Impact of Supply Chain Drivers on Retail Supply Chain Performance

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Abstract
Supply chain performance is a vital issue for making products available to the customers at affordable costs. The objective of this study is to identify the drivers of retail supply chain performance. For the purpose of the study, data were gathered from the respondents through a structured questionnaire survey. The collected data were analyzed using Partial Least Squares Structural Equation Modeling (PLS-SEM) technique with smart PLS 2.0M3 software. Data analysis findings reveal that suppliers’ role, use of IT, inventory management, transportation management and coordination are the significant determinants of retail supply chain performance. The findings of this study bear deep significance both in practical and theoretical aspects.

Keywords: Supply chain drivers and performance.

1. Introduction
Retailing is an activity that involves buying goods or services and subsequently selling them to the final consumers, usually in small quantities and without transformation (Vera, 2012). Retail superstores offer a good variety of products sought by households. It is often seen that superstores start their business with a huge bang while some of them become successful and most of them leave the market with huge loss (Islam, 2012). It happens for many reasons but the main reason was their inability to respond to customers’ preferences at affordable costs (Khan et al., 2014). Firms that could perform the value creation activities properly have been successful in satisfying customers’ needs by responding timely at affordable costs. Therefore managing retail supply chain is an important issue for meeting customers’ needs profitably. On the other hand, Halldorsson et al. (2008) and Hult et al. (2006) argued that proper retail supply chain management begets huge benefits for the firms. Since retail supply chain is complex with large networks and huge products, it becomes sometimes difficult to manage the supply chain. For this reason, it is important to know the essential elements that might ensure better retail supply chain performance. Moreover, it is a pressing need to provide products on demand and maintain good services to the customers as they are very much demanding (Coe and Lee, 2013; Frédéric and Thomas, 2015). Therefore, it is essential to find out how retailers can improve their supply chain performance. Under this backdrop, the present study aims at investigating the relationships between supply chain drivers and performance in retailing context. Hence, the main objective of this study is to identify the key drivers of retail supply chain performance.

2. Literature Review
The present study set out to identify the important drivers of supply chain performance of retail chain stores. Supply chain performance of an organization refers to its capacity to meet customer requirements on demand. A number of measures have been proposed in the academic literature for evaluating overall supply chain performance and the most common measures are accuracy, responsiveness, on time complete deliveries, reduction of inventory and mutual continuous improvement (Beamon, 1999). In this study, for the retail supply chain performance measures, operational performance has been considered in terms of supply chain responsiveness and supply chain efficiency as proposed by Beamon (1999), Gunasekaran et al. (2001), and Ho et al. (2002). Among the determinants of supply chain performance, supply chain management practices have been found to be positively correlated with supply chain performance (Catalan and Kotzab, 2003; Roh, 2009; Squire et al., 2009; Sukati et al., 2011; Thatte, 2007). On the other hand, supply chain integration which consists of internal and external integration is also being used by researchers (Boon-itt and Wong, 2011; Flynn et al., 2010; So and Sun, 2011; Swink and Song, 2007); as the determinants of supply chain performance. In supply chain management practices and integration, most of the researchers have found suppliers’ role, customer relationship, information technologies and internal integration as the determinants of supply chain performance (Alexander et al., 2013; Chong et al., 2011; Danese et al., 2013; Lao et al., 2010; Miguel and Brito, 2011; Qi et al., 2009; Roh, 2009; Sukati et al., 2011; Thatte, 2007). Apart from SCM practices and Integration, a number of drivers were proposed by Chopra and Meindl (2007) as the determinants of supply chain performance. Chopra and Meindl (2007) developed a framework for supply chain management and in this framework a link among the supply chain drivers, strategies and competitive advantage was shown. The framework suggests that companies should manage these drivers (facilities, inventory, transportation, information, sourcing & pricing) to achieve the performance level they want and maximize the supply chain profits.

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(Chopra and Meindl, 2010). They proposed these drivers as the pillars of supply chain performance. Among the drivers of supply chain performance developed by Chopra and Meindl (2010), use of information technology and suppliers’ role are also discussed in supply chain management practices and integration. But inventory management and transportation management are also important determinants of supply chain performance (Creazza et al., 2010; Demir, 2013a; Kewl, 2013; Kumar, 2015; Stanger et al., 2012; Tanskanen et al., 2009; Thontowi et al., 2010), which have been ignored in supply chain management practices and integration. On the other hand, coordination in the supply chain activities has gained much attention as an important driver of supply chain performance (Kumar, 2015; Qudus et al., 2012; Rajesh, 2011). Hence the present study uses suppliers, inventory management, IT, transportation management and coordination as the drivers of supply chain performance. Detailed descriptions of these five variables and their relationship with supply chain performance have been discussed below.

2.1. Suppliers
Suppliers include those parties providing the finished products to the retailers. Since retailers rely on the suppliers for the products sold at their outlets, the suppliers become an integral part of retail supply chain. Very good collaboration with suppliers is a must for retail supply chain because the retailers deal with variety of products and most of them are daily necessities (Forslund, 2014). Therefore retailers should work very closely with the suppliers for improving their supply chain performance. Previous studies also found that retailers can improve their supply chain performance with better collaboration of the suppliers (Sosa et al., 2014; Sukati et al., 2011; Yasushi, 2013). Hence the following hypothesis can be derived in this study:

H1: Suppliers’ role is positively related to retail supply chain performance.

2.2. Inventory Management
Inventory includes all the stocks ready for sale in the retail outlets. Retailers have to understand how much inventory they should always have in stock so that they can manage the ongoing demand. It is also essential to forecast the future demand of products precisely to meet customer demand responsively and affordably. In a retail context, where consumer tastes and preferences are continuously changing, maintaining a wide assortment of stock is critical (Helena, 2015). Therefore, organizations have to think about how many units of a particular product have to be inventoried and when to replenish the outlets with required items to avoid stock out (Miller, 2010). A good number of successful retailers look at proper inventory management as a tool to improve their supply chain performance through sophisticated products assortments and in-stock position (Dimitrios and Koumanakos, 2008; Elsayed, 2015; Neeraj and Neha, 2015). Hence the following hypothesis can be derived in this study:

H2: Inventory management positively influences retail supply chain performance.

2.3. Use of Information Technology (IT)
Organizations all over the world are using modern information technologies to enhance their performance. Timely and accurate flow of information is a must for accomplishing the value addition activities of a supply chain. Information sharing can include end-customer demand, sales forecasts, order status, inventory levels, capacity availability, lead times, and quality (Stevenson and Spring, 2007). IT such as internet technologies facilitate the sharing of real-time information in the supply chain and allow the organization to be more effectively coordinated at the network level (Tasha and Suzanne, 2014). Information regarding customers’ preferences of particular products might enable the retailers to make the stocks available before the customers ask for the products. Use of IT in retailing allows a continuous linkage between production and point of purchase and delivery that might ensure better customer experience (Arshinder et al., 2008). Previous studies also supported that use of IT can be a solution to enhance supply chain performance (James et al., 2014; Kumar, 2015; Latika and Patthaveekarn, 2009; Rajesh, 2011). So it is hypothesized that;

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

2.4. Transportation Management
Transportation brings the products from the point of production to the point of consumption. Better supply chain performance largely depends on the proper transportation and distribution system (Creazza et al., 2010; Neeraj and Neha, 2015). Proper distribution management is an essential part of supply chain network as it encompases the transformation activities of goods from suppliers to manufacturer to distribution centers to end consumers and this system ensures responsiveness in the supply chain (Thatte, 2007). In retail supply chain, the main role played by transportation is to ship the products from manufacturers’ custody to the retailers’ vendors (Brian et al., 2010). Since transporting the products from the manufacturers to those points where demand exists, it becomes a vital driver of supply chain performance (Cholette and Venkat, 2009; Gebresenbet et al., 2011). With the help of well managed transportation systems, products might be shipped to the right place at right time in order to satisfy customers’ demands. Moreover, it builds a bridge between producers and consumers. Therefore, a good transport system performing logistics activities brings benefits not only to service quality but also to company competitiveness. Creazza et al. (2010) and Kewl (2013) found in their studies that proper transportation management contributes a lot to the overall supply chain performance. Hence it can be hypothesized that;

H4: Transportation management is positively related to retail supply chain performance.
2.5. Coordination

Supply chain management is the coordination of the chain activities associated with the movement of goods and services from raw materials to the end consumers (Peter, 2014). Coordination in the supply chain mainly concerns planning decisions and activities in a way so that supply chain performance can be maximized. Industries and researchers recognize that coordination in the supply chain activities brings better performance (Hitt, 2011; Roh, 2009). Each party in the supply chain faces dependencies among themselves. From product design to delivery many issues in the supply chain process demand close attention to manage these dependencies. Manufacturers, suppliers, retailers and customers share their goals in that they want products that satisfy customers (Cao and Zhang, 2011). Even within the organization, supply chain activities have to be performed in a synergistic way to achieve organizational goals. Coordination in the supply chain process serves to meet these goals through coordination mechanisms (Nyaga et al., 2010). Moreover, researchers urged for more research to unveil the significance of coordination in improving supply chain performance (Daugherty, 2011; Ellinger and Richey Jr, 2013; Stank et al., 2011) while some studies found that coordination plays a vital role in enhancing supply chain performance (Kumar, 2015; Rajesh, 2011). Therefore, it has been hypothesized in this study that;

**H5**: Coordination positively influences retail supply chain performance

3. Methodology

The main objective of this study is to identify the drivers of retail supply chain performance. Hence five drivers were explored through literature review for further statistical testing in this study in relation to retail supply chain performance. On the other hand, retail supply chain performance was measured on the responsiveness and efficiency of the retailers in meeting customer demand. The participants were the outlet and supply chain managers of some top retail chain stores in Bangladesh. Responses from the respondents were gathered through a structured questionnaire survey using single stage cluster sampling method of probability sampling. The total number of respondents was 115. The survey used a five-point Likert scale for all the variables. For developing the survey items, previous studies were followed. Like, the measurement items for suppliers’ role in retail supply chain performance were adapted from the study done by Sosa et al. (2014). The items were taken as they represent high reliability and best match with the objectives of the study. Similarly, the measurement items for inventory management were adapted from the research works done by Talib and Anny (2013) and Sheila et al. (2012); items for IT were adapted from the studies done by James et al. (2012) and Rajesh (2011). The measurement items for transportation management were developed from the studies done by Tracey et al. (2005) and Kim (2006). For coordination, the researchers adapted the items that are consistent with the measurement of coordination in other studies that are used to measure the relationship between coordination and supply chain performance (Rajesh, 2011). The collected data were analyzed using Partial Least Square Structural Equation Modeling with the support of smart PLS software 2.0M3. The findings are documented below.

4. Findings

4.1. Measurement Model (Outer Model)

As mentioned earlier that the data of this study were analyzed using PLS SEM technique. There are two steps in PLS SEM analysis. In the first stage, the measurement model provides statistical output for testing the reliability and validity of data.

| Variable         | Items | Loadings | Cronbach Alpha | Composite Reliability | Average Variance Extracted (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        | IM1   | 0.825    | 0.735          | 0.833                 | 0.558                            |
| management       | IM2   | 0.699    |                |                       |                                  |
|                  | IM4   | 0.642    |                |                       |                                  |
|                  | IM5   | 0.807    |                |                       |                                  |
| Information      | IT2   | 0.780    | 0.786          | 0.852                 | 0.538                            |
| Technology       | IT3   | 0.801    |                |                       |                                  |
|                  | IT4   | 0.673    |                |                       |                                  |
|                  | IT5   | 0.645    |                |                       |                                  |
|                  | IT6   | 0.755    |                |                       |                                  |
| Transportation   | TR1   | 0.781    | 0.750          | 0.822                 | 0.606                            |
|                  | TR4   | 0.763    |                |                       |                                  |
|                  | TR5   | 0.792    |                |                       |                                  |
| Coordination     | CO1   | 0.755    | 0.791          | 0.856                 | 0.543                            |
Once the measurement model confirms the reliability and validity, then the hypotheses can be tested in the second step which is the structural model of PLS SEM analysis. Table 4.1 shows the measurement model output. While testing reliability and validity, some items were deleted before testing the final model for hypotheses testing since those items (IM3, IT1, TR2, TR3 & SCP6) posed low loadings.

4.1.1. Reliability and Convergent Validity

Reliability refers to the internal consistency of data (Hair et al., 2012). Table 4.1 shows that the Cronbach’s alpha and Composite reliability values for all the variables are more than 0.70 which confirm the reliability of data (Hair et al., 2012). Convergent validity involves the degree to which individual items reflect a construct converging in comparison to items measuring different constructs (Urbach and Ahlemann, 2010). There are two criteria used for testing the convergent validity. These are construct’s average variance extracted (AVE) and factor loadings. Average variance extracted (AVE) value should be greater than 0.50 (Fornell and Larcker, 1981) and the absolute standardized outer loadings of items should be above 0.50 for establishing convergent validity (Hair et al., 2012). Table 4.1 shows that all the AVE values are higher than 0.50 and all the items loading is higher than 0.50 which confirm the convergent validity of constructs in this study.

4.1.2. Discriminant Validity

Discriminant validity measures whether two factors are statistically different or not (Anderson and Gerbing, 1988). Table 4.2 demonstrates the discriminant validity of the data in measurement model.

According to Compeau et al. (1999), 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 square root of 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 others.

4.1.3. Coefficient of Determinations (R²)

Coefficient of Determination (R²) value represents the variation in the endogenous variables caused by the exogenous variables. The present study has got a Coefficient of Determination (R²) value of 0.648 which indicates that five supply chain drivers namely suppliers’ role, inventory management, use of IT, transportation management and coordination could explain 64.80% variations in retail supply chain performance. Based on the Cohen (1988) Approach, the value of R² is substantial for this study. This indicated that supply chain performance was influenced by the five supply chain drivers by 64.80%.

4.2. Structural Model Assessment for Hypotheses Testing

After confirming the reliability and validity of data in measurement model, the structural model is run for generating the output for hypotheses testing. The significance level for two-tailed t-test is 5% and the path coefficient will be significant if the T-Statistics is larger than 1.96. Table 4.3 demonstrates the values for hypotheses testing and the details have been discussed below. PLS model was run with five supply chain drivers (exogenous variables) and supply chain performance (endogenous variable).
5. Discussion of Results

Retailers all over the world are striving for better supply chain performance by providing 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 overall resources utilization. The retail chain stores all over the world are also trying to provide the best value to the customers but continuously they are facing troubles in ensuring products availability in their outlets at affordable costs. For this reason, the present study tries to examine which supply chain drivers are the most important to improve retail supply chain performance. The findings generated from the empirical data revealed that all the supply chain drivers (Hypotheses, 1-5) had significant effect on retail supply chain performance. Among them, coordination (p<0.000) was found to be the most significant driver of retail supply chain performance followed by inventory management (p<0.000), suppliers’ role (p<0.002), use of IT (p<0.003) and transportation management (p<0.004). Therefore, retail chain stores should focus on these supply chain drivers to enhance their performance by making products available and affordable in the outlets and thus satisfy the customers in a better way.

6. Conclusion

As supply chain management becomes increasingly global, retailers must focus on how they can enhance their supply chain performance for providing better customer value. Furthermore, determinants of firms’ supply chain performance are frequently getting attention from the practitioners, industry and academicians. In response to the importance of supply chain drivers and the far limited discussion regarding their influence in improving supply chain performance, the present study made an endeavor to identify the drivers of retail supply chain performance. The findings of the study suggest that suppliers’ role, use of IT, inventory management, transportation management and coordination are the significant determinants of retail supply chain performance. This research has implications both in practical and theoretical aspects with an interest in examining the determinants of supply chain performance. It provides both retail supply chain managers and policy makers some clear evidences of how to achieve better supply chain performance based on which policy implications could be derived to incorporate the organization’s resources for optimum output. The findings might also enrich existing body of literature in retail supply chain management. Though the present research has immense theoretical and practical implications, there are some limitations that need to be taken into consideration for generalizing the results of this study. One limitation is that, this is a cross-sectional study. Therefore, it limits the ability to observe the dynamic changes of retail supply chain processes. As such, a longitudinal study should be attempted to examine the relationships for an extended period of time to be able to provide more precise results.

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