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Effects of Supply Chain Integration on Performance: An Analysis of Manufacturing Firms in Rwanda

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Preface

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Effects of supply chain integration on performance: An analysis of manufacturing firms in Rwanda

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Abstract

This study extends the developing body of literature on supply chain integration (SCI), which is the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organizational processes to achieve effective and efficient flows of products and services, information, money and decisions to provide maximum value to customers. Previous researches were inconsistent in their findings about the relationship between SCI and performance. We attribute this inconsistency to incomplete definitions of SCI, in particular the tendency to focus on customer and supplier integration only excluding the important central link of internal integration. Mainly using a cross-sectional approach, we used a structured questionnaire to collect responses from 258 employees drawn from 580 registered companies in the Rwanda Development Board (RDB) and analyzed these with the help of Pearson's correlation and structural equation modeling (SEM). We use three dimensions of SCI -- internal integration, supplier integration and customer integration -- to determine the effects of individual SCI dimensions and their interactions on a firm's performance. The findings indicate that SCI is related to both operational and firm performance. Further, the results also indicate that internal and customer integration are more strongly related to improving performance than supplier integration.

Keywords: Supply chain integration, internal integration, customer integration, supplier integration, firm's performance.

JEL Classification Codes: M11; L10; M110; M19; L60.

1. Introduction

Researchers around the world have articulated the importance of the close relationship between the performance of manufacturing firms and their supply chain integration (Elmuti et al., 2008; Gibson et al., 2005). These researchers call for a systematic approach to supply chain integration (SCI) as global competition has increasingly caused organizations to rethink the need for cooperative, mutually beneficial supply chain partnerships (Lambert et al., 2000; Wisner and Tan, 2000) and the joint improvement of inter-organizational processes has become a high priority (Zhao et al., 2008).

Our study addresses SCI's influence on a firm's performance. As discussed by Vaart and van Donk (2008), literature on SCI is characterized by evolving definitions and dimensions. While some research focuses on individual dimensions of SCI, in particular on customer and supplier integration (Cousins and Menguc, 2006; Homburg and Stock, 2004; Koufteros et al., 2007), others use various omnibus definitions (Rosenzweig et al., 2003) examining SCI as a single construct. In addition, many conceptualizations of SCI are incomplete, leaving out the important central link of internal integration. These incomplete and evolving conceptualizations have led to inconsistent findings leaving out the important role of internal integration in implementing supply chain integration and its role in performance (Das et al., 2006; Devaraj et al., 2007; Germain and Iyer, 2006; Stank et al., 2001a).

Some studies have found that integration across the supply chain has a positive impact on firms' performance (Bagchi and Chun Ha, 2005; Flynn et al., 2010; Kim, 2006; Zailani and Rajagopal, 2005) while others have proved that integration has a positive impact on supply chain performance (Lee et al., 2007; Narasimhan and Kim, 2002) and operational performance (Flynn et al., 2010; Frohlich and Westbrook, 2001). Lee (2007) views the main benefits of the integrated supply chain in terms of cost reduction, but also an increased value for the focal firm, its shareholders and members of it supply chain. Yeung et al., (2009: 66) posit that, 'the rationale behind supply chain integration is to combine partners' resources and perspectives into a firm's value propositions thus allowing all firms in a supply chain to excel in performance.' Evans (2015) in a study on the impact of supply chain integration strategies on the performance of the pork processing industry in Rwanda shows that there is a positive relationship between internal factors, supplier and customer integration and a firm's performance.

Despite these benefits some manufacturing firms in Rwanda are striving to cope with the management of individual functions instead of integrating activities into key supply chain processes; only a few firms have adopted and successfully implemented the concept of jointly planning, controlling and designing a supply chain with their partners to improve their performance.

2. Literature review

2.1 Supply chain integration

Supply chain integration is defined as 'the extent to which all activities within an organization, and the activities of its suppliers, customers, and other supply chain members,

are integrated together.' Customer and supplier integration are commonly referred to as external integration, which is the degree to which a manufacturer partners with its external partners to structure inter-organizational strategies, practices and processes into collaborative, synchronized processes (Stank et al., 2001). Customer integration involves core competencies derived from coordination with critical customers, whereas supplier integration involves core competencies related to coordination with critical suppliers (Kim, 2006).

In contrast, internal integration focuses on activities within a manufacturing firm. It is the degree to which a manufacturer structures its own organizational strategies, practices and processes into collaborative, synchronized processes to fulfill its customers' requirements (Cespedes, 1996; Kahn and Mentzer, 1996; Kingman-Brundage et al., 1995) and efficiently interact with its suppliers. While internal integration recognizes that the departments and functions within a manufacturing firm should function as part of an integrated process, external integration recognizes the importance of establishing close, interactive relationships with customers and suppliers. Both perspectives are important in allowing supply chain members to act in a concerted way so as to maximize the value of the supply chain.

Researchers argue that a close relationship between customers and a manufacturer offers opportunities for improving the accuracy of demand information, which reduces the manufacturer's product design and production planning time and inventory obsolescence, allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables manufacturers to reduce costs, create greater value and detect demand changes more quickly. Customer integration has been found to be related to customer satisfaction both directly (Homburg and Stock, 2004) and indirectly through its relationship with product development and innovation (Koufteros et al., 2007; Song and Di Benedetto, 2008).

Studies have also investigated the importance of supply chain integration on performance (Droge et al. 2004; Frohlich and Westbrook 2001; Zailani and Rajagopal 2005). Some authors have also questioned the validity of integration (Cousins and Menguc, 2006; Danese and Romano, 2011; Gominez et al., 2012) and suggest that external supplier integration does not improve a firm's operational performance. Supply chain integration increases performance only if supply complexity is high.

Bask and Juga (2001) argue that in their study conducted in China intensive integration was not necessarily the best solution in all cases; rather limited integration might be beneficial in some areas depending on different national and industry contexts. Donaldson (2011) analyzed the impact of customer integration on efficiency and the moderating role of supplier integration. In a survey conducted in Thailand, Wong et al., (2011) argue that under environmental uncertainty the relationships between supplier/customer integration and delivery and flexibility performance and those between internal integration and product quality and production costs are high.

2.2 Internal integration

Internal integration is defined as a process of inter-functional interaction, collaboration, coordination, communication and cooperation that brings functional areas together into a cohesive organization (Flynn et al., 2010; Zhao et al., 2011). Internal integration is defined as 'the degree to which a manufacturer structures its own organizational strategies, practices and processes into collaborative, synchronized processes, in order to fulfill its customers' requirements and efficiently interact with its suppliers' (Flynn et al., 2010).

Internal integration deals with integrating and linking information among different organizational departments, creating easy access to inventory information, developing an easily accessed integrated database that encompasses main operational data, integrating production processes using advanced information systems and linking production and marketing departments using computerized planning systems (Lee et al., 2007).

Further, supply chain partners who exchange information regularly are able to work as a single entity and can understand the needs of the end customer better and hence can respond to market changes quicker (Stein, 1998). Companies with low internal integration strategies will achieve low levels of external integration and companies implementing the full internal integration strategies will have the highest levels of external integration (Gimenez and Ventura, 2005).

2.3 External Supply chain integration

As the competitive environment is becoming increasingly challenging, firms are undertaking efforts to compete along multiple fronts. However, many firms find it difficult to compete in the market by relying on their internal resources and competencies alone. Hence, they are collaborating with their customers and suppliers to obtain information and complementary resources which they can deploy to build competitive advantages (Zhao et al., 2011).

2.4 Supplier Integration

Li et al., (2014) define supplier integration as 'The long-term relationship between the organization and its suppliers. It is designed to leverage the strategic and operational capabilities of individual participating organizations to help them achieve significant ongoing benefits.'

Supplier integration is characterized by various aspects and activities such as information sharing, coordination, trust, shared technologies, integrated processes, long-term contracts, assisting suppliers in improving production processes, fostering quality improvements, investing in suppliers' assets including suppliers in new product development, improving suppliers' overall capabilities, risk and reward sharing and shared gains from development efforts (Echtelt et al., 2008). As such, integration results in improved decision making, enhanced knowledge sharing, aligned capabilities, built learning routines and increased performance of supply chain (SC) partners (Echtelt et al., 2008). Trust enhances the degree of commitment between the two parties, reduces transactional costs, improves cooperation,

enhances the satisfaction of the two parties, decreases formal contracts and reduces conflicts (Sahay, 2003).

Supplier integration, also called 'backward' integration (Frohlich and Westbrook, 2001) refers to the process of interaction and collaboration between an organization and its suppliers to ensure an effective flow of supplies (Zhao et al., 2011). Supplier activities include activities such as placing strategic activities with suppliers, involving suppliers' capabilities to generate new products during the design stages, production planning and inventory management, having a rapid response order processing system with suppliers, installing a supplier network that ensures reliable delivery and exchanging information with suppliers. According to Yao et al., (2007), supplier integration has to do with data flow between two or more companies and constitutes a way towards achieving process integration under which a supplier takes control of the inventory and purchasing functions of the buyer.

2.5 Customer integration

Tan et al., (1998) define customer integration as 'demand management practices through long-term customer relationship, satisfaction improvement, and complaint management.' The fundamental aspect of customer relationships is the focus on key customers to understand their needs and requirements and to satisfy them. Customer integration includes different activities and practices such as integrated problem-solving initiatives, direct customer contacts, managing customer complaints, increasing customer satisfaction and establishing long-range relations with customers (Sousa, 2003; Tan et al., 1998). Customer integration is expected to yield different benefits to organizations including the ability to differentiate their products from competitors, increased market share and retention of profitable customers, improved customer loyalty, quickly resolving potential problems, shared knowledge and expertise concerning new technologies, a deep understanding of customer needs and rapid responses to customers (Magretta, 1998; Wasti and Jeffrey, 1999).

Customer integration, also called 'forward' integration (Frohlich and Westbrook, 2001) refers to the process of interaction and collaboration between an organization and its customers to ensure an effective flow of products and/or services to customers. Customer integration involves sharing demand information, it helps the manufacturer in understanding customer needs better and forecasts better customer demand as well as the collaborative involvement of customers with respect to product design, provision of better quality products at a lower cost and more flexibility in responding to customer demands (Flynn et al., 2010)

Customer activity concerns processes dealing with planning, implementing and evaluating relationships between service providers and service recipients. Customer relationship management (CRM) focuses not only on inbound customer relationships but also on outbound customer relationships in SCM. Customer activity involves the ability to communicate the delivery of products and services to end-user customers both locally and globally. Customer activity is principally about the sharing of product information with customers, accepting customer orders, interacting with customers to manage demand, having an order placing protocol in the system, sharing order status with customers during order scheduling and providing information during the product delivery stage.

2.6 Contingency Perspective of Supply Chain Integration

The contingency theory is often employed to understand organizational issues from a contextual perspective (Jayaram et al., 2004). The contingency theory suggests that organizations should align their structures and processes with the environment to enhance performance (Petersen et al., 2005). In a supply chain, customers and suppliers can be deemed as important parts of a firm's performance. According to the contingency theory, an organization's performance is influenced by how its practices are aligned (Pagell, 2004) and the individual dimensions of SCI should be aligned to enhance a firm's performance. The environment that an organization operates in shapes its structures and processes. Accordingly, we propose the following alternative hypothesis H1. *There is a significant relationship between SCI and a firm's performance.*

2.6.1 Internal integration and performance

Because internal integration breaks down hierarchical barriers and improves cooperation to meet customer requirements, rather than operating within the functional silos associated with traditional departmentalization and specialization, it is expected to be related to performance. Internal integration also increases the amount and variety of information available to a manufacturer (Montaka et al., 2015). In addition, frequent interactions and confrontations with different perspectives may reduce mistakes and waste, acquire opportunities for simplification and achieve concurrent engineering. In this sense, internal integration is the base for SCI and is positively related to operational and financial performance. Previous studies have found that components of internal integration such as cross-functional collaboration and integrative inventory management systems have positive impacts on a firm's performance (O'Leary-Kelly and Flores, 2002; Rosenzweig et al., 2003; Vickery et al., 2003).

2.6.2 Relationship of customers and supplier integration with performance

A close relationship between customers and a manufacturer offers opportunities for improving the accuracy of demand information which reduces the manufacturer's product design and production planning time and inventory obsolescence allowing it to be more responsive to customer needs. Because customer integration generates opportunities for leveraging the intelligence embedded in collaborative processes, it enables manufacturers to reduce costs, create greater value and detect demand changes more quickly. Customer integration involves sharing demand information; interacting with customers to set reliability, responsiveness and other standards to understand customer needs better and to forecast better customer demand; and the collaborative involvement of customers with respect to product design, provision of better quality products at lower costs and more flexibility in responding to customer demands (Homburg and Stock, 2004).

To implement customer and supplier integration successfully, manufacturers need to be internally integrated well because internal integration functions as coordination and learning mechanisms in customer and supplier integration (Marquez et al., 2004). Customer and supplier integration extends internal integration by establishing a cross-functional team integrating external organizations.

3. Methodology

Our study employed a cross-sectional survey design using a questionnaire to solicit data from a sample of 258 respondents drawn from 580 registered companies in Rwanda using the Slorvin and Yamane's formula (Yamane, 1967):

(1) $n = N/[1+N(e)^2]$.

In the 580 companies contacted, 258 questionnaires were distributed of which 177 were usable. The respondents were 109 from supply chain departments (purchasing, logistics managers) and 68 top level managers who were directly involved in supply chain activities. An exploratory factor analysis (EFA) using a principal component analysis with varimax rotation was used to assess the construct validity of SCI and performance. The appropriateness of using a factor analysis was further substantiated by Bartlett's test of sphericity and Kaiser-Meyer-Olkin (KMO) measures of sampling adequacy. The value for KMO measures of sampling adequacy should be greater than 0.7 and is inadequate if it is less than 0.5.

The Bartlett's test should be significant at a significance value of less than 0.05 (Leech et al., 2005). From our results, the KMO values were well above the recommended acceptable level of 0.7 which is 0.611 closer to 0.7 thus confirming that the collected data was worthy of a factor analysis. Based on Frohlich and Westbrook (2001) and Agus' (2001) suggestions coupled with the fact that data for this study was generated using multi-scaled responses, we carried out a reliability test. The reliability analysis was conducted by calculating the Cronbach Alpha for the main constructs in the study to test the internal consistency of each factor. The results show that the Cronbach Alpha of the four main constructs exceeded the threshold point of 0.70 suggested by Nunnally (1978). Also, the alpha optimization process that was carried out showed alpha coefficients for SCI.

The key constructs are i) internal integration (II), ii) customer Integration (CI), iii) supplier integration (SI), and iv) firm performance (Perf). Internal integration was measured based on periodic interdepartmental meetings among internal functions (II1), and integrative inventory management (II2). Supplier integration was measured by the level of strategic partnerships with major suppliers (SI1) and key supplier involvement in organizational planning and goal setting (SI2). Customer integration was measured by frequent interaction with customers to set reliability, responsiveness and other standards (CI1) and the level of frequent follow up of the organization with its customers for quality/services feedback (CI2). Operational performance was measured by a quick modification of products to meet major customer requirements (P1) and the firm's outstanding on time delivery record to customers

(P2) while the supply chain performance was measured by annual sales (P3). The constructs and the relationship are presented in Figure 1.

Insert Figure 1 about here.

4. Results and Discussion

The data collected was reviewed for completeness and accuracy. Thereafter, the data was sorted and coded and then entered into the Statistical Package for Social Sciences (SPSS). We used the Chi-square to test the extent to which supply chain integration affected the performance of manufacturing firms in Rwanda. The data collected was cleaned for errors; internal integration, supplier integration, customer integration and performance were subjected to a factor analysis and a reliability test. The essence of these tests was to arrive at the critical items of the constructs that were to be applied for statistical and hypotheses testing. In addition, an exploratory factor analysis (EFA) was done to establish whether the resulting factors from the factor analysis closely fit the constructs as theoretically given in literature.

The EFA results pointed to the fact that all elements had loadings on their respective factors that were significant showing Eigen values exceeding 2, with cumulative variance explained by values ranging between 35.304 and 100. Additionally, the KMO (Kaiser-Meyer-Olkin) approximation was 0.713 and showing a significant Chi-square value (Barlett's test of sphericity = 33.90). This put the KMO estimate for our study above the threshold value of 0.50 recommended by Hair et al., (1998). Factor loadings of all the constructs in our study were thus sufficiently high enough to make the findings meaningful.

Considering the descriptive statistics and factor analysis in Table 1, the results show that among the supply chain integration (SCINT) metrics, under supplier integration, the level of strategic partnerships with major suppliers showed the highest mean (2.95), followed by the level of the organization reliability on a few dependable suppliers (2.63), the level of information exchange with major suppliers through information networks (2.50) and supplier participation in design (2.40). Under internal integration the level of departments in the supply chain that established more frequent contacts with each other had the highest mean (3.33) followed by cross-functional teams in process improvement (3.19), integrative inventory management (3.10) and organization application integration (3.06). Also, under company integration with customers metrics, periodic contacts with customers had the highest mean (4.57), followed by the agility of the ordering process (4.21), level of communication with customers (4.13), follow up with customers for feedback (4.11), customers ordering computerization (2.70) and sharing of marketing information (2.10). Under customer integration (CI), the analysis shows that the highest recorded mean was in computerization for easy customer ordering (3.72) followed by frequent interactions with customers to set reliability, responsiveness and other standards (3.52), quick ordering systems with major customers (3.33) and frequency measurement and evaluation of customer feedback (3.01).

Insert Table 1 about here.

Finally, under firms' performance (FIRMPERF) sales and on time delivery recorded the highest mean (4.31) followed by operational performance (3.05) represented by the on-time delivery record (2.93) and the quick modification of products to suit major customer requirements (2.98).

As shown in the proposed structural model (Table 2), our hypotheses were supported or partially supported, broadly indicating that SCI is related to performance. Specifically, by applying the contingency approach we found that internal integration was directly related to both business and operational performance (α =0.042 <5 per cent) and that customer integration was directly related to operational performance. Although supplier integration was not directly related to either type of performance, the interaction between supplier and customer integration was related to operational performance explained by p-values equal to .048 and 0.042 <5 per cent respectively. The most significant variables were organizational follow-up, interdepartmental meetings, interacting with customers and suppliers' involvement.

Insert Table 2 about here.

When the results of our study are compared with those from previous research on SCI (Droge et al., 2004; Germain and Iyer 2006; Stank et al., 2001a and b), it is evident that internal integration was significantly related to operational and business performance. Thus, our research reinforces the importance of internal integration in improving a firm's performance. Hence, the findings of our study are important since much of existing literature on SCI does not include internal integration as a dimension of SCI. Our findings on customer integration are significantly related to performance. This is consistent with the findings of several previous studies (Germain and Iyer, 2006; Koufteros et al., 2005). However, our findings contradict Devaraj et al.'s (2007) study which shows that customer integration had no direct significant effect on operational performance.

Our results show that supplier integration was negatively related to certain aspects of operational performance. This conforms with the findings of Stank et al., (2001a) and contradicts Devaraj et al., (2007) who found a positive relationship between supplier integration and operational performance.

4.2 Pearson's Correlation of Supply Chain Integration and a firm's Performance

We used Pearson's correlation to test the interactions between SCI and business performance (PERF). Our results show that a firm's performance dimension, 'sales performance' had high correlations with customer integration especially with frequent interactions with customers to set its reliability, responsiveness and other standards (r = 56) and was closely followed by 'internal integration' especially on the level of periodic interdepartmental meetings among internal functions (r = 0.53).

Operational performance had a high correlation with periodic interdepartmental meetings among functions (r = 0.54), followed by frequent follow up with customers for quality/service feedback (r = 0.55) and integrative inventory management (r = 0.51).

An analysis of these findings indicates that there is a direct relationship between internal integration and a firm's operational performance supporting H1 that states that there is a relationship between internal integration and performance of manufacturing firms in Rwanda. On the other hand, these results also indicate that customer integration affected a firm's performance especially in frequent interactions with customers to set its reliability, responsiveness and other standards to meet customer requirements. These results support H2 that states that customer integration directly affects a firm's performance while supplier integration does not. Therefore, the results of our study fail to accept H3 which states that supplier integration affects the performance of manufacturing firms in Rwanda.

4.3 Structural Equation Modeling

Structural equation modeling (SEM) is a very general statistical modeling technique which is widely used in behavioral sciences. It can be viewed as a combination of factor analysis and regression or path analysis. Interest in SEM is often on theoretical constructs which are represented by latent factors. SEM is an appropriate tool for investigating the strength of a relationship between various phenomena and hence it was employed to simultaneously determine the relative strength of the relationship between the constructs of our study: Internal integration (II), customer Integration (CI), supplier integration and a firm's performance. To do this effectively, an alternative hypothesis (H1: The SEM model has a good fit) was enacted. The relative strength of the relationship between these constructs is given in Table 3.

Insert Table 3 about here.

Empirical data as used in our study is expected to support the underlying assumptions of SEM regarding the goodness of fit to allow for the acceptance of the alternative hypothesis (H1) that the model has a good fit. In this regard, the resulting probability value must be significant to support the overall alternative hypothesis of the SEM model. The SEM results showed a Chi-square value of 89.247 with 24 degrees of freedom and a probability value of 0.200 as indicated by the results of the default model. Based on these results, it was clear that the null hypothesis that the SEM model had a good fit was supported. The model can thus be said to fit the data (p-value > 0.05).

Based on these results our study shows that most of our hypotheses were supported or partially supported, broadly indicating that SCI is related to a firm's performance. By specifically applying the contingency approach our study found that internal integration was directly related to both firm and operational performance, customer integration was directly related to operational performance and sales enhanced an understanding of the effects of SCI on a firm's performance. Although supplier integration was not directly related to either type of performance, the interaction between supplier and customer integration was related to operational performance.

5. Conclusion and Recommendations

Our study built on the contingency theory by testing the applicability of the theory in Rwanda. First, it adds to literature by empirically testing the relationship between supply chain integration and a firm's performance. Our study reveals a significant correlation between internal integration and customer integration with a firm's performance. The supply chain integration should be focused on to achieve the desired influence including but not limited to customer interactions, frequent follow-ups with customers for quality /service feedback, periodic interdepartmental meetings among functions and integrative inventory management.

The implication of the relationship between supply chain integration and supply chain patterns is that they individually and collectively influence the performance of businesses. Hence, our study concludes that supply chain integration is a critical ingredient for improving manufacturing firms' business performance in Rwanda.

While our study makes a significant contribution to SCI literature and has important implications in practice, it does have some limitations which provide some opportunities for future studies. First, our study used a cross-sectional design which means that causality cannot be established. Because integration between customers, suppliers and manufacturers is developed over time, it will be fruitful for future research to examine the evolution of SCI patterns in a longitudinal fashion. Second, because the data was only collected from manufacturing firms, future studies can broaden the scope by collecting data from all supply chain partners including suppliers, manufacturers and customers. Third, although our research provides some interesting findings about the relationships between SCI and performance in Rwanda, it is not clear whether these relationships will be the same in other countries.

Future research should examine the effects of these contextual factors on SCI patterns and their relationships with performance in Rwanda. Another interesting area of research is the factors that influence the degree of customer, supplier and internal integration in SCI patterns. These may include factors such as a competitive environment, relationship commitment, trust, organizational characteristics and national culture. Likewise, the relationship between SCI and competitive performance is another potentially interesting area for future studies, especially in Rwanda.

However, this relationship may be different across different firm sizes, countries, ownership types, industries or regions. It is recommended that efforts be made to examine the differences in the relationship between SCI and firm performance across different firm sizes, ownership types, industries or regions.

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Table 1.Factor analysis and descriptive statistics

Descriptive Statistics			Factor analysis			
Supply chain dimensions	Mean	Std. Dev	SI	CI	II	PERF
SI1: Strategic partnership with suppliers	2.95	1.052	.615	-.258	.191	.335
SI2: Supplier Involvement in planning	2.65	.851	.758	.212	-.143	-.113
CI1: Frequent Interaction with customer	3.52	.783	.125	.754	.185	.149
CI2: Customer follow up for feedback	3.10	1.077	-.390	.468	.367	-.419
II1: Interdepartmental meeting	2.91	.920	-.078	.195	.112	.875
II2: Integrative inventory management	3.10	1.143	.171	.080	.812	.138
P3 : Annual sales	2.98	.873	.666	.060	.326	-.064
P2 : On time delivery	2.93	.849	.567	-.115	-.225	.145
P1 : Quick product modification	3.05	1.428	.028	.610	-.474	.068

Note: Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Table 2: Standardized Regression Weights: (Group number 1 - Default model)

Standardized Regression Weights			Estimates
Product modification	<---	Strategic partnership	.217
On time delivery	<---	Strategic partnership	.261
Product modification	<---	Interaction with customer	.048
Product modification	<---	Organization follow- up	-.030
Product modification	<---	Supplier involvement	-.203
On time delivery	<---	Supplier involvement	-.042
On time delivery	<---	Interaction with customer	.041
On time delivery	<---	Organization follow-up	.019
Annual sales	<---	Product modification	.034
Annual sales	<---	On time delivery	.103
Annual sales	<---	Interdepartmental meeting	.042
Annual sales	<---	Integrative inventory	.105

Source: Author's calculations.

Table 3. CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	30	89.247	24	.200	3.719
Saturated model	54	.000	0		
Independence model	9	133.927	45	.200	2.976

Source: Author's calculations.

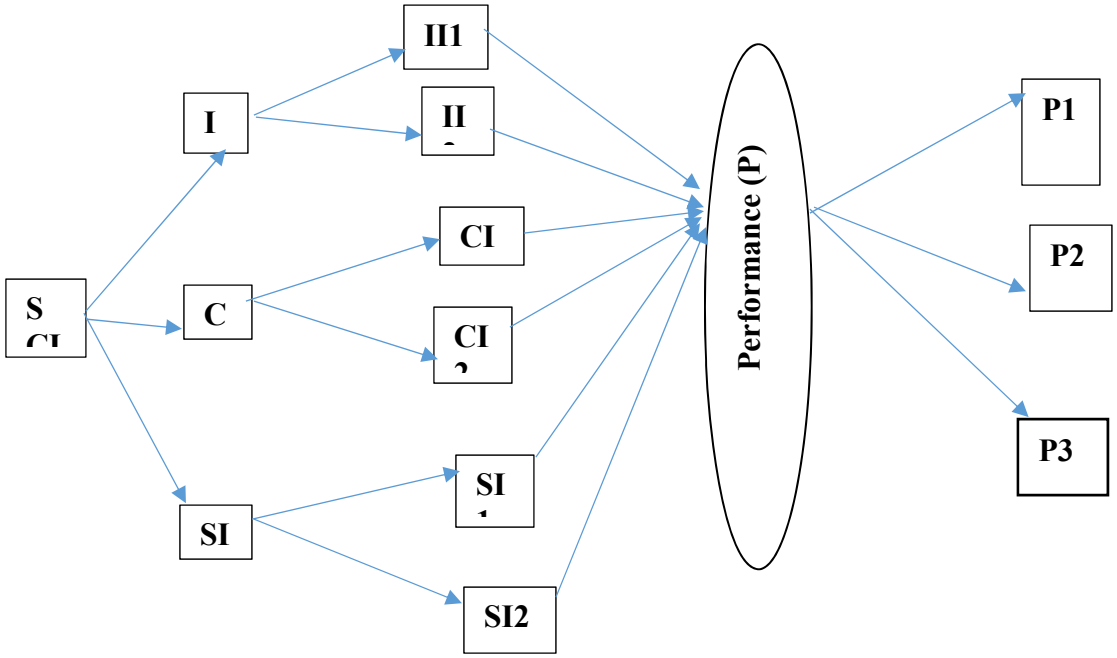

Figure 1: Constructs of SCI and a Firm's Performance