International Journal of Business and Management; Vol. 12, No. 4; 2017
ISSN 1833-3850 E-ISSN 1833-8119
Published by Canadian Center of Science and Education

Supply Chain Integration and Flexibility and Its Impact on Business Performance

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Received: February 22, 2017 Accepted: March 18, 2017 Online Published: March 26, 2017

doi:10.5539/ijbm.v12n4p130 URL: https://doi.org/10.5539/ijbm.v12n4p130

Abstract

This study explores the significance of integration and flexibility as critical determinants of business performance by examining the connection amongst supply chain integration and flexibility on the one hand and business performance on the other. Using mainly a cross-sectional approach, structured questionnaire was used to collect responses from two hundred and fifty-five employees drawn registered companies in the Kumasi Metropolis and analyzed with the help of Pearson's correlation and structural equation modeling (SEM). Three elements of supply chain integration (company integration with suppliers, cross functional integration within a company and company integration with customers) and three elements of supply chain flexibility (adaptability, alignment and agility) were subjected to analysis. The results indicate that supply chain integration and supply chain flexibility exhibit significant correlation with firm performance. Supply chain integration and supply chain flexibility have high correlation with 'financial performance' followed by 'logistic performance' and then 'operational performance'. Also, the results demonstrate that four supply chain integration surrogates; 'production data integration', 'going after customers for feedback', 'periodic connection with customers' and 'real time search of inventory' and two supply chain flexibility proxies specifically 'technology' and 'supply network strategies' are crucial as they exhibit the most noteworthy influence on firm performance. Results of this study offer remarkable demonstrations of the effects of integration and flexibility in enhancing performance of businesses and greater attention must be paid to those proxies of supply chain integration and flexibility that exhibited the most significant impact on firm's performance.

Keywords: Supply chain, flexibility, collaboration, performance

1. Introduction

The global nature of the business environment today is compelling businesses to pursue alternative and innovative ways of achieving efficiency and competitiveness in their daily operations. Among the accepted efficient and effective approaches is the proper management of the supply chain (Elmutiet al., 2008). Gibson et al. (2005) describe supply chain management as a set of methods employed to competently integrate and coordinate the flow of materials, information and finances throughout the supply chain in such a way that products are produced, supplied, and or distributed in quantities that are right, to desired locations, and at the right time in the most cost efficient way, that satisfy customer requirements. However, achieving the kind of flow described by Gibson et al. (2005) has become progressively problematic because of the growing diversity and uncertainty in the business environment necessitating that businesses respond to it by promoting flexibility as a crucial component to their operational strategy.

Upton (1994) describes flexibility as the capability of a business to alter or respond to environmental uncertainty with little penalty in time, effort, cost or performance. Flexibility in supply chain denotes a probable approach to improving efficiency in the supply chain, which is a significant measure of supply chain performance (Vickeyet al., 1999). Tummala et al. (2007) reveal that flexibility is among the eight topmost important factors essential for effective management of the supply chain. However, developing the flexibility feature alone does not automatically result in flexible operations (Gupta and Somers, 1996) for the reason that flexibility is mostly seen

as a response to environmental uncertainly (Riley and Lockwood, 1997). Due to the increasing level of market turbulence and increases in competition which has the tendency of affecting businesses, better preparedness for facing higher risks and uncertainties through more flexible solutions are required. In addition, the intensification of competition from the global business environment and the desire for superior customer service has significantly intensified the need for integration of supply chain processes (van der Vaart & van Donk, 2008) thereby making supply chain integration a very crucial element in the attainment of organisational performance objectives.

Supply chain integration is widely believed to be a very useful approach in improving various measures of firm performance and is also considered to be of strategic importance (Zailani & Rajapogal 2005; Singh & Power, 2009). Due to this strategic importance, many managers now realize that actions taken by one or more of the supply chain players has influence on the overall performance of the business.

This study sought to clearly determine the relationship between the constructs (supply chain flexibility and integration and business performance) which other researchers have described only implicitly. This study is one of few attempts to estimate the influence supply chain integration practices and supply chain flexibility policies individually and collectively have on business performance. It therefore fills a gap that exists in this respect in the supply chain management literature.

2. Literature Review

2.1 Supply Chain Integration

The concepts of supply chain (SC), supply chain management (SCM), and supply chain integration (SCI) are constructs that have so overtly been defined that they mean differently to different people and organizations. Available literature provides a number of definitions of supply chain management that are closely related to integration (Mentzer et al., 2001). Pagell (2004) even believes that "the entire concept of SCM is really predicated on integration.

Lambert et al. (1998) define supply chain management as "an integration of business processes". Supply chain integration is the linkages among different supply chain network components including the internal linkages among the different divisions and specialized units inside an organisation that 'source', 'make' and 'deliver' products and the external linkages with other firms outside the organisation, including the network of direct suppliers' and their suppliers and direct customers' and their customers (Rosenweig et al., 2003). **Sw**ink et al. (2007) on the other hand put forth that to succeed, the integration process has to include such activities that enable the different actors, share as well as enhance strategic knowledge and information with other actors outside the immediate organization.

The established way of thinking in most available supply chain literature is that "the more integration, the better the performance (Droge et al., 2004). Lee (2000) contends that a really incorporated supply chain accomplishes more than just cost reduction; it likewise generates numerous incentives for the organisation, its supply chain partners and its shareholders. Hammer (2001) added that vertical integration ought to be supplanted by virtual coordination where every member focuses on those procedures that it performs best, leaving the rest to the others. A perfect circumstance is that the whole procedure across the supply chain is outlined, overseen and facilitated as one unit.

However not everybody supports the idea that a solid and closely coordinated effort is the best arrangement for each situation. Bask and Juga (2001) contend that it is important to reexamine the overwhelming perspective of integrated supply chain management. They push for a change from an all-encompassing integration to a semi-integrated supply chain. Their belief is that such a shift will enable organisations to leverage their strength to achieve higher strategic goals for others to follow. For some organisations, however, close-fitting integration is the answer while for others; exhaustive integration may be most appropriate in such designated areas of supply chain management as quality management and performance measurement. For other aspects, it may be rather beneficial to strive for limited integration. This research defines supply chain integration as the effective collaboration and coordination of both internal (department, functions) and external business operations (customers and suppliers) to create the most value in the supply chain.

2.2 Supply Chain Flexibility

Over the last two decades, a lot of research has gone into characterizing the different forms of flexibility or adaptability in manufacturing but there is still no generally accepted definition of flexibility. The initial definitions of flexibility were focused on the capability of manufacturing systems to successfully deliver a wide assortment of parts without any significant external involvement to change the system (Buzacott, 1982). Boyles

(2001) further indicate that, a vast majority of the initial definitions see flexibility as the responsive capacity of management to manage the uncertainty confronting organizations, overlooking the performance dimensions of cost, time and quality. This view has been subsequently reiterated by Upton (1994), who regarded flexibility as an outcome of the various elements, each of which emerges in various time interims and with three usually unmistakable "components" or "methods" of flexibility: range, mobility and uniformity. Reviewing these components put forward by Upton (1994), analyst and researchers started to include other performance elements in their definitions. On account of these, an all-inclusive description of flexibility would be *"the ability to change or react to environmental uncertainty with little penalty in time, cost or performance*" (Upton, 1994). Riley and Lockwood (1997) accordingly see flexibility as a reaction to environmental uncertainties. This study adopted the explanation of Lee (2004) and operationalized flexibility as adaptability, alignment and agility. *Adaptability* was accordingly conceptualized as the capacity to tweak the supply chain's design, modify supply network strategies, products, and technology to meet structural changes in the market. *Alignment* as creating incentives among the different actors within the supply chain for a general superior performance; and *Agility* as the capability of the supply chain to rapidly respond to unexpected short- term fluctuations in demand or supply and the capacity to deal with external interruptions efficiently.

2.3 Supply Chain Performance

Supply chain performance and effective management of the supply chain are progressively becoming accepted as crucial elements in gaining competitive advantage for firms (Simchi–Levi et al., 2000). Gunasekaran (2001) adds that supply chain performance is an important strategic element for enhancing organizational effectiveness towards the achievement of more competitiveness, better customer satisfaction and higher profitability. Most previous studies on supply chain modeling identified and used several different performance measures including cost, quality and customer responsiveness (Chan, 2003; Gunasekeran, 2001). A good number of these studies focused on cost as a primary measure of supply chain performance because it was easier to implement in quantitative models. Beamon (1999) however, contend that focusing on such simple performance measure limits the scope of the measurement which might be inconsistent with the strategic goal of the organization. It is therefore argued that any supply chain performance system should not ignore any important tradeoffs among different objectives. Beamon (1999) accordingly developed a framework for the selection of metrics for measuring the performance of supply chain systems. In this framework, three types of performance measures were identified as important components of a supply chain performance measurement system. These were flexibility, resources and output. ***Flexibility*** is conceptualized as the capacity to adapt to changes within the supply chain. It was operationalized as the capability to respond to any changes in products, delivery times, volume and mix. Flexibility measures therefore include new product flexibility, delivery flexibility, mix flexibility and volume flexibility. ***Resource*****s** is conceptualized as the efficiency in using the available resources in a supply chain system. Resource measures include; the costs of using several resources, inventory levels in the supply chain system, and return on investments. ***Output*** measures include customer satisfaction (in terms of on-time deliveries, order fill rates and response time), sales quantities and profit.

In spite of the fact that managers are supposed to be accountable for firm performance, the success of the organization is first and foremost contingent upon the level of efficiency of the supply chain in which the organization functions as partner (Rosenweig et al., 2003). However, within the supply chain, managers are required to also focus on the external environment and take into account the impact the strategies they have adopted is having on other partners within the supply chain. In this regard, Chopra and Meindle (2003) believe that supply chain performance can only be optimal when all organisations within a supply chain adopt the "inter organizational" and "inter functional" strategic approach to achieve their individual set goals. The performance of the Supply chain is therefore dependent on the ability of partners with the chain to adapt to dynamic environments (Vanderhaeghe & De Treville, 2003). These differing positions result in a number of issues that are worth investigating.

One primary issue worth investigating in this regard concerns the relationship between supply chain integration and business performance. Research into this issue have commonly focused on examining the effect supply chain integration has on supply chain performance (Frohlich & Westbrook, 2001; Vickery et al., 2003; Rosenzweig et al., 2003; Cousins &Menguc, 2006). Frohlich and Westbrookm (2001) for instance portrayed the strategic relevance of supply chain integration in their study arguing that integration has to be seen in terms of the direction (toward suppliers and or customers) and the degree of supply chain activities. Rosenzweig et al. (2003) stretched this thought further suggesting that effective integration is required within the supply chain to enable organisations cope with increasing complexity and uncertainty in the business environment. They further argue that adequately integrated organisations stand to gain competitive advantage over their competitors

because of the potential of increased information visibility and operational knowledge shared among members of their supply chain, as well as the reduction of overall supply chain costs (Rosenweig et al., 2003). Other research on this issue focused on the positive relationship between supply chain integration and firm performance (Vickery et al., 2003; Cousins & Menguc, 2006). These studies have yielded mixed findings and that could have resulted from the different definitions and measures of firm performance. Further work on supply chain integration is therefore needed. This study hence puts forth that the strategic imperative for firms to integrate their supply chains with that of their partners stems from the fact that as they integrate more, information sharing improves and that would enable them reduce the bullwhip effect, work more closely with crucial suppliers and customers to reduce costs, effectively deal with inventory problems and work closely together to enhance the product design processes and service levels. In this regard, the hypothesis (H_1) under 2.4.1 was put forward for testing.

2.4 Hypothesis of the Study

2.4.1 H_1: Supply chain integration is positively related to business performance.

The second issue worth investigating is the correlation between supply chain flexibility and business performance. Flexibility-the capacity to deal with change - is crucial to the survival of organisations in the long-run (Upton, 1994). In the short run however, flexibility influences the competitiveness of organisations and in many cases, have the potential to impact its profitability. Flexibility becomes especially important when the entire supply chain is conceived as involving a network of supply, production and delivery firms. Under such conception, a number of sources of uncertainty have to be handled (Giannoccaro et al., 2003). Flexibility also enables firms to switch production among different plants and suppliers, to make it easier for management to cope with internal and external variability (Chen et al., 1994). This clearly points to the fact that different facets of supply chain flexibility could have a direct influence on overall firm performance. Therefore this research also hypothesized (H_2) under 2.4.2 that;

2.4.2 H_2:Supply chain flexibility is positively related to business performance.

In order to achieve meaningful performance**,** supply chain flexibility and integration should not be studied in isolation because researchers often posit the connection between flexibility and integration (Jack and Raturi, 2002; Swafford et al., 2006). According to Yussuf et al. (1999), integrating the internal capacities of organisations, their suppliers and customers can boost manufacturing performance and the flexibility of the firm. They accordingly argue that linking integration and flexibility requires effective coordination of activities, resources and organizations.

Integration among independent firms such as raw material suppliers, manufacturers, distributors, third party logistics providers and retailers, is the key to attaining the level of flexibility necessary to enable a progressive logistics process in response to rapidly changing conditions in the market. Poor integration among the chain members cause inflexible chain and can lead to dysfunctional operational performance (Simatupanget al., 2002). Swafford et al. (2006) also added that superior world class business performance is achieved when supply chain integration is associated with flexibility. This research therefore further hypothesized (H_3) under 2.4.3 that:

2.4.3 H_3: supply chain integration is positively related to supply chain flexibility.

The third and final issue worth investigating focuses on the combined effect of supply chain integration and supply chain flexibility on business performance. To investigate this effect, this study hypothesized (H_4) under 2.4.4 that:

2.4.4 H_4: supply chain integration and supply chain flexibility are both positively related to business performance

The literature review described above led us to the development of three construct variables; supply chain integration, supply chain flexibility and business performance. Structural equation modeling techniques were then used to investigate the inter relationships among the three construct variables.

3. Methodology

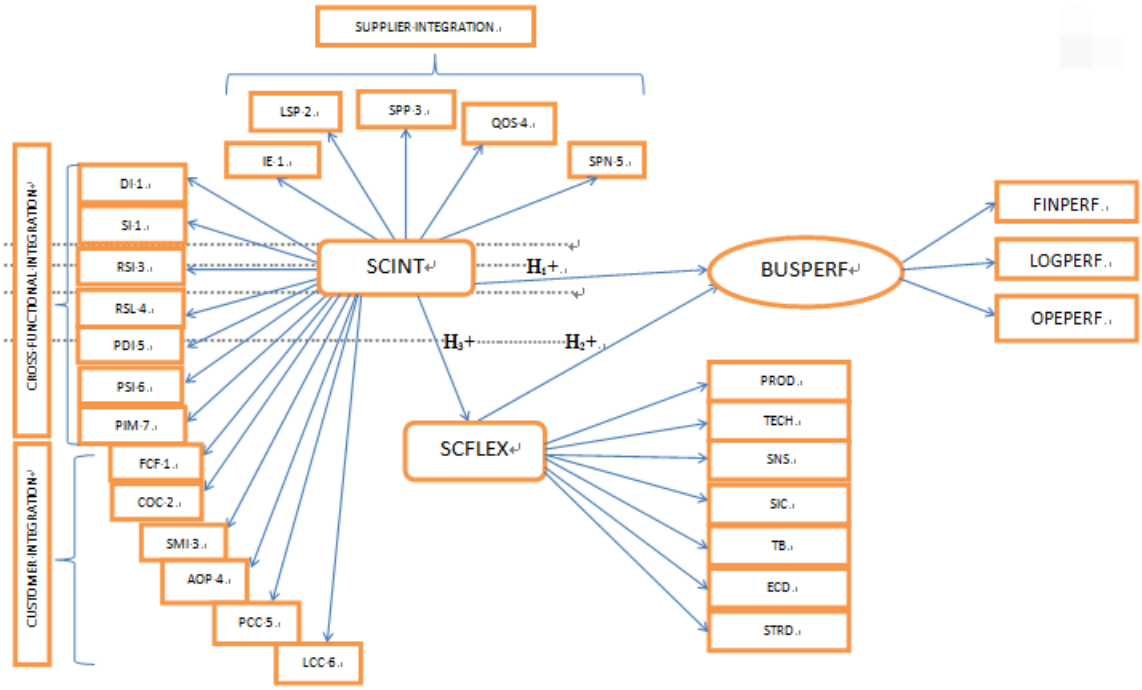
The study adopted a cross-sectional survey design using questionnaire adapted from Kim (2006) to solicit data from a sample of two hundred and fifty five (255) respondents drawn from registered companies in the Kumasi metropolis. The respondents were made up of 100 staff from supply chain departments, 75 from operations departments and 50 top level managers who are directly involved in supply chain activities. Three key constructs (i) Supply chain integration (SCINT); (ii) Supply chain flexibility (SCFLEX) and (iii) Business performance (BUSPERF) are measured.

The SCINT dimensions were measured based on three variables adapted from Kim (2006). The first variable-

Company integration with suppliers included information exchange (LE 1); level of strategic partnership (LSP 2); supplier participation in network design (SPD 3); quick ordering system (QOS 4); and stable procurement network (SPN 5). The second variable-Cross functional integration within the company included data integration (DI 1); systematic IS integration (IS 2); real-time search for inventory (RSI 3); real-time search for logistics related data (RSL 4); production data integration (PDI 5); production and sales integration (PSI 6) and periodic interdepartmental meetings (PIM 7). The third and final variable under SCINT was Company integration with customers and this included follow–up with customers for feedback (FCF 1); computerization of customers' ordering (COC 2); sharing market information (SMI 3); agility of ordering process (AOP 4); periodical contact with customers (PCC 5) and level of communication with customers (LCC 6).

The dimension of Supply chain flexibility was the ability to change or react to environmental uncertainty with little penalty in time, cost or performance (Upton, 1994). Since supply chain flexibility is viewed as a reaction to environmental uncertainties according to (Riley and Lockwood, 1997), this study accordingly operationalized flexibility as adaptability, alignment and agility. As Lee (2004) explained, the flexibility of a company can be judged in terms of three distinctive components. These components include (a) *Adaptable flexibility* which include product modification (PROD), technology improvement (TECH) and supply network strategies modification (SNS); (b) *Alignment flexibility* which includes supply chain incentive creation (SIC) and trust building (TB); and (c) *Agility flexibility* which also include handling external coordination disruption (ECD) and short term changes in demand (STCD).

The construct 'business performance' was a very critical bottom–line consequence of the level of integration and flexibility of the supply chain. This study operationalized it using the indicators: 'financial performance (FINPERF)', 'logistical performance (LOGPERF)', and 'operational performance (OPEPERF) '. The constructs and the relationship this study postulates between them are presented in the figure 1 below.



4. Results and Discussion

4.1 Measurement of Constructs using Factor Analysis and Reliability Test

After the data collected was cleaned for errors, the Supply Chain Integration (SCINT), Supply Chain Flexibility (SCFLEX) and Business performance (BUSPERF) elements were subjected to factor analysis and reliability test. The essence of these tests was to arrive at the critical items of the constructs that would be applied for statistical and hypotheses testing. In addition, Exploratory Factor Analysis (EFA) was carried out to establish whether the resulting factors from the factor analysis closely fit the constructs as theoretically elucidated in the literature (Table 1). Results of the EFA 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 values ranging between 38.81 to 100 (Table 2). Additionally, the KMO (Kaiser-Meyer-Olkin) approximation was 0.763 and showing a significant Chi-square value (Barlett's Test of Sphericity = 33.098). This puts the KMO estimate for this study above the threshold value of 0.50 recommended by Hair et al. (1998). Factor loadings of all the constructs in this study were thus sufficiently high enough to make the findings meaningful.

Considering the descriptive statistics and factor analysis in Table 1, the result showed that among the Supply Chain Integration (SCINT) metrics, under Company Integration with Suppliers, Quick Ordering System showed the highest mean (4.41), followed by Level of Strategic Partnership (4.25), Information exchange (3.90), Stable Procurement Network (3.72) and lastly Supplier participation in design (2.40). Under the Cross Functional Integration within the company, Periodic interdepartmental meetings had the highest mean (4.70), followed by Data Integration (4.10), Production and Sales Integration (3.70), Systematic IS integration among functions (3.51), Real-time searching of inventory (3.45), Real-time searching of logistics-related operating data (3.10), and finally Data integration in production process (2.80). Also, under the Company integration with customers metrics, Periodical contacts with customers had the highest mean (4.57), followed by Agility of ordering process (4.21), Level of communication with customers (4.13), Follow up on customers for feedback (4.11), Customers ordering computerization (2.70) and lastly sharing of marketing information (2.10).

Under Supply Chain Flexibility (SCFLEX), the analysis indicated that the highest recorded mean was in Supply Network Strategies (4.01), followed by External Coordination Disruption (3.90), Supply Chain Incentive Creation (2.80), Technology (1.50), Trust Building (1.50),Short Term Response in Demand (1.03) and products (1.01).

Finally, under Business Performance (BUSPERF), financial performance recorded the highest mean (4.31) followed by operational performance (4.10) and then logistical performance (3.30).

Table 1. Factor analysis and descriptive statistics

Supply Chain Integration (SCINT)	**Mean**	**Std. Dev.**	**Exploratory Factor Analysis**		
			Factor Loadings 1 SCINT	**Factor Loadings 2 SCFLEX**	**Factor Loadings 3 BUSPERF**
Company Integration with Suppliers					
Information Exchange	3.90	0.74	0.77	0.48	0.23
Level of Strategic Partnership	4.25	2.63	0.78	0.23	0.21
Supplier Participation in Design	2.40	0.70	0.81	0.45	0.50
Quick Ordering System	4.41	1.74	0.70	0.27	0.67
Stable Procurement Network	3.72	0.67	0.88	0.49	0.66
Cross Functional Integration within the Company					
Data Integration	4.10	0.82	0.43	0.73	0.20
Systematic IS Integration	3.51	1.71	0.44	0.84	0.16
Real-time Searching of Inventory	3.45	0.84	0.23	0.87	0.27
Real-time Searching of Logistics-related operating data	3.10	2.16	0.64	0.80	0.29
Data Integration in Production process	2.80	1.63	0.32	0.79	0.17
Production and Sales Integration	3.70	0.48	0.37	0.76	0.20
Periodic Interdepartmental Meetings	4.70	0.67	0.52	0.82	0.22
Company Integration with Customers					
Follow-up with Customers for Feedback	4.11	1.73	0.28	0.38	0.82
Customer Ordering Computerization	2.70	1.82	0.40	0.59	0.98
Sharing Market Information	2.10	0.74	0.39	0.40	0.73
Agility of Ordering Process	4.21	2.42	0.57	0.24	0.88
Periodical Contact with Customers	4.57	0.53	0.49	0.64	0.73
Level of Communication with Customers	4.13	1.11	0.23	0.47	0.96
Supply Chain Flexibility (SCFLEX)					
Adaptable Flexibility					
Products	1.01	0.02	0.87	0.56	0.51
Technology	1.50	0.53	0.81	0.49	0.66

Supply Network Strategies	4.01	0.47	0.89	0.65	0.69
Alignment Flexibility					
Supply Chain Incentive Creation	2.80	0.42	0.45	0.89	0.43
Trust Building	1.50	0.53	0.81	0.49	0.66
Agility Flexibility					
External Coordination Disruption	3.90	0.57	0.66	0.23	0.87
Short Term Response in Demand	1.03	0.07	0.51	0.31	0.82
Business Performance (BUSPERF)					
Financial Performance	4.31	0.48	0.82	0.47	0.67
Logistical Performance	3.30	1.49	0.85	0.49	0.63
Operational Performance	4.10	0.57	0.62	0.36	0.59

Based on the suggestions of Frohlich & Westbrook (2001) and Agus (2010) coupled with the fact that data for this study was generated using multi-scaled responses, a reliability test was carried out. Cronbach Alpha was used to test the internal consistency of each factor. The reliability analysis was conducted by calculating the Cronbach Alphas for the main constructs in the study. Items result indicated that the Cronbach alpha of the three main constructs exceeded the threshold point of 0.70 suggested by Nunnally (1978). Also, the alpha optimization process carried out showed Alpha coefficients for Supply Chain Integration (SCINT), Supply Chain Flexibility (SCFLEX) and Business performance (BUSPERF) ranging between 0.81 and 0.90 demonstrating a good level of internal consistency (Table 2). Based on these statistics, 28 elements were taken for the confirmatory analysis phase. The Confirmatory Factor Analysis (CFA) and a measurement model using STATA 11 were used for determining the construct validity of the individual scales. This was done by examining how well the individual elements measured on the scale (Agus, 2010). Precisely, the confirmatory factor analysis (CFA) was employed to determine the unidimensionality of each construct. The results showed that the goodness of fit (GFI) and comparative fit indices (CFI) of the three constructs exceeded the 0.90 criterion suggested by Bagozzi and Yi (2012) thus establishing the construct validity. The results of the CFA further showed that all elements loaded highly on their respective constructs, thus supporting the independence of the constructs and providing a strong empirical evidence of their validity.

Table 2. Statistical Results for test of reliability

Construct	**Exploratory Factor Analysis – EFA (Varimax Rotation)**		**Confirmatory Factor Analysis – CFA**		**Reliability**	
	Eigenvalue	**% of Variance Explained**	**Cumulative Variance Explained**	**GFI**	**CFI**	**Cronbach Alpha**
Supply Chain Integration	2.74	38.81	38.81	0.97	0.97	0.81
Supply Chain Flexibility	2.31	32.72	71.53	0.97	0.97	0.90
Business Performance	2.01	28.47	100	0.97	0.97	0.83

(Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization (KMO= 0. 763, Bartlett's Test of Sphericity (chi-sq= 33.098, sig = 0.007).

4.2 Person's Correlation Analysis of Supply Chain Integration, Supply Chain Flexibility and Business Performance

4.2.1 Supply Chain Integration and Business Performance

The pearson's correlation was used to test the interactions between Supply Chain Integration (SCINT) and Business Performance (BUSPERF) as shown in Table 3. The result indicated that the Business performance dimension, 'financial performance' had high correlations with supply chain integration especially with 'Real-time searching of logistics-related operating data' (r = 0.54) and was closely followed by 'Information Exchange' (r = 0.53). Logistical performance had a high correlation with 'Agility of ordering process' (r = 0.53) and 'Level of strategic partnership' (r = 0.51). Operational performance had a high correlation with 'Periodic departmental meetings' (r = 0.58), followed by 'Periodical contact with customers' (r = 0.55) and 'Agility of ordering process' (r = 0.51).

Analysis of these findings indicate that Real-time searching of logistics-related operating data, information

exchange with suppliers, increase strategic partnership, supplier participation in design, and product data integration should be given high consideration to improve the financial performance of the company. Strategic partnership with suppliers and agility of ordering process for customers should be considered as crucial for enhancing the logistical performance of the company. Finally, to enhance operational performance; 'production data integration cross functions within the company', 'periodical interdepartmental meetings', 'periodical contact with customers', and ' agility of ordering process should be given strategic and crucial consideration to improve and maintain high business performance.

Table 3. Supply chain integration and business performance

Supply Chain Integration (SCINT)	**Business Performance**		
	Financial Performance	**Logistical Performance**	**Operational Performance**
Company Integration with Suppliers			
Information Exchange	0.53 (**)	0.42 (**)	0.49 (**)
Level of Strategic Partnership	0.51 (**)	0.51 (**)	0.45 (**)
Supplier Participation in Design	0.50 (**)	0.49 (**)	0.47 (**)
Quick Ordering System	0.42 (**)	0.39 (**)	0.47 (**)
Stable Procurement Network	0.42 (**)	0.49 (**)	0.28 (**)
Cross Functional Integration within the Company			
Data Integration	0.48 (**)	0.48 (**)	0.41(**)
Systematic IS Integration	0.43 (**)	0.48 (**)	0.43 (**)
Real-time Searching of Inventory	0.48 (**)	0.49 (**)	0.40 (**)
Real-time Searching of Logistics operating data	0.54 (**)	0.46 (**)	0.47 (**)
Production Data Integration	0.51 (**)	0.49 (**)	0.58 (**)
Production & Sales IS Integration	0.49 (**)	0.42 (**)	0.42 (**)
Periodic Interdepartmental Meetings	0.40 (**)	0.44 (**)	0.58 (**)
Company Integration with Customers			
Follow-up with Customers Feedback	0.49 (**)	0.48 (**)	0.48 (**)
Customer Ordering Computerization	0.41 (**)	0.43 (**)	0.31 (**)
Sharing on Market Information	0.41 (**)	0.41 (**)	0.45 (**)
Agility of Ordering Process	0.48 (**)	0.53 (**)	0.51 (**)
Periodical Contact with Customers	0.32 (**)	0.47 (**)	0.55 (**)
Level of Communication with Customers.	0.41 (**)	0.41 (**)	0.48 (**)

*** if p < 0.10; **if p < 0.05; *** if p < 0.001 2. All tests are two-tailed**

4.2.2 Interactions between Supply Chain Flexibility and Business Performance

The Pearson's correlation test was further used to determine the interactions between Supply Chain Flexibility (SCFLEX) and Business Performance (BUSPERF) as indicate in the Table 4. The outcome of the test indicated that under the Business performance dimension, financial performance had high correlations with Supply Chain Flexibility (SCFLEX) especially with 'Trust Building' (r = 0.54). Under logistical performance, the highest correlation was with 'Supply Network Strategies (r = 0.49) and under operational performance, the highest correlation was with 'Supply Network Strategies (r = 0.57). It is therefore observed that flexibility policies should target trust building and supply network strategies for high business performance.

Table 4. Supply chain flexibility and business performance

Supply Chain Flexibility (SCFLEX)	**Business Performance (BUSPERF)**		
	Financial Performance	**Logistical Performance**	**Operational Performance**
Adaptable Flexibility			
Products	0.47 (**)	0.48 (**)	0.49 (**)
Technology	0.41 (**)	0.42 (**)	0.48 (**)
Supply Network Strategies	0.49 (**)	0.49 (**)	0.57 (**)
Alignment Flexibility			
Supply Chain Incentive Creation	0.49 (**)	0.43 (**)	0.47 (**)

Trust Building	0.54 (**)	0.48 (**)	0.41 (**)
Agility Flexibility			
External Coordination Disruption	0.42 (**)	0.48 (**)	0.46 (**)
Short Term Response in Demand	0.47 (**)	0.43 (**)	0.49 (**)

*** if p < 0.10; ** if p < 0.05; *** if p < 0.001; All tests are two-tailed.**

4.2.3 Interactions between Supply Chain Flexibility and Supply Chain Integration

To test the relationship between the Supply Chain Flexibility (SCFLEX) and Supply Chain Integration (SCINT), the Pearson's correlation was again used and the results are as shown in Table 5 below.

The results indicate that adaptable flexibility had high correlations with the Supply Chain Integration categories- 'follow-up with Customers feedback' (r = 0.57); followed by 'production and sales IS integration' (r = 0.55); 'Periodic Interdepartmental Meetings' (r = 0.53); 'Agility of Ordering Process' (r = 0.52) and 'Data Integration' (r = 0.51). This indicates that to be flexible from the adaptability sense, follow-up with customer's feedback, production and sales IS integration, Periodic Interdepartmental Meetings, Agility of Ordering Process and Data Integration should be well monitored and maintained. Alignment flexibility also had high correlations with Supply Chain Integration, especially with 'supply data integration' (r = 0.52). It was also observed that Agility flexibility had a high correlations with Supply chain integration especially 'periodic interdepartmental meetings' (r = 0.58), followed by 'Periodical contact with customers' (r = 0.55) and 'production data integration' (r = 0.55). Hence with agility flexibility, the adoption of periodic interdepartmental meetings, periodical contact with customers and product data integration enables the company to be agile in the market.

Table 5. Supply chain integration and supply chain flexibility

Supply Chain Integration (SCINT)	**Supply Chain Flexibility (SCFLEX)**		
	Adaptable Flexibility	**Alignment Flexibility**	**Agility Flexibility**
Company Integration with Suppliers			
Information Exchange	0.49 (**)	0.43 (**)	0.47 (**)
Level of Strategic Partnership	0.47 (**)	0.47 (**)	0.45 (**)
Supplier Participation in Design	0.48 (**)	0.48 (**)	0.49 (**)
Quick Ordering System	0.45 (**)	0.40 (**)	0.49 (**)
Stable Procurement Network	0.49 (**)	0.42 (**)	0.45 (**)
Cross Functional Integration within the Company			
Data Integration	0.51 (**)	0.42 (**)	0.44 (**)
Systematic IS Integration	0.48 (**)	0.47 (**)	0.38 (**)
Real-time Searching of Inventory	0.44 (**)	0.43 (**)	0.39 (**)
Real-time Searching of Logistics	0.49 (**)	0.47 (**)	0.42 (**)
Production Data Integration	0.41 (**)	0.52 (**)	0.55 (**)
Production & Sales IS Integration	0.55 (**)	0.49 (**)	0.41 (**)
Periodic Interdepartmental Meetings	0.53 (**)	0.49 (**)	0.58 (**)
Company Integration with Customers			
Follow-up with Customers Feedback	0.57 (**)	0.44 (**)	0.42 (*)
Customer Ordering Computerization	0.46 (**)	0.49 (**)	0.45 (**)
Sharing on Market Information	0.43 (**)	0.48 (**)	0.49 (**)
Agility of Ordering Process	0.52 (**)	0.42 (**)	0.50 (**)
Periodical Contact with Customers	0.49 (**)	0.45 (**)	0.55 (**)
Level of Communication with Customers.	0.45 (**)	0.41 (**)	0.48 (**)

* if p < 0.10;** if p < 0.05; *** if p < 0.001; All tests are two-tailed.

4.3 Structural Equation Modeling

Structural equation modeling is an appropriate tool for investigating the strength of the relationship between various phenomena and therefore it was employed to simultaneously determine the relative strength of the relationship between the constructs of this study: Supply Chain Integration (SCINT), Supply Chain Flexibility (SCFLEX) and Business Performance (BUSPERF). To effectively do this, the null hypothesis (Ho: The SEM model has a good fit) was enacted. The relative strength of the relationship between these constructs is depicted

in figure 2 below. Empirical data as used in this study is expected to support the underlying assumptions of the SEM regarding the goodness of fit to allow for the acceptance of the null hypothesis (Ho) that the model has a good fit. In this regard, the resulting probability value must be significant to support the overall null hypothesis of the SEM model. The results of the SEM showed a Chi-square value of 21.3904 with 46 degrees of freedom and probability value of 0.0014 (Figure 2). 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). Also, additional statistical structural indices suggested by Hair et al. (1998); Agus (2001) and Bagozzi and Yi (2012) such as Goodness of fit index (GFI = 0.93), Bentler Comparative fit index (CFI = 0.96), Bollen Incremental Fit Index (IFI = 0.96) were calculated to further strengthen the proposition that the model fit the data. Given that the probability values and the other structural modeling indices were considerably above the recommended levels, the model was accepted to be a reasonable depiction of the data.

Standardized estimates

Chi-Square = 21.3904

Degree of freedom = 46

Probability = .0014

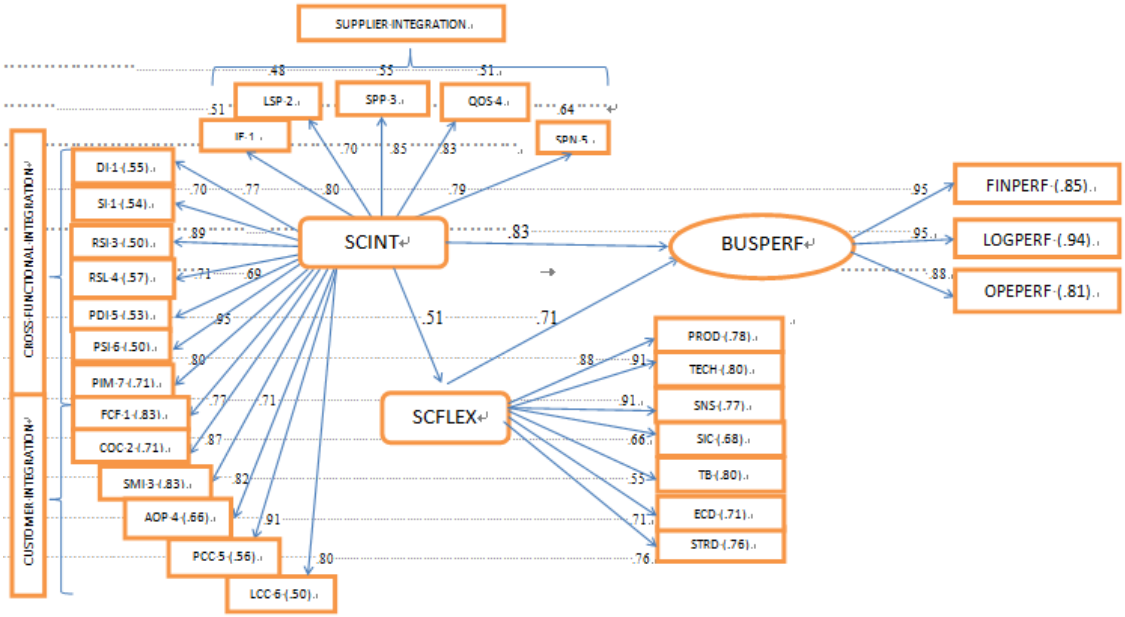


Figure 2. SEM Linking supply chain integration, supply chain flexibility and business performance

Supply Chain Integration (SCINT) was found to have a high direct structural effect on Business Performance depicting a structural effect value (SEV) of 0.83. The standard error of the standardized structural coefficient of SCINT on Business Performance was low (0.09). The non-zero critical ratio, which indicates the structural effect between the constructs SCINT and Business Performance, was positive and very significant (15.19). Supply Chain Flexibility (SCFLEX) was also found to have a high direct structural effect on Business Performance that was also significant (SEV of 0.71). The effect, however, also showed complex linkages with a low standard error of (0.11) and non-zero critical ratio of (11.79). Furthermore, SCINT depicted a positive structural effect on SCFLEX (SEV of 0.57), a low standard error (0.13) and a non-zero critical ratio of (7.09) which is very significant. These results provide a strong basis for accepting all three hypotheses (H_1, H_2 and H_3) of the study since they are all supported.

The study therefore concludes as follows. Firstly, there exist a significant positive relationship between Supply Chain Integration (SCINT) and Business performance (H_1). Secondly, the structural effect of Supply Chain Flexibility (SCFLEX) on Business performance is significant and positive (H_2). Thirdly, the structural effect of

Supply Chain Integration (SCINT) on Supply Chain Flexibility (SCFLEX) is also significant and positive (H_3). This study further concludes that there is a mediating effect in the linkage between supply chain integration and supply chain flexibility on business performance (H_4). Total effect was 0.69 while the indirect effect was 0.23 (table 6). Given that SCINT had a significant direct positive structural effect on SCFLEX (structural effect = 0.57), we conclude that there is a stronger mediating linkage between SCINT and SCFLEX on business performance. Putting all together, this study reaffirms the position that effective supply chain integration and supply chain flexibility can produce significant improvements in business performance.

Table 6. Structural and measurement results of the structural equation model

Constructs and Indicators	**Standardized Loadings**	**Standard Errors**	**Critical Ratio**	**P - Values**
Supply Chain Integration (SCINT)				
Company Integration with Suppliers				
Information Exchange	0.81	0.17	12.51	0.000
Level of Strategic Partnership	0.70	0.02	11.73	0.001
Supplier Participation in Design	0.85	0.13	12.91	0.000
Quick Ordering System	0.83	0.07	12.77	0.000
Stable Procurement Network	0.79	0.11	11.04	0.003
Cross Functional Integration within the Company				
Data Integration	0.77	0.08	17.07	0.000
Systematic IS Integration	0.70	0.06	11.18	0.000
Real-time Searching of Inventory	0.89	0.13	19.23	0.000
Real-time Searching of Logistics	0.71	0.10	10.14	0.005
Production Data Integration	0.95	0.07	20.13	0.000
Production and Sales Integration	0.69	0.11	10.02	0.000
Periodic Interdepartmental Meetings	0.80	0.05	11.77	0.000
Company Integration with Customers				
Follow-up with Customers Feedback	0.93	0.05	22.13	0.000
Customer Ordering Computerization	0.77	0.12	13.50	0.000
Sharing Market Information	0.87	0.07	15.01	0.000
Agility of Ordering Process	0.71	0.17	12.13	0.010
Periodical Contact with Customers	0.91	0.07	20.11	0.000
Level of Communication with Customers	0.80	0.07	18.09	0.000
Supply Chain Flexibility (SCFLEX)				
Adaptable Flexibility				
Products	0.88	0.09	10.17	0.000
Technology	0.91	0.05	14.71	0.000
Supply Network Strategies	0.91	0.07	21.19	0.002
Alignment Flexibility				
Supply Chain Incentive Creation	0.66	0.11	10.10	0.000
Trust Building	0.51	0.10	9.81	0.053
Agility Flexibility				
External Coordination Disruption	0.55	0.12	10.03	0.017
Short Term Response in Demand	0.75	0.08	19.44	0.000
Business Performance (BUSPERF)				
Financial Performance (0.85)	0.95	0.07	23.15	0.000
Logistical Performance (0.94)	0.95	0.04	22.07	0.000
Operational Performance (0.81)	0.88	0.06	20.33	0.000
Exogenous/Endogenous Path				
a. SCINT → BUSPERF [$^{H}_{1}$ is Supported]	0.83	0.09	15.19	0.000
b. SCFLEX → BUSPERF [$^{H}_{2}$ is Supported]	0.71	0.11	11.79	0.000
c. SCINT → SCFLEX [$^{H}_{3}$ is Supported]	0.57	0.13	7.09	0.003
d.				
e. SCINT → SCFLEX → BUSPERF	Indirect Effect (.79*.29) = 0.23			0.000
	Total Effect (.48 + .21) = 0.69			

5. Conclusion and Implication

It is quite obvious from the results that, organisations can no longer ignore the potential benefits of integrating the supply chain alongside ensuring the adoption of prudent supply chain flexibility policies in responding to environmental uncertainty. To realize this potential, however, the links and interrelationships among the different parts of the supply chain ought to be recognized in a manner that enables it to respond to any environmental uncertainties which has the tendency of posing challenges to business performance.

The significant correlation exhibited by supply chain integration and supply chain flexibility with firm performance is an indication that pursuing integration and flexibility strategies along the supply chain has a good potential of tremendously enhancing organisational performance. Specifically, they have the potential of enhancing the financial, logistics and operational performance of the organisation. The supply chain integration surrogates that should be focused on to achieve the desired influence include but are not limited to production data integration, going after customers for feedback, periodic connection with customers and real time search of inventory. Also, to achieve the full benefits of flexibility, the two proxies that organisations need to pay close attention to are technology and supply network strategies. Supply chain integration (SCINT) and supply chain flexibility (SCFLEX) therefore provide a setting through which everyone in the organisation can focus their attention on production, cost reduction, quality improvements and environmental uncertainties all together. The implication of the relationship between supply chain integration and supply chain flexibility is that they individually and collectively influence the performance of businesses. Judging from the analysis above, we conclude that supply chain integration is a critical ingredient for improving business performance especially in Ghana. We also conclude that supply chain flexibility is equally critical in improving business performance. We like to add that where supply chain integration and flexibility policies are pursued simultaneously, the effect on business performance is higher.

The results of this study validate some of the key linkages, support beliefs and evidences by researchers regarding the relationships between supply chain integration, supply chain flexibility and business performance. By strengthening supply chain integration and flexibility, business performance is most likely to improve. The conclusion emerging from this study is that supply chain integration and supply chain flexibility would ultimately result in positive gains for any business that earnestly pursues them.

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