

Drivers of Retail Supply Chain Efficiency: Moderating Effect of Lean Strategy

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Abstract— The retail chain store business is an infant stage of growth and development in Bangladesh and so are the supply chain management practices in this sector. The main objective of this study is to identify the key drivers of retail supply chain efficiency. Moreover this study aims at examining the moderating effect of lean supply chain strategy on the link between supply chain drivers and performance. For the purpose of the study, data were collected with a structured questionnaire from 115 participants consisting of outlet and supply chain managers of some selected retail chain stores in Bangladesh. Collected data were analyzed using partial least squares (PLS) structural equation modeling with the support of the software Smart PLS 2.0 M3. Findings revealed that out of five supply chain drivers, four namely inventory management, use of IT, transportation management and coordination were the most significant determinants of retail supply chain efficiency while suppliers' role was found to be negatively correlated. Moderating effect of lean strategy was also noticed on the link between two drivers namely transportation management and coordination with retail supply chain efficiency. The outcomes of this empirical study may equip retail supply chain managers with some knowledge that they might use in the competitive business environment to enhance retail supply chain performance by utilizing the limited firm resources.

Keywords: *Supply chain efficiency, lean strategy, supply chain drivers and retail chain stores*

1. Introduction

Supply chain is a network of activities that perform the functions of procurement of materials, transformation of these materials into immediate and finished products and the distribution of these finished products to customers. Very often it happens that customers do not get their required products at stores due to improper management of supply chain that consequently leads to less profit and customer loss. A few firms have been able to perform the value creation activities in the supply chain properly and satisfy customers' needs by responding timely at affordable costs. It is commonplace for retail chain stores

that a lot of products remain idle in one region and other regions lack the required items due to the improper supply chain management [10]. This scenery is also common in Bangladesh as the retailing industry here is fragmented and undeveloped compared to its South Asian counterparts [34].

However, this structure is changing due to globalization, economic and trade liberalization, changing patterns of consumers' shopping behavior, growth of urbanization, substantial increase of middle class consumers, government's liberal attitude towards foreign imported food products and the growth of organized superstores [34].

As a result the annual turnover of the superstores now stands more than Tk. 16 billion (1600 crore) with a sales growth rate of 15-20 percent. This scenario has forced the superstore owners to expand their operation with 600 more retail outlets in the next five years [35]. But till 2015, around 200 retail chain stores are in operation in the country. Like other countries, the retail chain store industry in Bangladesh is hugely complex because it involves so many markets, products, processes and intermediaries. No wonder the supply chain for delivery of necessary commodities and services is often fragmented and understood only in discrete sections. Changes in one area impact upon the others, and environmental factors such as pricing, regulatory change or actions by competitors impact the whole supply chain in ways that are not easily understood or managed [11]. Ref. [8] noted that accelerating technology, the commoditization of healthcare, increasing demands from populations all influence the approach that suppliers of products and services worldwide need to take if they are to design and manage an effective supply chain that will be capable of exploiting their intellectual property in a sustainable way providing safe and continuous provision of products or devices and sustaining with resilience yet still be flexible and cost efficient.

Despite its massive growth over the past ten years, the retailing sector has not expanded structurally due to lack of knowledge of retailing management and lack of academic researches [18]. Consequently this potential sector has small amount of share (only 2%) in the total grocery retail industry of Bangladesh and significant service gap (gap between the customers' perception of services and their expectations) has been found in all dimensions of service quality of retail chain stores in Bangladesh [15]. As the retail chain store business is an infant stage of growth and development, supply chain management (SCM) practices are not that much efficient in this sector. It is identified that there is a lack of adequate studies conducted in the area of retail supply chain management [18]. As a result, in spite of huge potential, Swopno, the biggest retail chain company in Bangladesh, had to close some of their outlets in the year 2010-2012 due to bad performance of managing their supply chain. But no research initiatives have been taken so far to explore the factors that might influence superstores supply chain performance. From that ground the present research initiative has been taken to identify the key factors affecting the operational performance in term of supply chain efficiency of retail chain stores in Bangladesh. So, the main objective of this study is to identify the key drivers of retail supply chain efficiency. Moreover this study aims at examining the moderating effect of lean supply chain strategy on the link between supply chain drivers and performance.

2. Literature review

According to [10], the supply chain must use three logistical (facilities, inventory, transportation) and three cross functional drivers (information, sourcing, pricing) to reach the performance level organizations are looking for. For each of the drivers, supply chain managers must make a trade-off between efficiency and responsiveness based on interaction with the drivers. The combined impact of these drivers determines the performance of the entire supply chain. Through a rigorous literature review this study has identified suppliers, inventory management, use of IT, transportation management and coordination as the drivers of supply chain performance. These drivers have been discussed in details in the next part.

2.1 Supplier

Retailers are mostly dependent on suppliers for sourcing. Sourcing is the purchasing of products—or components that go into a product – from the supply chain. Sourcing decisions have a profound impact on distribution and inventory disposal in a supply chain. Therefore, sourcing and procurement decisions directly affect the efficiency of the entire supply chain [49]. The sourcing process involves a host of essential tasks, such as managing

supplier relationships, identifying suppliers, managing cost negotiations, and evaluating supplier performance after product shipment [18]. To help companies achieve their business objectives, product development and sourcing teams must be closely aligned throughout the entire product development process. Communication between suppliers and retailers has become more vivid and fruitful with the transmission of Point of sale (POS) data and the use of electronic data interchange (EDI). Point of sale data is increasingly important, allowing suppliers to know the actual consumer demand patterns of fast moving items, which enables suppliers to prepare for the next order before the retailer makes the order [5]. The connection between the two entities electronically through the use of EDI allows for quicker information sharing, which then leads to shorter order cycle times. The major difference between the traditional supply chain and the one emerging during this time is the focus on the interaction between the retailer and supplier, rather than on each entity's supply chain practices within their own organization [7].

At present for better collaboration, retailers and suppliers are continuously sharing demand information that was impossible previously. In the mass merchandising segment of the retail industry, retailers realize that their suppliers can supply their products in such a way that significantly reduces costs on the retail end. (VMI) Vendor Managed Inventory is another form of retailer supplier collaboration. When retailers participate in VMI, they are allowing their suppliers to know the actual demands of their products and provide automatic replenishment at the retailing or distribution facilities. VMI is effective only when communication and trust exist in the partnership because both incur risks as a result of sharing sensitive information across companies. Therefore, research suggests that in retail supply chain retailers and suppliers should treat each other as partners to maximize the gain for both of them. It was also found in some studies that suppliers can increase supply chain performance [48], [11], [45] and [51]. Another study by [44] identified suppliers as the most vital part in a supply chain and they can increase performance significantly. Therefore it can be hypothesized that

H1: Suppliers positively influence retail supply chain efficiency.

2.2 Inventory management

Inventory management is one of the pivotal tasks of retail supply chain management. Retailers are always busy with lessening the risk of stock outs by carrying buffer inventory for items with high demand. Retailers are now realizing the cost of losing sales along with the costs of holding idle inventory. As retailers mostly deal with fast

moving consumer goods, they always need to adjust supply chain strategies as per market demand. Initiatives are being taken to increase the velocity of products through the supply chain and increase the accuracy of inventory management [12]. Managing inventory is a balancing act. Having adequate inventory on hand — but not getting caught with obsolete or out-of-season items — involves skillfully balancing a number of competing requirements and staying alert to changing external factors [15]. In a retail context, where consumer tastes and preferences are constantly shifting, maintaining a wide assortment of stock is critical. Obtaining lower prices from suppliers by making volume purchases is desirable, but not if it means ending up with slow-moving inventory that must eventually be sold at a discount or returned. Increasing the rate of turnover and keeping stock levels low is important, but not if it means sacrificing customer service or incurring excessive shipping costs by expediting orders when stocks run too low. Inventory managers and analysts can use predictive analytics to create models that score inventory levels by SKU to identify which products are likely to be stocked out [15].

There are some studies that revealed the importance of inventory management in increasing supply chain performance. Ref. [47] found that holding safety inventory is positively correlated with supply chain responsiveness but it is negatively related to efficiency as it incurs costs. Ref. [46] conducted a study on the use of VMI in the manufacturing industry. They found that VMI can increase the efficiency. Ref. [42] conducted a study on perishable inventory management practices and supply chain performance. The study found that proper inventory management is significantly ($P \leq 0.05$) related to supply chain efficiency. Ref. [50] have analyzed that the increasing customer requirements are a great stimulus for networked and integrated inventories management and networked inventory management system is positively related to organizational efficiency and performance. So it is hypothesized that;

H2: Inventory management positively influences retail supply chain efficiency.

2.3 Information technology

Information technology has changed the way of doing business. Strategic management views information technology as a source for creating sustainable competitive advantages [7]. Ref. [29] states that information technology can change the structure of an industry by setting up entry and exit barriers. It is also a fact in supply chain management as information deeply affects every part of a supply chain. It serves as the connection between various stages of a supply chain, allowing them to coordinate and maximize total supply

chain profitability. Information is also crucial to the daily operations of each stage in a supply chain. Information sharing can include end-customer demand, sales forecasts, order status, inventory levels, capacity availability, lead times, and quality [43]. However, from these distinct types of data, the main focus is generally on demand information. According to [24], creating a transparent, visible demand pattern that paces the entire supply chain" is the primary objective of collaboration in the supply chain. Significant efforts have been made to use demand information upstream in the chain in a timely manner, generally based on IT technology solutions, such as electronic data interchange systems or Internet technologies. These solutions facilitate the sharing of real-time information in the supply chain and allow the organization to be more effectively coordinated at the network level [43]. In particular, demand information exchange in the form of actual orders, order commitments, and forecasts have been shown to reduce the need for inventory, increase service level, and improve production efficiency [25]. Use of JIT system, EDI, ERP and some other information technologies is contributing a lot to improved supply chain performance. It is found in some studies that use of IT is positively and significantly related to supply chain performance [2], [28], [39]. Hence it can be hypothesized that;

H3: Use of IT positively influences retail supply chain efficiency.

2.4 Transportation management

Transportation refers to the movement of products from one location to another. It is an important driver of supply chain because it carries the products to those points where demand exists. Products are rarely consumed at the place where these are produced. So transportation adds utility to the products by making them available to the customers. Any supply chain's success is closely linked to the appropriate use of transportation [10]. Transportation decisions impact supply chain profitability and influence both inventory and facility decisions within a supply chain and it is a key driver of the overall profitability of a firm because it directly impacts both the supply chain cost and the customer experience. Good distribution can be used to achieve a variety of supply chain objectives ranging from low cost to high responsiveness [8]. As a result, retailers must decide which transportation system they will follow to distribute products in the supply chain network. A research by [3] showed that inefficient transportation system is negatively related to supply chain efficiency. On the other hand, proper transportation management that reduces unit transportation costs by more than a half is proposed by [4] which is positively related to supply chain efficiency. So it is hypothesized that;

H4: Transportation management positively influences retail supply chain efficiency.

2.5 Coordination

Managing specific supply chain drivers is an important aspect of Supply Chain Management [40]. These drivers include facilities, inventory, transportation, information, sourcing and pricing, which interact with each other [11] and have an impact on the supply chain's responsiveness and efficiency [24]. Supply chain management is the effective coordination and integration of different parties with different objectives towards a common goal. The great potential for improvement in these objectives through effective supply chain management mechanisms has recently been realized [50], [11]. Improvement in one part of the supply chain may not pay off if other parts of the chain can't keep up. Companies have learned this truth recently [11]. Organizations have realized that coordination among supply chain partners can enhance the overall performance of the supply chain [24].

Traditionally, all the drivers of SC have worked independently. Unfortunately, although they seem to be working towards a common goal, these organizational units have different objectives. This conflicting situation does not only create as many different business plans as the number of organizational units but it also decreases the overall gain of the drivers in the supply chain significantly [10]. A company's success or survival against these challenges does not come from isolated efforts in different companies and/or departments within the same organization, but through coordinated efforts between different organizational units as well as separate organizations [3]. Therefore supply chain structure implies the coordination of the focal organization and the links between supply chain members [19].

Ref. [39] conducted a study on SMEs supply chain in India and the findings were that due to better coordination, machine hour utilization has increased substantially. It means that coordination is positively related to supply chain efficiency. Ref. [30] argued that coordination among the partners in supply chain has a positive impact on the reduction of bullwhip effect, inventory costs, and supply chain flexibility. Ref. [33] conducted a research in the industrial settings and found that lack of coordination in the chain has a negative impact on the supply chains performance, meaning that coordination is a must for ensuring supply chain responsiveness and efficiency. Therefore it is hypothesized that;

H5: Coordination positively influences retail supply chain efficiency.

Supply chain strategies may be designed to be more efficient or to be more effective [23]. Ref. [11] conducted a comparative study in USA and Taiwan and found that the sample data from the US did not support the hypothesis that supply chain strategies have any direct impact on organizational performance. It can only influence the relationship between supply chain management practices and performance indirectly. Most organizations less focused on developing an effective performance measurement and performance metrics for supply chain management [21]. According to Ref. [26] problems in measuring the performance of supply chain management is the lack of relationship between strategy and performance measurement. This result shows that supply chain strategy had no direct relationship with supply chain performance. So the present study intends to examine whether lean supply chain strategy can play moderating role on the link between supply chain drivers and retail supply chain efficiency. Hence the following hypotheses are developed to test the moderating effect.

H6: Lean strategy moderates the relationship between suppliers' role and retail supply chain efficiency.

H7: Lean strategy moderates the relationship between inventory management and retail supply chain efficiency.

H8: Lean strategy moderates the relationship between use of IT and retail supply chain efficiency.

H9: Lean strategy moderates the relationship between transportation management and retail supply chain efficiency.

H10: Lean strategy moderates the relationship between coordination and retail supply chain efficiency.

3. Methodology

As mentioned earlier that this study aims at identifying the factors affecting the retail supply chain efficiency with the analysis of moderating effect of lean strategy, a methodological approach was followed to achieve the research objectives. So there are five independent variables namely suppliers, inventory management, use of IT, transportation management and coordination; one moderating variable namely lean supply chain strategy and the dependent variable is retail supply chain efficiency. Data were collected from the respondents with a structured questionnaire. The items for the variables have been adapted from previous studies [25], [6], [44] in a way so that each item represents the content of definition for the respective constructs.

The items were measured with 5 point Likert scale with response options ranging from strongly agree (5) to strongly disagree (1). Data were collected from 115 participants consisting of outlet and supply chain managers of some selected retail chain stores operating in the capital city of Bangladesh. The outlet and supply chain managers were chosen as the samples because of their close connection with the operation of retail chain stores and they are the right persons to give the answers for the questions. Respondents were selected through probability sampling using cluster sampling on geographical basis as only retail chain stores operating in Dhaka city were considered. Collected data were analyzed using partial least squares (PLS) structural equation modeling with the support of the software Smart PLS 2.0 M3 [41]. Structural equation modeling is a second-generation multivariate statistical analysis that has been gaining attention in the areas of both environmental management [38] and operations management [37]. PLS was used in this study as it is the most appropriate method of data analysis for small sample size [41].

The hypotheses of this study were tested based on empirical data by means of structural model of partial least squares (PLS) method. 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 PLS – SEM analysis

There are two parts in PLS SEM analysis; measurement model and structural model. In the first part, measurement model gives the values of items loadings, Cronbach alpha for reliability test, values for content validity, path coefficient and coefficient of determination. On the other hand structural model gives the values of t-statistics, items significance and predictive relevance. These two models' output has been discussed in the next section.

In the measurement model of PLS analysis constructs are measured on the basis of some criteria that are necessary for validating the results. The criteria include reliability and validity of data that are measured in terms of Cronbach alpha value, composite reliability, outer loadings and average variance extracted (AVE). Values for all these criteria have been shown in Table 4.1.

Table 4.1 exhibited the results of construct validity analysis of this study. The construct validity consists of convergent validity that includes the analysis of average variance extracted (AVE).

Factor Loading, Cronbach's Alpha and Composite Reliability. Ref. [22] suggested that items having loadings more than 0.5 are acceptable. It is clearly shown in Table 4.1, that all items loadings are greater than 0.6 and significant at the 0.001 level, indicating convergent validity at the indicator level. So it meets the threshold set by the researchers. Ref. [36] proposed that Cronbach alpha value more than 0.7 is acceptable and above 0.8 is a good scale for exploratory purposes. This is also supported by [22].

Table 4.1: Measurement model (Outer Model)

Variable	Items	Loadings	Cronbach alpha	CR	AVE
Supplier	S1	0.760	0.827	0.873	0.536
	S2	0.734			
	S3	0.738			
	S4	0.731			
	S5	0.649			
	S6	0.775			
Inventory management	IM1	0.825	0.735	0.833	0.558
	IM2	0.699			
	IM3	0.642			
	IM4	0.807			
Information Technology	IT1	0.780	0.786	0.852	0.538
	IT2	0.801			
	IT3	0.673			
	IT4	0.645			
	IT5	0.755			
Transportation	TR1	0.781	0.750	0.822	0.606
	TR2	0.763			
	TR3	0.792			
Coordination	CO1	0.755	0.791	0.856	0.543
	CO2	0.721			
	CO3	0.685			
	CO4	0.756			
	CO5	0.764			
Lean Strategy	LS1	0.856	0.806	0.864	0.561
	LS2	0.725			
	LS3	0.692			
	LS4	0.752			
	LS5	0.719			
Efficiency	SE1	0.776	0.805	0.860	0.508
	SE2	0.688			
	SE3	0.626			
	SE4	0.753			
	SE5	0.737			
	SE6	0.683			

In this study, Cronbach alpha values of all the constructs are above 0.7 and some have values more than 0.8. So the data of this study represented good internal consistency. In PLS-SEM analysis using composite reliability as the indicator's internal consistency is recommended by [22].

According to [20] acceptable value for composite reliability is greater than 0.7. The model posed good internal consistency as the composite reliability value for all the constructs is higher than 0.8 where SUP (0.873), IM (0.833), IT (0.852), TR (0.822), CO (0.856), LS (0.864) and SE (0.860). The calculated values are all above conventional cut offs for reliability > 0:70 [36]. So it is clear from the statistical values of measurement

model that all the constructs have good internal consistency.

Finally, average variance extracted (AVE) was analysed to examine the construct validity. The average variance extracted (AVE) echoes the variance captured by the indicators relative to measurement error. According to [5], the average variances extracted (AVE) values ranged between 0.5 and 0.7 indicates a good level of construct validity of the measures. Table 4.2 showed that all the constructs have the recommended average variance extracted (AVE) value which is 0.5 and more.

4.2 Discriminant validity

Discriminant validity measures whether two factors are statistically different or not [1]. The discriminant validity is essential to confirm the construct validity. This step is compulsory in order to test the hypothesis through path analysis. Table 4.2 demonstrated the discriminant validity of the data in measurement model.

Table 4.2: Discriminant validity

	SUP	IM	IT	TR	CO	LS	SE
SUP	0.732						
IM	0.277	0.747					
IT	0.419	0.212	0.733				
TR	0.087	0.253	0.064	0.778			
CO	0.479	0.201	0.526	0.042	0.737		
LS	0.121	0.248	0.143	0.076	0.195	0.748	
SE	0.367	0.428	0.538	0.275	0.548	0.499	0.712

Table 4.2 depicted the results of discriminant validity test of the constructs for the present study. Discriminant validity is tested through average variance extracted (AVE) suggested by [20]. According to [14] the average variance shared between each construct and its indicators should be greater than the variance shared between the construct and other construct. This happens when the AVE is higher than the estimated correlations among each pair of constructs. 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. R^2 value represents the variation in the endogenous variables caused by the exogenous variables. The strength of relationship between the five exogenous variables and one endogenous variable is 0.501. In this study, the value of R^2 for SE was 0.501. Based on the approach, the values of R^2 are substantial for this study [13]. The R^2 value of .501 for SE indicates that 50.10% variations in retail supply chain efficiency were caused by the five supply chain drivers and remaining 49.90% is influenced by other factors that have not been considered in this study. To assess the overall quality of the research model (both measurement and structural), Goodness of Fit (GOF) was measured suggested by [47]. This GOF allows calculating the explanatory power of the PLS model. The GoF for the present study is 0.527 which

falls in the large explanatory power range [51]. Thus, the GoF value indicates a good overall model fit.

4.3 Results of hypothesis testing (Structural Model) (Inner Model)

Hypotheses testing in PLS-SEM analysis are done by generating T-Statistics for significance testing for inner model. T statistics can be found through bootstrapping process in PLS analysis. The significance level for two-tailed t-test was 5% and the path coefficient will be significant if the T-Statistics is larger than 1.96.

Table 4.3: Structural model output for hypotheses testing

Hypothesis	Path Coefficient	Standard Error	T-Value	P-Value
SUP -> SE(H1)	-0.004	0.104	0.045	0.481
IM -> SE(H2)	0.254	0.083	3.027	0.001
IT-> SE(H3)	0.298	0.106	2.809	0.002
TR -> SE(H4)	0.178	0.084	2.119	0.018
CO-> SE(H5)	0.335	0.099	3.377	0.000

H1, that posited suppliers positively and significantly influence the retail supply chain efficiency. Table 4.3 showed a path coefficient of -0.004 between supplier and retail supply chain efficiency. It is clear from table 4.3 that suppliers' role is negatively correlated with retail supply chain efficiency. The t statistics for the variable is 0.045 and p value is 0.481 that indicate insignificant effects. Thus, hypothesis 1 was not accepted as the findings showed negative and insignificant relationship between suppliers' role and retail supply chain efficiency.

H2 received strong supports from the findings since its path coefficient is 0.254 which is enough to be a significant path as suggested by [31]. Again the t statistics for this variable is 3.027 which is highly significant with a p value of 0.001. So hypothesis 2 which posited that inventory management is an important supply chain driver to increase retail supply chain efficiency was accepted. This finding is also consistent with the findings of the studies conducted by [42], [50] & [46]. H3 (IT) also got strong support from the findings. The path coefficient of this variable with retail supply chain efficiency is 0.298 that exceeds the limit of a significant path [31]. This variable got t- statistics of 2.809 and the corresponding p value is 0.002 that identified IT as a significant contributor to retail supply chain efficiency. The H3 is accepted. This hypothesis also got support from previous studies done by [28], [39] that also showed a positive and significant relationship between use of IT and supply chain performance.

On the other hand, hypothesis 4 that posited transportation management as a significant driver to increase retail supply chain efficiency has got positive path coefficient value of 0.178. According to [31], it is a significant path. Also the t-statistics and p value for this variable are 2.119

and 0.018 respectively; so both of the values for transportation management are significant at 5% level. Hence hypothesis 4 that transportation management is positively and significantly related to retail supply chain efficiency is accepted. This is consistent with the findings derived from the studies done by [16] & [17].

Hypothesis 5 that posited coordination among departments can significantly increase retail supply chain efficiency got strong support from statistical findings. The path coefficient between coordination and retail supply chain efficiency is 0.335. So, hypothesis 5 was accepted as the value of path coefficient was significant. This indicated that, there was strong positive relationship between coordination and retail supply chain efficiency. Further, the t-statistics and p value for this variable are 3.377 and 0.000 respectively; so coordination is significant at 5% level. Hence, hypothesis 4 that coordination is positively and significantly related to retail supply chain efficiency is accepted.

4.4 Moderating effect

Moderating effect was tested to see whether lean supply chain strategy can strengthen or weaken the relationship between supply chain drivers and retail supply chain efficiency. In order to determine the function of these moderators, Smart PLS moderating effect tool, which uses the product indicator approach recommended by [9], is used. In PLS SEM analysis, moderating effect exists if the path coefficient of interaction effect is significant.

The results of moderating effect test are summarized in Table 4.4. Firstly, the interaction of effect of lean strategy was examined in the relationship between suppliers' role and retail supply chain efficiency. The path coefficient of interaction effect (Suppliers*lean strategy) on efficiency was -0.632 which is not significant at 5% level (t-1.019). The findings indicate that the lean supply chain strategy can't moderate the relationship between suppliers' role and retail supply chain efficiency. So hypothesis 6 is not supported.

Table 4.4: Output of moderating effects

Relationship	P-Coefficient	T-statistics	P value	Comments
SUP*LS -> SE	-0.632	1.019	0.155	Insignificant
IM*LS -> SE	0.569	0.570	0.248	Insignificant
IT*LS -> SE	0.352	0.470	0.319	Insignificant
TR*LS -> SE	0.951	1.658	0.050	Significant
CO*LS -> SE	0.844	2.373	0.009	Significant

In the interaction effect of lean strategy and inventory management on retail supply chain efficiency, the path coefficient was found 0.569 with a t- statistics of 0.570 which demonstrates an insignificant path (table 4.4). So it can be inferred that lean supply chain strategy doesn't moderate the relationship between inventory management

and retail supply chain efficiency. Hence, the hypothesis 7 is not supported.

It is clear from the Table 4.4 that the path coefficient of interaction effect of lean strategy and use of IT on retail supply chain efficiency is 0.352 with a p value of 0.319 which is not significant at 5% level. The findings conclude that there is no moderating effect of lean supply strategy in the relationship between use of IT and retail supply chain efficiency; thus hypothesis 8 is not supported. Table 4.4 shows that the path coefficient of interaction effect of lean supply chain strategy and transportation management on retail supply chain efficiency is 0.951 with p value of 0.050 which denotes a significant path. The lean supply chain strategy significantly moderates the relationship between transportation management and retail supply chain efficiency. So hypothesis 9 is supported. Finally the moderating effect of lean supply chain strategy on the link between coordination and retail supply chain efficiency was tested. Table 4.4 shows that the path coefficient of interaction effect is 0.844 and the t statistics is 2.373 which is enough to be a significant path. Therefore, it justifies that lean supply chain strategy has significant moderating effects in the relationship between coordination and retail supply chain efficiency; and H 10 is supported.

5. Discussion

Providing products and services at reasonable costs to the customers highly depends on how much the organization's resources are utilized. The findings of this study reflect that supply chain drivers play vital roles in increasing retail supply chain efficiency. Out of the five supply chain drivers considered in the study, only suppliers' role was found to have minor negative influence on retail supply chain efficiency. It might be due to the fact that suppliers sometimes charge higher prices for their products that affect the efficiency of retail supply chain.

On the other hand, resource utilization is an internal matter of retail chain stores and suppliers can have very little influence in this regard. The findings indicate that when suppliers' role increases, it reduces retail supply chain efficiency but the extent is little (only 0.04%). So suppliers are not important for gaining retail supply chain efficiency. This finding is inconsistent with the manufacturing firms' supply chain efficiency where it is shown that suppliers are integral part of the producers. The manufacturers fully depend on suppliers for the raw materials to make the finished products and their pricing policy affects the manufacturing costs that relate to efficiency. This means that suppliers have very little to do for retail supply chain efficiency.

Inventory management was found to be highly significant factor that can increase retail supply chain efficiency. It is in line with the assumptions by [28] who suggested that proper inventory management can reduce the level of idle inventory as well as ensure the best capacity utilization of warehouses. It is also vivid in the findings of this study that retail supply chain efficiency can be increased by proper inventory management.

As the retailers deal with the fast moving consumer goods, their inventory management exerts profound impact on supply chain efficiency. So inventory management is an important factor of retail supply chain efficiency.

Therefore, this finding validates the findings of [42], [46] who identified through their research that proper inventory management can increase supply chain efficiency. Use of information technology (IT) is playing a significant role in increasing supply chain performance. It is also found in this study that use of IT can enhance retail supply chain efficiency which is in line with the observation of [6] who also observed that use of IT significantly improves supply chain performance. It is due to the fact that use of IT helps firms to do the work very quickly that would take much time and resources to complete manually. Retailers are doing internal process integration, quick order fulfilment and timely inventory replenishment with the help of modern information technology. So when these activities are done properly at a convenient time period, it automatically increases the efficiency of a supply chain.

These results, to some extent, confirmed those of [16], [42] whom based on a survey of manufacturers, distributors, and industrial customers in the U.S., reported that use of information technology had a positive impact on their efficiency.

Transportation management was also found to be a significant supply chain driver that can increase retail supply chain efficiency. The majority of perishable products sold in grocery retail stores demand careful handling, special transportation equipment, and cold storage facilities to ensure that the quality is preserved until the expiration date. For this reason experts [11], [30] suggested that transportation network design of these products have substantial effects on supply chain performance. The present study also revealed that transportation management is positively and significantly related to retail supply chain efficiency. Better management of transportation and distribution network is an important determinant of retail supply chain efficiency.

It is due to the fact that retailers are using their own transportation services and they utilize the capacity to the fullest that ensures on time delivery and removes delay in the transportation process. So on the basis of this study, it

can be concluded that transportation management is an important supply chain driver that can increase retail supply chain performance to greater extent. The retail chain stores in Bangladesh should utilize their transportation and distribution network in a way that ensures best capacity utilization and thus increases their supply chain efficiency.

As mentioned earlier, coordination among the parties in a supply chain network has become an indispensable part and it was found in this study that coordination is positively and significantly related to retail supply chain efficiency. It means that if coordination in the supply chain increases, it enhances retail supply chain efficiency.

This finding is in line with the findings of [32] who also showed that coordination in the supply chain network can significantly contribute to the improved supply chain performance. Thus the study has cemented the assertion that coordination in the supply chain ensures decreased costs by avoiding unnecessary activities, reduced inventory and shorter order cycle times [27] that improves efficiency in supply chain. Therefore retail supply chain managers should concentrate on the coordination in their supply chain so that the best performance can be achieved.

The findings of this study showed that there is significant moderating effect of lean strategy in the relationship between transportation management and retail supply chain efficiency. Retail supply chain efficiency increases in the presence of interaction effect between transportation management and lean strategy. Therefore the findings of this study suggest the adoption of lean strategy with transportation driver of supply chain to improve retail supply chain efficiency. Again, in this study, lean strategy moderated the relationship between coordination and retail supply chain efficiency. It was found that the interaction effect between lean strategy and coordination significantly increases retail supply chain efficiency. It indicates that lean strategy works better to increase retail supply chain efficiency when there is good coordination among the parties in the supply chain network.

This study portrayed that lean supply chain strategy along with the supply chain drivers can enhance retail supply chain efficiency. There is no moderating effect of lean strategy was found in the relationship between the remaining three supply chain drivers (suppliers' role, inventory management and use of IT) and retail supply chain efficiency. Looking at the direct effect of suppliers' role on retail supply chain efficiency, it is clear that suppliers exert negative influence; when there is interaction between lean strategy and suppliers' role, it also shows negative path but insignificant. The interaction effect of lean strategy and inventory management on retail supply chain efficiency was also found to be insignificant

that indicates lean strategy doesn't moderate the relationship. Moderating effect of lean strategy was also assessed on the link between use of IT and retail supply chain efficiency; and it was found that lean supply chain strategy didn't have any moderating effect on retail supply chain performance. So the lesson derives from the findings is that retail supply chain efficiency can be improved when lean supply chain strategy is applied with transportation and coordination drivers of supply chain performance while this strategy can't influence retail SC efficiency by its interaction effects with other three supply chain drivers namely suppliers' role, inventory management and use of IT.

6. Conclusion

This study identifies some specific supply chain drivers that increase the retail supply chain efficiency. The outcomes of this empirical study may equip retail supply chain managers with some knowledge that they might use in the competitive business environment to enhance retail supply chain performance by utilizing the limited firm resources. From this study, managers can know which supply chain drivers are most important for increasing retail supply chain efficiency and then work accordingly. Moreover, this study revealed that retail supply chain efficiency can be improved in some aspects if lean supply chain strategy is followed with the supply chain drivers. As there is scarcity of studies on retail supply chain management, this study will enrich the body of knowledge in the context of retailing management.

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