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Determinants of Supply Chain Performance: A Strategic Point of View

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Abstract - With the application of supply chain strategy, retailers can make a wise decision to increase supply chain performance. This study is one of the novelties in supply chain management research because it aimed at empirically analyzing the influence of supply chain strategies as the determinants of retail supply chain performance. For the purpose of the study, data were collected with a structured questionnaire from 115 mangers of some selected retail chain stores in Bangladesh. Collected data were analyzed using Partial Least Squares method with smart PLS software version 2.0M3. The present study has shown some meaningful findings regarding the determinants of retail supply chain performance. Firstly, it is found in the study that agile supply chain strategy is the most pivotal factor influencing retail supply chain performance. The lean strategy was also found to be a contributor to the retail supply chain performance while hybrid strategy was found to exhort very weak influence in increasing the performance of retail supply chain. The findings of this study can benefit the supply chain managers involved in retailing. From this study retail managers can know which strategy they should adopt to bring forth substantial advantage for the companies by maintaining their supply chain in a better way.

Keywords— Supply chain strategies, responsiveness, efficiency and retail chain stores.

1.0 Introduction

Remaining responsive to customers' preferences is a big challenge for companies in this globalized world. For satisfying customers with better products and services, big retailers around the world are adapting their business strategies in the fast changing business environment. Supply chain strategies are also playing a significant role in this regard. One of the main objectives of supply chain strategy is to increase the firm's supply chain performance with respect to its customers [19]. Supply chain performance is an important indicator of how well the supply chain strategy fulfills its objectives since it denotes the ability of the supply chain to adapt to changing customer needs and ultimately lead to elevated performance [4].

But research works on supply chain strategies are very limited [13, 28&41]; these studies have not critically examined the association between supply chain strategies and performance. Rather there are

very few studies that tried to examine the causal relationship between supply chain strategies and performance [35, 54&27]. But these studies have been conducted in manufacturing industries; like [27] who tried to present supply chain metrics and to propose a fuzzy-based performance evaluation method for lean supply chain. So research should be conducted in a retail setting to investigate the effects of supply chain strategies on retail supply chain performance. Moreover the previous studies focused on only agile and lean strategies [54] but there is hybrid strategy that has drawn significant attention among the researchers. So the present study tried to assemble these three types of strategies with respect to their influence in retail supply chain performance.

Supply chain strategy consists of a set interrelated issues employed to incorporate suppliers, manufacturing, warehouses, and stores so that products are made and distributed at the right quantities, to the right location, at the right time, in order to lessen system-wide costs while satisfying service level requirements [50]. Currently organizations are thinking supply chain strategies as a way of increasing their performance and achieving long term goals. This supply chain strategy helps the supply chain process in the movement and storage of raw materials, work-in-process inventory, and finished goods from point of origin to point of consumption. For this reason, firms adopt these strategies to manage the integration of all the supply chain activities through better supply chain relationships to achieve a competitive advantage for the supply chain [21]. As retail supply chain is somewhat different in the sense that they are mostly dependent on suppliers for their finished products, supply chain strategies here act as a catalyst for success. In the face of global competitive business environment, big retailers are utilizing supply chain strategies to beat the competitors. For this reason, the strategic view of managing supply chains has assumed utmost importance, especially since such a complex environment has effectively shifted the attention of competition from a firm versus- firm paradigm to a supply chain-versus-supply chain paradigm [29, 52]. Managers can effectively manage their retail outlets if they are apt in choosing the right supply chain strategy. As the retail chain stores deal with the fast moving consumer goods, supply chain strategy for them requires a system that focuses on

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integration of business processes throughout the value chain with the aim of providing maximum value to the end-customers [60]. While developing strategy for retail supply chain, the retailers must first consider the nature of demand for the products they are selling. Then the organizations can fix their objectives with the market situation and design a supply chain strategy that best matches with preferences of customers and organizational goals. Though supply chain strategies are important to be successful, very few empirical studies done as to their impact on retail supply chain performance. The few studies done in this area divulged inconsistent findings regarding the impact of supply chain strategy on supply chain performance and firm benefits. In particular, while some studies [28,40 & 9] show positive associations between supply chain strategy and supply chain responsiveness, others [35] show that supply chain strategies do not directly bring benefits for the firms, but that they need supports from other factors to do so [24]. However, literatures regarding the supply chain strategies and performance for retailing are scarce. So the present research initiative can pave the ways to minimize the literature gap by exploring the impact of supply chain strategies on retail supply chain performance. The present study used three types of supply chain strategies with respect to their effect on two dimensions of supply chain performance namely responsiveness and efficiency. These are discussed in the next section.

1.2 Supply Chain Performance
A simple definition of good supply chain performance is to get the right products to the right place at the right time at the lowest cost. The performance characteristics with the greatest value in a supply chain are accuracy, responsiveness, on time complete deliveries, reduction of inventory and mutual continuous improvement. In the academic literature several measures have been proposed for measuring overall supply chain performance [3]. For measuring the retail supply chain performance, operational performance has been considered in terms of supply chain responsiveness and supply chain efficiency as proposed by [3], [18], and [23]. The above mentioned dimensions of supply chain performance are also supported by SCOR model and balanced scorecard model. These dimensions of retail supply chain performance have been discussed below.

Supply chain responsiveness (SR) is the promptness and the degree to which the supply chain can address variations in customer demand [22, 39&31]. At present customers are very much demanding and for this reason increased emphasis on availability of products and services as well as on time delivery creates unique needs for a volume

flexible response [56]. If supply chain responsiveness increases, it obviously brings benefits to organizations and in the long-term have a positive impact on a firm's performance [42]. In a rapidly changing competitive business world, organizations have to design their supply chains in ways that are meaningfully more flexible and responsive than the existing ones [26]. Firms need to know what strategies are important to respond to changing customer needs so as to succeed in today's uncertain environment [16, 34&58] as well as any disruptions in supply [17, 29&11]. On the other hand, efficiency is the measurement of how well the company's resources are utilized [3]. So supply chain efficiency (SE) is how well the resources in the Supply chain are utilized. The definition of an efficient supply chain varies from company to company. Supply chain efficiency is defined from three perspectives such as supply chain performance, cost and a combination of performance and cost [1]. Definitions of efficiency in terms of performance are for example high delivery precision and high customer satisfaction. To remain competitive in the new global environment, companies will have to seek ways to lower cost and at the same time enhance the service towards customers. This means that a company needs to have both cost focus and customer focus at the same time [8]. The purpose of efficient supply chains is to coordinate the flow of materials and services so as to minimize inventories and maximize the efficiency in the chain that will increase supply chain performance [1]. Efficient supply chains work best when demand is predictable and products/services are stable. Supply chain efficiency can be achieved if the resources of organizations are utilized. For supply chain to be efficient, all parties in supply chain network should work in a coordinated manner so that unnecessary costs can be avoided [1].

2. Literature Review
Supply chain strategy deals with the procurement of raw materials, transportation of materials to and from the company, product or manufacture of the operation to provide the service, and distribution of the product to the customers, along with any follow-up service and a specification of whether these processes will be performed in-house or outsourced [40]. The supply chain strategy of the retailers refers to the strategic goals and objectives of their supply chain. [19] Argued that the alignment of an organization's activities with its strategies leads to supply chain responsiveness that might help create competitive advantage for the firms. So it is necessary to know the strategic influence of supply chain to responsiveness. There exists a need to widen knowledge in retailing as supported by [59], who claimed that there is a time lag of more than ten years in retail research as

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compared to manufacturing research. This is very much true especially for research in retail supply chain management. [44] called for a retail interest from supply chain management researchers. But no study could be identified that focused on supply chain performance in retail business. The process of supply chain strategy starts with the business value proposition to customers, based on core competencies and identified market winners and shows how the supply chain can contribute to achieving business goals [53]. [55,36] suggest three types of supply chain strategies which are agile supply chain, lean supply chain and hybrid supply chain that affect supply chain performance. They have done some case studies and merged the lean and agile supply chains to form a strategy referred to as a hybrid supply chain strategy. However, [36] integrated both the lean and agile supply chain and used the term of leagile to increase supply chain performance. Different supply chain strategies are used for different products [1, 12 &46]. Supply chain strategies may be designed to be more efficient or to be more responsive [21], also the combination of both. Different types of supply chain strategies are discussed below.

2.1 Agile Strategy (AS)
Agile supply chain strategy aims at being responsive to customer needs as well as being flexible [25, 28]. This agile supply chains are most appropriate for products having uncertain demand [1, 47&55]. It is apt in time compression, quick response and eliminating the barriers to quick response [10]. [13] was one of the first scholars who considered agility in the supply chain management context. Subsequently researchers gave importance on supply chain agility as a business wide capability, enabling the firm to respond to changing market environments [5, 29, &51]. As such, agility is characterized by flexibility and speed/responsiveness, and spans organizational structures, processes, information systems and mindsets [48, 9]. For this reason, the scope of supply chain agility extends beyond a single firm and includes association with major customers and suppliers [5]. Supply chain agility refers to a company's capability, in conjunction with its key suppliers and customers, to rapidly and successfully react to changes in its environment [5]. Inherent in this conceptualization is also the organization's flexibility and its ability to quickly and effectively reconfigure key resources with the aim to remain competitive. The idea of supply chain agility represents a dynamic capability able to positively influence the operational performance of the firm. Operational performance includes a firm's competitive position in terms of supply chain cost, customer service (delivering the right quality and right quantity at the right time), service level performance (on-time-in-full deliveries), and

supply chain flexibility [3, 18&23]. It can be argued that in today's challenging global markets, the route to sustainable advantage lies in being able to leverage the respective strengths and competencies of network partners to achieve greater responsiveness to market needs [8]. And agile strategy is a major catalyst of supply chain performance. Similarly [54] found in his study that agile supply chain strategy is positively correlated with supply chain performance. Thus it is hypothesized that;

H1a: Agile strategy positively influences the retail supply chain responsiveness.

H1b: Agile strategy positively influences the retail supply chain efficiency.

2.2 Lean Strategy (LS)
Lean strategy focuses on the elimination of waste with a bias towards "pulling" goods through the system based on demand. In retailing, lean strategy is employed to diminish costs and wastages. This strategy requires the retailers to anticipate the market demand and assemble the products so that customers get the maximum value at reasonable costs. It is through this holistic, enterprise-wide approach to lean implementation that the theory extends beyond functional strategy to a broader supply chain strategy employed by the company. A lean supply chain works to reduce cost and waste [57] by eliminating non-value-added activities, pursuing scale economies and deploying optimization techniques to get the best capacity utilization in production and distribution [25,28]. The objective of this strategy is to achieve the most efficient methods of production and delivery of products by reducing waste in the value creation process. As retail managers can discern the demand in advance, they can plan and assort the necessary products in efficient batches to customer orders. So there is relatively less waste and inventory – at least inbound in the supply chain. The strategy is however prone to excessive inventories of finished product outbound. The aims of a lean strategy are to do every operation using less of each resources- people, space, stock, equipment, time, and so on that best match with retail supply chain. So the retailers can increase supply chain performance by eliminating operations that ad no value, simplifying movements, reducing unnecessary inventory, using higher technology, looking for economies of scale, locating outlets near to customers and removing unnecessary links from the supply chain [38]. On the other hand [54], in his study found a positive association between lean supply chain strategy and supply chain performance. Therefore, on the basis of previous literatures, it can be hypothesized in this study that;

H2a: Lean strategy is positively correlated with retail supply chain responsiveness.

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H2b: Lean strategy is positively correlated with retail supply chain efficiency.

2.3 Hybrid Strategy (HS)

Organizations sometimes use a hybrid strategy where both lean and agile supply chains are utilized [55]. Hybrid or leagile supply chains thus use a combination of lean and agile approaches within a supply chain strategy [32] and exploit the benefits of both lean and agile supply chains [55]. Supply chains utilize this hybrid solution by holding strategic inventory in some generic or unfinished form at the de-coupling point with final configuration made quickly once actual demand is known. Hybrid strategy aims at building an agile response upon a lean platform by seeking to follow lean principles up to the de-coupling point and agile practices after that point. Organizations wishing to increase performance through cost-efficient practices should operate at a location that offers low cost and develop strategies in line with the lean supply chain [18]. On the other hand, organizations that want to be competitive through innovation should use strategies more closely to the agile supply chain [18]. This is empirically supported by a study done by [18, 20] that state the nature of supply chain strategy, aimed at an efficient cost is a lean supply chain. Furthermore, Groote [21, 13, &43] indicated in their study that generally profit in the supply chain investments will only be available if there are alignments between supply chain strategies with form of process or product requests. Therefore, it is evident that final customers' needs for functional products with a predictable market demand should be met with efficient (or lean) supply chains and the needs for innovative products should be met with responsive (or agile) supply chains [6, 13, 47&51]. However the present study tries to test whether this hybrid strategy can influence the retail supply chain performance or not. Based on the findings of the mentioned studies that hybrid strategy has impact on supply chain performance, it can be hypothesized that; **H3a:** Hybrid strategy positively influences retail supply chain responsiveness.

H3b: Hybrid strategy positively influences retail supply chain efficiency.

3. Research Methodology

3.1 Instruments Development

The present study has three independent variables and two dependent variables. The items for the independent variables namely lean and agile supply chain strategy have been adopted from previous studies [54] and items for dependent variables were adopted from the studies by [29,2& 54]. Items for the hybrid strategy were developed from existing literatures. Each item represents the content of definition for the respective constructs. For the content validity of the items, a pre pilot study was conducted by three academicians and two senior supply chain mangers of retail chain stores to make comments on the clarity and appropriateness of the measures developed for the study. After getting their feedback, the items were adjusted and used for pilot study and it revealed good reliability and validity of the items. The items were measured with 5 point Likert scale with response options ranging from strongly agree (5) to strongly disagree (1).

3.2 Data collection and Analysis Techniques

Data were collected from 115 managers of some selected retail chain stores in Bangladesh. Among the total respondents, 101 were the outlet managers and the remaining 14 were the senior supply chain managers of different retail chain stores. For collecting the data, formal request letter was used for taking permission from the authority of the selected organizations. Then the questionnaires were distributed among the respondents. Total 120 questionnaires were distributed and finally 115 were collected in usable condition. So the total sample size in this study was 115. The survey was conducted in 2014. Mostly the outlets managers were surveyed because they are closely linked to the overall operations of the respective stores. Collected data were analyzed using partial least squares (PLS) with the support of the software Smart PLS 2.0 M3 [45]. The hypotheses of this study were tested based on empirical data by means of structural model of partial least squares (PLS) method. Structural equation modeling is a second-generation multivariate statistical analysis that has been gaining attention in the areas of both environmental management [33, 38] and operations management [37]. PLSs were used in this study as it is the most appropriate method of data analysis for small sample size [42]. In PLS, the test of a conceptual model involves two steps namely measurement model (outer model) and a structural model (inner model). The findings of measurement and structural models are presented below.

4. Findings

4.1 Reliability and Validity Test

The present study evaluated the measurement model by assessing the convergent and discriminant validity following the criteria suggested by [7]. Cronbach alpha values were used to test the reliability of data. Table 4.1, shows that all the Cronbach alpha values are above 0.7 which represents a good internal consistency of data [37].

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Table 4.1: Reliability and Validity Test

Constructs	Items	Factor loadings	Cronbach alpha	CR	AVE
Agile Strategy	AS1	.777	.857	.898	.639
	AS2	.698			
	AS3	.773			
	AS4	.870			
	AS5	.870			
Lean Strategy	LS1	.828	.802	.816	. 528
	LS2	.685			
	LS3	.669			
	LS4	.882			
	LS5	.601			
Hybrid Strategy	HS1	.653	.705	.842	.524
	HS2	.813			
	HS3	.777			
	HS4	.647			
Supply Chain Responsiveness	RS1	.657	.873	.901	.531
	RS2	.782			
	RS3	.759			
	RS4	.710			
	RS5	.771			
	RS6	.752			
	RS7	.730			
Supply Chain Efficiency	SE2	0.776	.805	.860	.508
	SE3	0.688			
	SE4	0.626			
	SE5	0.753			
	SE6	0.737			
	SE7	0.683			

The loadings of each questionnaire item on its respective measure were computed for evaluating convergent validity. The acceptable value for each item is 0.6 [1]. Total three items were deleted due to their low factor loadings. Now all the loadings are above the 0.6 mark which is enough for convergent validity [20]. Twenty eight of the 31 loadings were above the strict 0.60 criterion. This strongly supports the convergent validity of the items. In addition to that the composite reliability for all the constructs is more than 0.70 which is above the acceptable level. Then the average variance extracted (AVE) for each construct is above 0.50 which also meets the criteria for convergent validity. So the measurement model exhibits high convergent validity since all factor loadings are above 0.6, all AVEs are above 0.5, and all composite reliabilities (CRs) are above 0.7.

Table 4.2 shows the discriminant validity of the constructs taken in the present study. Discriminant validity is tested through average variance extracted (AVE) suggested by Fornell and Larker (1981). Actually, a construct should share more variances with its indicators than the other constructs. This happens when the AVE is higher than the estimated correlations among each pair of constructs.

Table 4.2: Discriminant validity

	AS	HS	LS	SE	SR
AS	**0.799**				
HS	0.681	**0.726**			
LS	0.198	0.067	**0.723**		
SE	0.588	0.476	0.516	**0.728**	
SR	0.738	0.509	0.212	0.584	**0.735**

A measure showing discriminant validity should be composed of items with high loadings on their appropriate constructs (convergent) but with low loadings on other constructs [15]. The measurement model also demonstrates good discriminant validity since the square root of the AVE for each construct was higher than its correlation with other factors.

4.2 Hypotheses testing based on PLS structural model results

Usually PLS coefficient is used for hypotheses testing that indicate the strength of relationship between a pair of variables. The statistical significance of the structure coefficients was explored in a bootstrapping analysis similar to the procedure used above in evaluating the indicator weights of the measurement model. A precondition for a meaningful explanation of path coefficients is that the overall structural model's quality touches a standard level. The strength of relationship is expressed by R^2. The value of R^2 represents the percentage of variation in the endogenous variables caused by the exogenous variables taken in the study. According to [7], R^2 values of at least 0.19, 0.33, and 0.67 are treated as weak, moderate, and strong, respectively. In the present study the value of R^2 amounts to 0.550 for responsiveness and 0.532 for efficiency (table.4.3). It indicates that the value is very near to strong explanatory power. So, the supply chain strategies are overall adequately responsible for the variance share of retail supply chain performance.

Table 4.3: Output of structural model

	Path coefficients	R square	T Statistics	P value
AS > SR	0.711	0.550	6.583	.000
LS > SR	0.070		1.002	.318
HS > SR	0.020		0.202	.840
AS > SE	0.371	0.532	2.899	.004
LS > SE	0.429		3.665	.000
HS > SE	0.194		1.801	.074

Table 4.3 shows that agile supply chain strategy highly coincided with better supply chain responsiveness for retail stores. The corresponding path coefficient of 0.711 exceeds the value of 0.1, which the literature proposes as the lower limit for practically meaningful paths. Therefore, H1a receives strong support in the sample and it is accepted and this finding is consistent with that of [54]. Again the positive coefficient of 0.07 for the path with adopting lean strategy to enhance retail supply chain performance is in line with H2a. So H2a; lean strategy can influence retail supply chain responsiveness, is accepted and it resembles the findings of [54] but it is insignificant. On the other hand, H3a is not supported as the path coefficient demonstrates very low and insignificant value. So hybrid strategy can't influence the retail supply chain responsiveness much. Again H1b which posited that agile strategy can increase retail supply chain efficiency got a positive path coefficient of 0.371 which is significant at 5% level. So H1b is accepted. Lean strategy was also found to be a significant contributor to retail supply chain efficiency with a positive path coefficient of 0.429 which is significant at 1% level. So H2b is supported. Lastly, hybrid strategy had a positive path coefficient of 0.194 which is not significant at 5% level but got supported as it has a significant path coefficient.

5. Discussion

The present study investigated the roles played by supply chain strategies to enhance the retail supply chain performance. To remain responsive to customer demand, the retail supply chain mangers must think about the strategies along with other supply chain management practices. The present study has shown some meaningful findings regarding the supply chain performance of retail chain stores. Firstly, it is found in the study that agile supply chain strategy is a pivotal factor influencing retail supply chain performance. It is because of the fact that agile strategy always seeks to maximize the satisfaction of customers by providing quick response at affordable costs. It is in line with the arguments of [5], who posited that agility, is the ability to quickly and effectively react to changes in market demand. To remain responsive to the preferences of customers, retailers must align agile strategy in their supply chain. The lean strategy was also found to be a contributor to the retail supply chain performance. It was found

to a significant factor that can increase retail supply chain efficiency but insignificant for responsiveness. As the lean supply chain strategy mostly focuses on waste minimization, it is difficult for companies to gain responsiveness with this strategy. On the other hand lean strategy is appropriate for products having consistent demand and organizations employ this strategy for an efficient supply chain. So the retailers should not concentrate on waste reduction for making their supply chain responsive. However, hybrid strategy was found to be very weakly correlated with retail supply chain responsiveness it could influence retail supply chain efficiency to some extent. Therefore the present study explored three supply chain strategies as the predictors of retail supply chain responsiveness. Out of these three strategies, agile strategy was found to be the most significant followed by lean strategy to influence the retail supply performance. Another predictor; hybrid strategy was found to exhort very weak effect in increasing the performance of retail chain stores. So retail managers trying to increase supply chain performance in terms of responsiveness and efficiency in the changing competitive market should design their supply chain with agility and also should think about lean strategy. Though lean and hybrid strategies are not significantly influencing retail supply chain performance, organizations can use them as a supplementary strategy when needed to increase the overall supply chain performance.

6. Managerial Implications

This empirical research paper reveals the significance of supply chain strategies in achieving better retail supply chain performance. Researchers around the world are very much concerned about the supply chain practices and performances of manufacturing firms but the empirical research literatures are very scarce in retail supply chain. Moreover the supply chain strategies are hardly addressed in research as the predictors of supply chain performance in retail settings. For this reason this research work is noteworthy especially for the retailers. The findings of this study can benefit the supply chain managers involved in retailing. The results showed that retail stores can remain competitive and responsive by adopting agile and lean supply chain strategies. The adoption of agile strategy might bring forth substantial advantage for the retailers to

maintain responsiveness in their supply chain. The results might give some insights to achieve the two-fold goals of retail supply chain. With the application of supply chain strategy, managers can make a wise decision to satisfy customers' needs at affordable costs and maintain a responsive supply chain. This study also demonstrates that hybrid strategy bears little importance in increasing retail supply chain performance. The study suggests that managers should not only emphasize on cost reduction and waste minimization to manage retail supply chain successfully, they should think about the strategy that might fit with the objective of the organization.

7. Conclusion

The findings of this study can be important guidelines for the retail managers. On the basis of empirical findings, they can formulate strategies that might help them to achieve organizational goals by satisfying customers. Though the findings of this research have some implications for the retail chain stores, it is not without any criticisms. This study is done in a developing country whose infrastructures might not resemble with those of developed countries. So the findings might not be fully generalizable to the developed economies retailing. Another limitation is that the data were collected from the capital city of Bangladesh and the outlets situated outside Dhaka have been excluded. So the findings might not represent the picture of whole industry. Furthermore, this study only considered supply chain strategies as the catalyst for retail supply chain performance but there are some other factors that might help companies to enhance supply chain performance. Future researchers can include the supply chain management drivers and practices to investigate to what extent supply chain performance is influenced by these factors. Further studies can be done with large samples as the present study was conducted with a relatively small group of respondents.

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