

# **Determinants of Supply Management Performance: A Study of the Garment Industry in Bangladesh**

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## **Abstract**

This research examines the relationship between antecedents of supplier integration and supply management performance. A conceptual model has been developed based on the literature on strategic supply management skills, supplier integration, the perceived status of supply management, and supply management performance. To test the model a survey interview was conducted to obtain primary data from the purchasing managers or equivalent within the highly competitive garment industry in Bangladesh. Finally, the model was tested using Structural Equation Modeling. The finding implies that firms can improve their supply management performance through an increased emphasis on strategic supply management skills, supplier integration and improving the perceived status of supply management.

## **Keywords**

Strategic supply management skills, supplier integration, perceived status of the supply management function, supply management performance, Garment, Bangladesh.

## **1. Introduction**

Today, market leaders, such as General Motors, General Electric, and Black and Decker, use supply management as a critical strategic resource to externalize their pursuit for competitive advantage by including their channel members (D'Avanzo et al., 2004). These companies realize that supply management decisions and practices provide value in the areas of cost management (Carr and Pearson, 2002), high quality, short cycle time (Hult et al., 2000) and fast delivery (Spekman, 1988) and enable all channel members to establish closer links and relationships, where appropriate, among buyers and suppliers. Supply management encompasses, "organizing the optimal flow of high-quality, value-for-money materials or components to companies from a suitable set of innovative suppliers" (Wagner, 2003, p. 8). Supply management performance is a powerful driver and a significant strategic tool for firms striving to achieve competitive success (Tan, 2002). This study explores the impact of supply management strategic skills on supply management performance. The overall research question is: what is the impact of supply management resources (strategic supply management skills, the perceived status of supply management, and supplier integration strategies) on supply management performance? While supply management scholars would agree that supply management skills, perceived status, and supplier integration strategies are essential resources for success, research studies provide only descriptive analyses for these resources. This study extends previous work by proposing and testing the relationships between specific supply management strategic skills and supply management performance using quantitative analysis. Previous research addressed the nature of supply management skills and their importance in enhancing the performance of firms (e.g. Carter and Narasimhan, 1996; Cavinato, 1987; Giunipero and Flint, 2001; Giunipero and Percy, 2000; Giunipero et al., 2005). This study of the Bangladesh garment industry is a first step towards creating structure in the study of supply management skills.

## **2. Literature Review**

### **Strategic Supply Management Skills**

Resource-based analysis shifts the emphasis from the characteristics of employees to their skills and their relative contributions to value creation in their firm (Lepak and Snell, 1999). Accordingly, the value of supply management skills is inherently dependent upon their potential to contribute to competitive advantage. Supply management skills are like other organizational assets and can be classified as core or peripheral assets. It is important to focus on the core (strategic) supply management skills from among the wide variety of skills that have been identified in previous literature. These are the ones that actually shape supply management's competitive position.

### **Supplier Integration**

Supplier integration is defined as “the combination of internal resources of the buying firm with the resources of selected key suppliers through the meshing of intercompany business processes to achieve a competitive advantage” (Wagner, 2003). Michael and Tan (2001) indicated that effectively selecting suppliers and managing their involvement are resources that enable firms to achieve supply management goals, such as customer satisfaction. In the same study, the authors reported that supplier integration is a valuable source of competitive advantage because it enhances responsiveness, flexibility, and timesaving. When implemented appropriately, the advantages of supplier integration are numerous; benefits should directly improve supply management (Birou and Fawcett, 1994).

### **Strategic Supply Management Skills and Performance**

According to Carr and Pearson (2002), a strategic supply management function can help a firm to sustain its competitive advantage in a number of ways. First, it provides value in the area of cost management. Effective management of the cost of inputs to production saves the firm dollars that go straight to the firm’s bottom line profits. Second, it provides the firm with valuable information concerning supply trends that will enable the firm to make better decisions and achieve its goals. Third, it establishes close relationships, where appropriate, with suppliers, to improve the quality and efficient delivery materials. Thus, a strategic supply management function is one that meets the needs of the firm and promotes consistency between its capabilities and the competitive advantage being sought by the firm.

## **3. Hypothesized Model of Supply Management Performance**

### **The Impact of Strategic Supply Management Skills on Supply Management Performance**

The supply management literature evolved along two separate paths that eventually merged into a common body of literature. The traditional path emphasized the tactical objectives of supply management, such as increasing productivity and reducing inventory and cycle time (e.g. Hult et al. 2000; Sharland et al. 2003). A more recent path has focused on strategic objectives. The strategic goals of supply management are to increase customer satisfaction, market share, and profits for all members of the virtual organization (Tan 2002). The strategic role of supply management now involves managing the relationships with trading partners in order to attain effectiveness and efficiency for supply chain members (Harwick 1997). Generally, supply management skills enable the supply management function to incorporate strategies that are aligned with the firm’s strategic plans and, therefore, enhance supply management performance. The first research question relates to the following hypotheses:

*H1: Higher levels of strategic supply management skills have a significant positive impact on the performance of the supply management function.*

### **The Impact of Supplier Integration on Supply Management Performance**

The second research question examines whether supplier integration contributes to supply management performance. Increased reliance on supply management as a source of competitive advantage necessitates integrating supplier’s operations with those of the supply management function in major supply decisions (Carter and Narasimhan 1996; Ellram and Carr 1994); Ginupero and Percy 2000; Johnson et al 1998). It is the process of incorporating or bringing together different groups, functions, or organizations, physically or by information technology, to work jointly and often concurrently on a common business-related assignment (Monczka, Trent, and Handfield 2002). Supplier integration does not only depend on supply management factors, and these impact on financial performance (Carr and Pearson 2002). Therefore, the second hypothesis to be tested is:

*H2: Higher levels of supplier integration have a significant positive impact on the performance of the supply management function.*

### **The Impact of Strategic Supply Management Skills on the Degree of Supplier Integration**

When the supply management integrates its decisions and operation with suppliers, the resulting connections, to the extent that these links exclude competitors from forming the same connections with the same critical suppliers for the same purpose, should provide competitive benefits to the firm (Rungtusanathan et al. 2003). Supply Management strategic skills enable supply management to play a role in supplier integration. The suppliers can help companies speed up the product development cycle and offer valuable insights into the design of the new product. In sum, strategic skills allow supply management professionals and suppliers to work together from product conception to final design, which can raise the firm’s performance, reduce cycle times, and allow the firm to be first to market. Thus:

*H3: Higher levels of strategic supply management skills have a significant positive impact on supplier integration.*

#### **The Impact of Supply Management Perceived Status on Supplier Integration**

Raising the status of supply management could lead to greater emphasis on the integration aspects of the supply management job; “dealing with maintaining positive relations with entities that are internal and external to the organization”. Therefore, the perceived importance of supply management is expected to have a substantial impact on supplier strategy. McGinnis and Vallopra (1999) posited that the higher status of supply management is associated with (1) a greater role of supply management in process development/improvement, (2) a greater likelihood that suppliers will be included in the procurement process, and (3) better supplier integration in process development/improvement. Thus:

*H4: Higher levels of supply management status have a significant positive impact on supplier integration.*

#### **The Impact of Strategic Supply Management Skills on Supply Management Status**

The structure and status of the supply management organization is expected to change in order to adapt to the strategic tasks required. The role of supply management, as emphasized in the supply management literature, continues to evolve towards a strategic level to support the firm’s competitive position. In this process, its role expands to include: supplier coordination, supplier development, supplier market research, cost analysis, sourcing strategy formulation, benchmarking, make or buy decisions, and supplier capability analysis (Carr et al. 2000). A supply management function that is not perceived by the firm to include strategic skills is clerical in nature, reactive to other functions, non-integrative and focuses on short-term issues. Thus, the fifth research question relates to the following hypotheses:

*H5: Higher levels of strategic supply management skills have a significant positive impact on perceived supply management status.*

### **4. Research Methodology**

The target population of this study consisted of those who work in supply chain, procurement, and the supply management field and are involved with the supply management function within the garment industry in Bangladesh. A simple random sampling technique was employed to gather the data in this study. A total sample of 250 individuals was randomly selected from the Bangladesh Garment Manufacturers and Exporters Association (BGMEA) directory 2007-2008. The size of the sample has a direct impact on the appropriateness and the statistical power of the Structural Equation Model (Hair et al. 1998). A sample size of 15 to 20 respondents per parameter was suggested. Hence, this research will use 19 respondents per parameter. In this study the conceptual model includes 5 parameters: strategic supply management skills, supplier integration, perceived status of the supply management function, and supply management performance. Sample Size = 5 participants x 19 per parameter = 95. Byrne (1998) points out, the CFI and incremental-fit indexes (IFI) are more appropriate when the sample size is small, as in this case.

The survey instrument was developed based on similar constructs to those used in previous studies. The researcher developed scales based on several other empirical studies to make an initial list of items. Then the researcher tested the first draft of the questionnaire with a pilot group of 30 respondents who worked as procurement managers, supply chain managers and supervisors. Respondents were asked to rate their level of agreement on a seven-point Likert scale, where 1 represented “strongly disagree”, 4 represented “neutral” and 7 represented “strongly agree”. In addition, three elements of business performance were measured by the position of their company with respect to its competitors on a seven-point scale, where 1 represented “not important”, 4 represented “important” and 7 represented “most important”.

### **5. Data Analysis**

The data was collected by delivering the questionnaire, by email or in person, to prospective respondents in the industry; typically they were the decision maker of the firm on supply chain functions who were most knowledgeable about the firm’s functional activities as indicated by their positions, which was established before the questionnaire was handed to them. A total of 250 questionnaires were sent, and only 105 completed surveys were returned, of which only 3 surveys were unusable. The overall response rate was 40 %.

#### **5.1 Reliability Assessment**

Establishing construct reliability involves testing each of the multiple indicators of a construct. The traditional measure of reliability is Cronbach’s- $\alpha$  (Nunnally and Bernstein 1994) which assumes that the indicators are measured without error. Values for Cronbach’s- $\alpha$  range from 0 to 1 with  $\alpha$ -values greater than 0.70 considered acceptable (Nunnally and Bernstein

1994). Since the data for this research was generated using scaled responses, it was deemed necessary to test for reliability. Cronbach's Alpha tests were performed on the eleven constructs and the full model. Based on the coefficient values, the items tested were deemed reliable for this type of research, i.e. they were greater than 0.70. The Cronbach's alpha of each construct was greater than 0.70. Also, the t-tests yielded no statistically significant relationships among the survey items tested. These results suggest that non-response bias did not significantly impact the study (Nunnally and Bernstein 1994).

#### **Analysis of Measurement Model (Confirmatory Factor Analysis – CFA)**

Multiple fit indexes should be used in reporting model fit, since different types of indexes measure different aspects of model fit (Bollen and Long, 1993). A confirmatory factor analysis (CFA) using AMOS version 7.0 package was used to test the measurement model. To evaluate the fit of CFA, several goodness-of-fit indicators were used including the ratio of  $\chi^2$  to degrees-of-freedom (df), goodness-of-fit index (GFI), adjusted goodness-of-fit index (AGFI), non-normalized fit index (NFI), comparative fit index (CFI). Some items were removed to make the model fit the ratio and to be ready for the next analysis. It was necessary to remove MNSB<sup>1</sup>, SSRS<sup>2</sup>, RWRK<sup>3</sup>, and TRGM<sup>4</sup> to achieve unidimensionality. When viewing the model fit indices that had the correlation across all the items, a good fit is apparent regarding each of the fit measures. As shown in Figure 1, the  $\chi^2$  of 243 (degree of freedom = 113) is significant at  $p = 0.000$ , and  $\chi^2/df$  was 1.988, less than 3.0 (Chau, 1997), suggesting the model fitted the sample data using criteria suggested by the structural equations model (SEM) literature (see Bollen and Long, 1993; Joreskog and Sorbom, 1993; Kline, 1998). The Goodness-of-fit, comparative Fit Index (CFI), and Incremental Fit Index (IFI) were 0.803, 0.916 and 0.918 respectively. Only GFI did not exceed 0.90 but Byrne (1998) points out that, the CFI and incremental-fit index (IFI) are more appropriate when the sample size is small. Root Mean Square Residual (RMR) was 0.068, which is also greater than 0.03 (Bentler and Chou 1987, Bollen 1989); this value was the indicative of good fit for the construct as well.

#### **Convergent Validity**

Once the CFA model fit was established for each of the constructs in the study, the convergent validity was assessed based on the level of significance of the factor loadings. If all the individual item factor loadings are significant, then the indicators are effectively converging to measure the same construct (Anderson and Gerbing, 1988). The coefficients for all indicators in the constructs should be large and significant ( $p < 0.01$ ), providing strong evidence of convergent validity. This was indeed the case. In addition, since each of the CFA models demonstrated good fit, each of the constructs is unidimensional. The critical ratio and p-value are within the suggested range for all the observed variables underlying each latent construct. The critical ratio (C.R.) was positive and large for all indicators, and the significance level for all was  $p < 0.001$ . Convergent validity is demonstrated when a set of alternative measures accurately represents the construct of interest (Churchill, 1979). One CFA model fit was established for each of the constructs in the study, and the convergent validity was assessed based on the level of significance of the coefficients.

#### **Discriminant Validity**

Discriminant validity is important to the discussion of model fit because it establishes that two or more constructs are separate and distinct from one another. If constructs are separate and distinct from one another, then it can be established whether or not a predictive or causal relationship exists between them. Discriminant validity among the latent variables and their associated measurement variables can be assessed by fixing (i.e. constraining) the correlation between pairs of constructs to 1.0, then re-estimating the modified model (Segars and Grover, 1993). This procedure essentially converts a two-construct model into a single-construct model. The condition of discriminant validity is met if the difference of the chi-square statistics between the constrained and standard models is significant (1 d.f.). The chi-square difference tests indicated that discriminant validity exists among all of the constructs. Also a procedure recommended by Anderson (1987) and Bagozzi and Phillips (1982), where pairs of constructs were assessed in a series of two-factor models using AMOS 7.0, was used. Each model was run twice, once constraining the phi coefficient to unity and once freeing the parameter. A Chi-square difference test was then performed on the nested models to assess if the chi-square values were significantly lower for the unconstrained models (Anderson and Gerbing 1988). The chi-square difference tests indicated that discriminant validity exists among all of the constructs comprising the Strategic Supply Management Skills, Supplier Integration, Supply Management Perceived Status, and Supply Management Performance ( $p < 0.01$ ), then the chi-square values were

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<sup>1</sup> Importance of managing supplier relationships skills

<sup>2</sup> Importance of structuring supplier relationships skills

<sup>3</sup> An increasing use of reward-risk sharing arrangement with suppliers

<sup>4</sup> In your corporation supply management is considered a training group for upper management

significantly lower for the unconstrained models (Anderson and Gerbing 1988). Therefore there exists discriminate validity among the constructs under investigation in this study.

### Analysis of Structural Equation Model

The Structural Equation Model provides an assessment of predictive validity, specifies the direct and indirect relations among the latent variables, and describes the amount of explained and unexplained variance in the model (Byrne n1998). In SEM there is no single test of significance that can absolutely identify a correct model given the sample data. Many goodness-to-fit criteria have been established to assess an acceptable model fit. Consequently, several authors recommend presenting a number of indices to support model fit (Bentler et al.1987). Prior to testing the hypotheses of the study, the model’s overall fit must be established (Bollen and Long, 1993). The results of the structural model estimation are shown in Figure 1. The SEM was based on the research constructs; Maximum Likelihood Estimation (MLE) was used to fit the SEM.

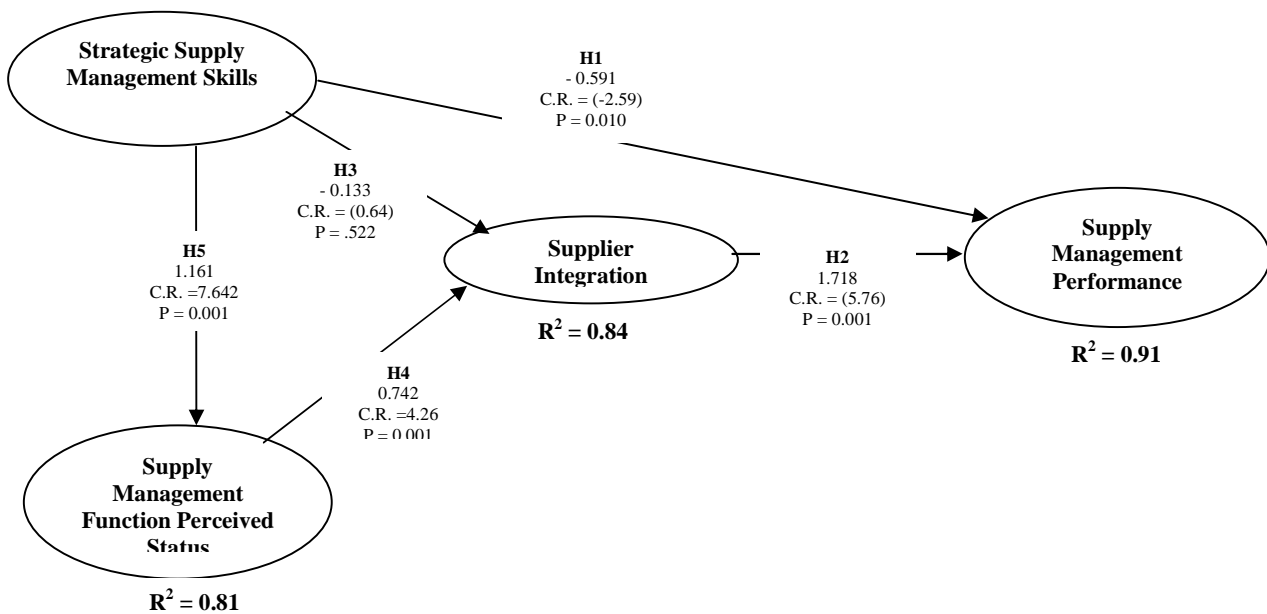


Figure 1: Analysis of Structural Model [Adapted from Eltantawy, (2005)]

As shown in Figure 1, the model’s chi-square statistic was significant, the  $\chi^2$  of 231.1 (degree of freedom = 114) is significant at  $p = 0.000$ , and  $\chi^2 / df$  was 2.027, less than 3.0 (Chau, 1997), suggesting the model fits the sample data well. Other fit indices examined in this research included Goodness of Fit Index (GFI), Comparative Fit Index (CFI), and Incremental Fit Index (IFI) which were 0.800, 0.912, 0.914 respectively – all greater than 0.90 except GFI (Byrne, 1998). But Byrne (1998) points out that, the CFI and incremental-fit index (IFI) are more appropriate when the sample size is small. So, even other indices were fit well with the CFI (0.912) and IFI (0.914) both exceed the recommended 0.90 level suggesting that good model fit as recommended by Byrne (1998). Root Mean Square Residual (RMR) was 0.068; which was greater than 0.030 indicate the good fit (Bentler and Chou, 1987, Bollen, 1989). Thus, the researcher concludes that the model fits the well.

### Hypotheses Testing

The hypotheses presented were tested using structural equation modeling (SEM). To test the hypothesized relationship between strategic supply management skills, supplier integration, perceived status of supply management, and supply management performance, the researcher used the estimates of the path coefficients, i.e. Critical Ratio (C.R.) and Probability (P-value). The hypothesized model permits an examination of the direct effects of strategic supply management skills, perceived status of supply management function, supplier integration and

supply management performance. Thus, the test of the proposed hypotheses is based on the direct and indirect effects in the structural model. All measures are presented in their standardized forms.

**H<sub>1</sub> (Higher levels of Strategic supply management skills have a significant positive impact on Supply Management Performance)**

The relationship between *strategic supply management skills* (Skills) and *supply management performance* (Perf) had a value of Critical Ratio (C.R) of 2.593, and the p-value was 0.010 (Support at  $p < 0.05$ ). This implied that strategic supply management skills have a positive impact on supply management performance. The result suggests that strategic supply management skills' impact is positive overall but it is so because of the mediated path through supplier integration and perceived status of supply management, not because of its direct effect on supply management performance.

**H<sub>2</sub> (Higher levels of Supplier integration have a significant positive impact on Supply management performance)**

The relationship between *supplier integration* (Integrat) and *supply management performance* (Perf) had a Critical Ratio (C.R) of 5.765 and the p-value was 0.000 (Support at  $p < 0.05$ ). This implied that supplier integration has positive direct impact on supply management performance. This finding supports the notion that a strategic supply management function, in contrast to a non-strategic supply management function, is viewed by top management as an important resource of the firm.

**H<sub>3</sub> (Higher levels of strategic supply management skills have a significant positive impact on Supplier integration)**

The relationship between *strategic supply management skills* (Skills) and *the degree of supplier integration* (Integrat) had a Critical Ratio (C.R) of 0.640, and the p-value was equal 0.520. This implies that strategic supply management skills do not have a strong impact on supplier integration. This may be because of the lack of attention to the role of strategic supply management skills in some Bangladeshi firms. It has been mentioned in the literature that some firms that did not pay attention to strategic supply management skills might not achieve higher performance.

**H<sub>4</sub> (Supply management perceived status has a significant positive impact on Supplier integration)**

The relationship between *supply management perceived status* (Status) and *supplier integration* (Integrat) had a value of Critical Ratio (C.R) of 4.266, and a p-value of 0.000 (Support at  $p < 0.05$ ). The result indicated that there is a significant and positive direct effect of the perceived status of supply management on supplier integration.

**H<sub>5</sub> (Higher levels of Strategic Supply Management Skills have a Significant positive impact on Perceived Supply Management Perceived Status)**

The relationship between *strategic supply management skills* (Skills) and the *perceived status of supply management* (Status) had a value of Critical Ratio (C.R) of 3.920, and a p-value equal to 0.000. This implied that strategic supply management skills have a positive impact on the perceived status of supply management. This study is important because it is the first empirical research on the Bangladeshi garment industry to establish relationships between strategic supply management skills and supply management performance. Therefore, this research fills a gap between theory and practice in the supply management area and its impact on supply management performance. The main objective of this research was to identify the impact of strategic skills on supply management performance.

## **6. Conclusions and Research Implications**

Support was found for the causal relationships between supplier integration and supply management performance; strategic supply management skills and supplier integration; the perceived status of supply management and supplier integration; and strategic supply management skills and the perceived status of supply management. Strategic supply management skills have a significant direct effect on supply management performance in addition to their indirect impact mediated through supplier integration and the perceived status of supply management. Strategic supply management skills are deployed in developing strategies and practices that can be used as a valuable and inimitable input to the firm's planning process and, hence, are a source of competitive advantage. Supply management organizations are being challenged to build superior supply chains through supplier integration, to enhance their firm's competitive advantage. Supplier integration is expected to lead to benefits for the firm, its customers and suppliers. In this study, information sharing with suppliers had the highest average mean when the respondents were asked to characterize the relationship with their suppliers. This result indicates that firms perceive their suppliers to

be an essential source of new supply-trend information and as an integral part of their firm's operations. Information sharing is used as means to achieve well integrated decisions and operations with the firm's suppliers.

The implications of this study are also important because the results suggest that firms can improve their supply management performance through an increased emphasis in strategic skills. And they should pay more attention to supplier integration to gain higher business performance. The supply management staff has to put these measures into effect. They should use their strategic skills to formulate and maintain supplier integration projects, which directly affect supply management performance. These skills allow the supply management function to develop strategies and practices that can be used as a valuable and inimitable input to the firm's planning process and, hence, are a source of competitive advantage. The researcher has highlighted the importance of the supply management function in the organization. Supply management should not only be a supporting function in the firm, but should be a core function, as has been demonstrated in this study which shows the importance of the status of supply management. Previous research has been conducted in Europe and America, so the present research might be the starting point to extend supply management research to the Bangladeshi context.

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