Measures underlying the constructs
F1: Supply Chain Integration (SCI)	
V1	Your firm has a policy to build long-term relationships with key suppliers.
V2	Your firm has close and frequent communication with suppliers.
V3	Your firm has a computer network linking information with suppliers.
V4	There is an exchange of important information between the firm and its suppliers.
F2: Supply Chain Operation (SCO)	
V5	The firm has employed effective methods or tools to manage and control its inventory level.
V6	Your firm is utilizing effective production planning and control systems such as MRP, ERP.
V7	Your firm has suitable methods and tools to manage the transportation routes.
V8	Your firm always uses the JIT and Lean Manufacturing System to produce the products.
F3: Human Resource Management (HRM)	
V9	Your firm has a capability to recruit and completely fill new staff positions.
V10	Your firm continuously maintains suitable training programs.
V11	Your firm provides the attractive incentives and benefits to maintain capable staff.
V12	Your firm has an open mind and always listens to staff opinions.
F4: Quality	
V13	Percentage of good quality products has been relatively high and improved constantly during the past six months.
V14	Your products have received certified national or international standards.
V15	Your firm has never received complaints about the products' quality during the past six months.
V16	Your products have never been returned as defective units during the past six month.
F5: Delivery	
V17	Your firm can plan transportation resources effectively (number of trucks, delivery staff, etc.).
V18	Your firm always delivers products to customers within the due-date.
V19	Your firm can ship products to customers accurately according to the purchasing orders.
V20	Your firm has never had to pay compensation due to the damage caused by the delivery.
F6: Flexibility	
V21	Process set-up or change over time can be gradually reduced.
V22	Process cycle time can be continuously reduced.
V23	Your firm can quickly adjust its production plan to satisfy urgent customer requirements.
V24	Your firm is capable of adjusting its production system to produce a variety of products.
F7: Cost	
V25	Production cost of your firm can be continuously reduced.
V26	Transportation costs of your firm can be continuously reduced.
V27	Your firm can reduce its waste continuously.
V28	The firm's inventory level can be continuously reduced.
F8: Firm performance during past 5 years (BP)	
V29	Increasing market share.
V30	Increasing sale revenue.
V31	Increasing return on investment.
V32	Increasing profit.

3 RESULTS

The measurement model was analyzed by using the SAS program and CALIS procedure. The results showed that the Chi-square to degree of freedom ratio is 1.54, the Comparative Fit Index (CFI) is 0.9273, and Non-normed Fit Index (NNFI) is 0.9205. All the *t*-statistics for the indicator variables are greater than 2.576, significant at $p< 0.01$. All standardized factor loadings range from 0.5479 to 0.8895, indicating an acceptable value.

Convergent validity is used to measure the similarity or convergence between the indicators measuring the same construct. Convergent validity is demonstrated when the correlations between these indicators are relatively strong. For this study, convergent validity was assessed by testing whether each individual item's coefficient was significant, that is greater than twice standard error (Lemak *et al*., 1997). The results provide satisfactory evidence of convergent validity for all items (Table 3).

Table 3: Result of testing measurement model

Indicators (1)	Unstandardized Coefficient (2)	Standardized Coefficient (3)	Standard Error (4)	2*(Standard Error) (5)	*t* value (6)
F1: Supply Chain Integration (SCI)					
V1	0.9246	0.8564	0.0682	0.1364	13.5578
V2	0.6747	0.7308	0.0641	0.1282	10.5309
V3	0.8634	0.8055	0.0706	0.1412	12.2350
V4	0.8310	0.8100	0.0673	0.1346	12.3451
F2: Supply Chain Operation (SCO)					
V6	0.9040	0.8263	0.0709	0.1418	12.7488
V7	0.8506	0.8215	0.0674	0.1348	12.6258
V8	0.7287	0.7453	0.0672	0.1344	10.8440
F3: Human Resource Management (HRM)					
V9	0.9053	0.8022	0.0931	0.1862	9.7197
V10	0.9806	0.7881	0.1162	0.2324	9.5415
V11	0.9367	0.7267	0.1178	0.2356	8.7612
F4: Quality					
V13	0.9876	0.7866	0.1150	0.23	10.4528
V14	0.8100	0.6587	0.0958	0.1916	8.4585
V15	0.9752	0.7606	0.0972	0.1944	10.0315
V16	0.9482	0.7965	0.0893	0.1786	10.6170
F5: Delivery					
V17	0.6663	0.5972	0.0846	0.1692	7.8771
V18	0.7729	0.6115	0.0942	0.1884	8.2024
V20	0.9951	0.8630	0.0732	0.1464	13.5913
F6: Flexibility					
V21	0.9468	0.5479	0.1762	0.3524	6.0134
V23	0.9672	0.5891	0.1720	0.344	6.4450
V24	0.9944	0.7026	0.1316	0.2632	7.5549
F7: Cost					
V25	0.9764	0.8789	0.0820	0.164	16.8894
V27	0.6302	0.6612	0.0698	0.1396	9.0267
V28	0.6542	0.6929	0.0679	0.1358	9.6302
F8: Business performance during the past 5 years					
V29	0.9315	0.8895	0.0577	0.1154	16.1321
V30	0.7824	0.7952	0.0607	0.1214	12.8865
V31	0.8061	0.8731	0.0521	0.1042	15.4824
V32	0.8251	0.8398	0.0577	0.1154	14.2887

In the structural model, goodness-of-fit indices indicated an acceptable fit of the model to the data. The ratio of Chi-square to degree of freedom is 1.55, which is below the recommended value of 3.0 for satisfactory fit of a model to data (Hartwick and Barki, 1994). In line with prescription, the CFI and NNFI are 0.9272 and 0.9202, greater than 0.90 level (Byrne, 2006) and thus indicate good fit. The R^2 values for the structural equations, which represent the variance explained by endogenous factors of F4 (Quality), F5 (Delivery), F6 (Flexibility), F7 (Cost), and F8 (Business performance) are 0.9142, 0.6920, 0.5702, 0.7907 and 0.9502, respectively. The results of testing structural model are shown in Table 4 and Figure 2.

Table 4: Results of testing structural model

Hypothesis	Regression weight	Standard error	*t*-value
H1a	0.1729	0.0635	2.7242
H1c	0.1613	0.0660	2.7452
H1d	0.4505	0.1088	4.1406
H1e	0.4042	0.1255	3.2197
H1h	0.3255	0.1014	3.2112
H1i	0.3526	0.1653	2.7332
H2a	0.4558	0.1052	4.3334
H2d	0.3793	0.1117	3.3940
H3a	0.8217	0.0834	9.8498
H3d	0.3815	0.0851	4.4838
H3f	0.3222	0.1559	2.0208

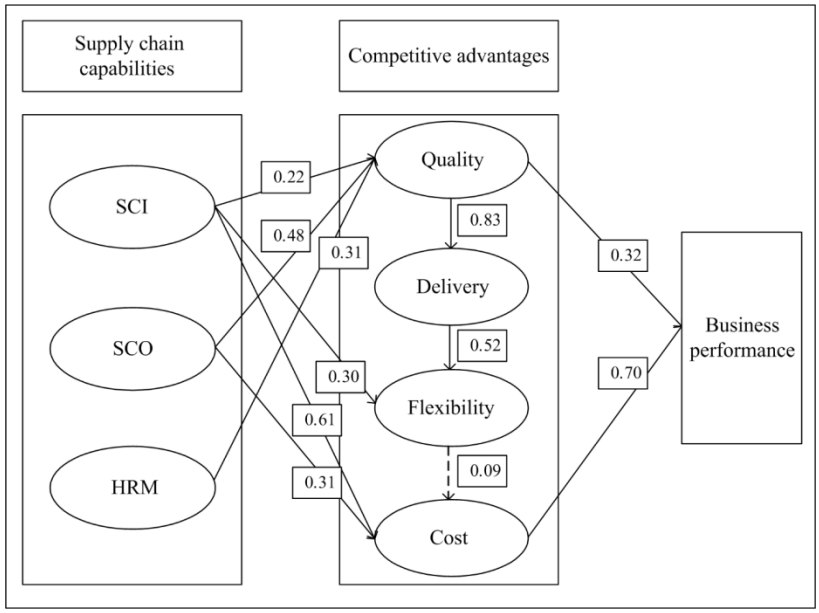

Fig. 2: Final relationships in the structural model

4 DISCUSSION

4.1 The effects of the supply chain capabilities on the competitive advantages

The results showed that SCI has positive and significant impacts on three competitive priorities, namely, quality, flexibility, and cost. Through building long-term relationships and sharing of information between supply chain partners, parties attain timely and accurate information (Pujara and Kant, 2013). This allows companies to make better decisions on ordering, capacity allocations, production, and material planning (Koçoğlu *et al*., 2011). So, with a high degree of SCI, manufacturers can react more flexibly to individual customer demands, to decreased delivery times, and to reduced inventories. In addition, vendors' participation during the initial design of new products and in problem solving is important to achieve high quality, faster response to market needs, and satisfy customer requirements (Crosby, 1979; Lascelles and Dale, 1988).

The paths from SCO to quality and cost are positive and significant. In the manufacturing and distribution systems, realizing a low inventory level and reducing lead time are positive factors of the cost efficiency construct (Li, 2000). The companies should focus on the improvement of manufacturing activities by applying effective systems and methods, such as a Just-In-Time (JIT) system, or Lean manufacturing. Therefore, the materials and final products that are distributed on-time help to reduce lead time, improve quality, and may lead to increase productivity (Saleeshya *et al*., 2015). When productivity increases, product costs decline and product price can be reduced.

The analysis revealed that HRM plays an important role in the improvement of quality. Indeed, for most total quality management theorists, skill acquisition and development lie at the heart of a successful quality strategy (Crosby, 1979; Deming, 1982). A more powerful and skillful staff has a stronger ability in quality improvement practices as well as ability to react to production problems, in order to meet the requirements (Swink and Hegarty, 1998).

4.2 The effects of the competitive advantages on business performance

The paths from quality and cost to business performance are positive and significant at $p < 0.01$. Quality helps companies gain a competitive advantage by delivering goods to the marketplace that meet customer needs. With high quality, their product would be increasingly recognized from customers, which in turn, leads to improved performance in terms of sales growth and market share (Forker *et al*., 1996; Laosirihongthong *et al*., 2013). Also, competing in the dynamic marketplace requires low-cost production as a basic approach. The companies, which can reduce unit cost can provide compatible price that leads directly to increased sales, revenue, and market performance.

4.3 The effects among competitive advantages

The result partly follows the cumulative model, which was proposed by Ferdows and De Meyer (1990). In this model, the typical sequence recom-

mended focusing on quality, delivery, flexibility, and cost efficiency. This showed that product quality should be considered as the base capability that supports other capabilities. When a company has a high-quality product, it may provide better delivery to its customers. While the efforts to improve the quality and delivery are gained, these efforts should make the production system more flexible. A high level of flexibility is a result of reducing set-up time, process cycle time, and batch size, which significantly contribute to the lower production cost. These findings are also partial consistent with the findings from previous studies (Amoako *et al*., 2007; Größler and Grübner, 2006; Sum *et al*., 2012).

5 CONCLUSIONS

The relationships of supply chain capabilities and competitive advantages towards business performance in the small and medium food companies in the Mekong Delta was examined. The results strongly supported that supply chain capabilities play an important role to gain competitive advantages, which in turn are critical factors to improve business performance. From these findings, small and medium food companies should have strategies to build closed collaboration with other partners in the supply chain. The abilities in the operational systems should be enhanced by applying JIT, Lean manufacturing and planning and control systems (MRP, ERP). In addition, HRM should be focused on, by improving recruiting quality, training, and having as well an intensive policy to attract staff.

Although this study makes significant contributions, it remains limitations in factors of supply chain capabilities and competitive advantages and number of companies surveyed. Further studies should be developed to fill these gaps and make comparison between different case studies to have a deeper vision on this theme.

REFERENCES

Amoako-Gyampah, K., Meredith, J.R., 2007. Examining cumulative capabilities in a developing economy. International Journal of Operations and Production Management. 27(9): 928-950.

Armstrong, J.S., Overton, T.S., 1977. Estimating nonresponse bias in mail surveys. Journal of Marketing Research. 14(3): 396-402.

Barney, J.B., Wright, P.M., 1998. On becoming a strategic partner: The role of human resources in gaining competitive advantage. Human Resource Management. 37(1): 31-46.

Byrne, B.M., 2006. Structural equation modeling with EQS and EQS/Windows: Basic concepts, applications, and programming. Sage Publications. Thousand Oaks, 304 pages.

Chiadamrong, N., Suppakitjarak, N., 2008. Relationships of Supply Chain Management Capability and Manufacturing Operations Competence on Organizational Performance: A Case Study of Thai industries. International Journal of Logistics Systems and Management. 4(5): 551-573.

Chiadamrong, N., Suppakitjarak, N.,2010. Hierarchical Impact of Manufacturing Supporting Functions on Business Performances: A Case Study of Thai Industries. International Journal of Logistics Systems and Management. 7(1): 108-132.

Crosby, P.B., 1979. Quality is free: The art of making quality certain. McGraw-Hill. New York, 309 pages.

Deming, W.E., 1982. Quality, productivity, and competitive position. Massachusetts Institute of Technology (MIT) Press.Cambridge, 373 pages.

Ferdows, K., De Meyer, A., 1990. Lasting improvements in manufacturing performance: in search of a new theory. Journal of Operations Management. 9(2): 168-184.

Forker, L.B., Vickery, S.K., Droge, C.L.M., 1996. The contribution of quality to business performance. International Journal of Operations & Production Management. 16(8): 44-62.

Größler, A., Grübner, A., 2006. An empirical model of the relationships between manufacturing capabilities. International Journal of Operations & Production Management. 26(5): 458-485.

Hartwick, J., Barki, H., 1994. Explaining the role of user participation in information system use. Management Science. 40(4): 440-465.

Kim, S.W., 2006. Effects of supply chain management practices, integration and competition capability on performance. Supply Chain Management: An International Journal. 11(3): 241-248.

Koçoğlu, İ., İmamoğlu, S.Z., İnce, H., Keskin, H., 2011. The effect of supply chain integration on information sharing: Enhancing the supply chain performance. Procedia-Social and Behavioral Sciences. 24: 1630-1649.

Laosirihongthong, T., Teh, P.L., Adebanjo, D., 2013. Revisiting quality management and performance. Industrial Management & Data Systems. 113(7): 990-1006.

Lascelles, D., Dale, B., 1988. A review of the issues involved in quality improvement. International Journal of Quality & Reliability Management. 5(5): 76-94.

Law, K.M.Y., Pujawan, N., 2009. Collective efficacy and schedule instability: a study in Hong Kong and Pearl River Delta region. International Journal of Industrial and Systems Engineering. 4(1): 01-18.

Lemak, D.J., Reed, R., Satish, P., 1997. Commitment to total quality management: is there a relationship with firm performance?. Journal of Quality Management. 2(1): 67-86.

Li, L.L.X., 2000. Manufacturing capability development in a changing business environment. Industrial Management & Data Systems. 100(6): 261-270.

Li, S., Ragu-Nathan, B., Ragu-Nathan, T., Rao, S.S., 2006. The impact of supply chain management practices on competitive advantage and organizational performance.International Journal of Managemant Science. 34(2): 107-124.

Özdemir, A., Aslan, E., 2011. Supply Chain Integration, Competition Capability and Business Performance: A Study on Turkish SMEs. Asian Journal of Business Management. 3(4): 325-332.

Porter, M.E., 1985. Competitive advantage: Creating and Sustaining Superior Performance. The Free Press.New York, 592 pages.

Prajogo, D., Olhager, J., 2012. Supply chain integration and performance: The effects of long-term relationships, information technology and sharing, and logistics integration. International Journal of Production Economics. 135(1): 514-522.

Pujara, A.A., Kant, R., 2013. Information sharing enablement of supply chain: a conceptual framework. International Journal of Logistics Systems and Management.14(3): 298-314.

Rosenzweig, E.D., Roth, A.V., Dean Jr, J.W., 2003. The influence of an integration strategy on competitive capabilities and business performance: an exploratory study of consumer products manufacturers. Journal of Operations Management. 21(4): 437-456.

Saleeshya, P.G., Sneha, A., Karthikeyan, C., Sreenu, C., Rohith, A.K., 2015. Lean practices in machinery manufacturing industries-a case study. International Journal of Logistics Systems and Management.20(4): 536-554.

Sum, C., Singh, P., Heng, H., 2012. An examination of the cumulative capabilities model in selected Asia-Pacific countries.Journal of Production Planning & Control. 23(10-11): 735-753.

Swink, M., Hegarty, W.H., 1998. Core manufacturing capabilities and their links to product differentiation. International Journal of Operations & Production Management. 18(4): 374-396.

Ward, P.T., Duray, R., 2000. Manufacturing strategy in context: environment, competitive strategy and manufacturing strategy. Journal of Operations Management. 18(2): 123-138.