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Investigating the Path from Supply Chain Integration to Business Performance: Evidence from a Sub-Saharan African Economy

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Abstract

Following the growing concerns on the inconsistent findings in previous research and drawing on the social exchange and networking theories, this study re-examined the impact of supply chain integration (SCI) on business performance (i.e. value creation and financial performance). The study argues that the impact of SCI on financial performance is through value creation and is depended upon longevity of product life cycle. Using primary data from 79 firms in Ghana, the study finds that value creation is a short-run consequence of SCI while financial performance is a long-run outcome of SCI. Additionally, results show that the financial performance outcome of SCI is experienced more from integrative efforts than from the value creation outcome. Results further indicate that firms whose products stay relatively shorter on the market are more likely to experience lower positive impact of SCI on value creation, and thus firms' ability to become proactive, monitor, and collect market information on product performance throughout its life cycle is key for coming out with strategies that will enable them maximize product's life span so as to experience greater benefits that come with pursuing integration with other channel members.

Keywords: supply chain integration, product life cycle longevity, value creation, financial performance

1. Introduction

Prior supply chain (SC) research has largely focused on the antecedents and outcomes of SC practices, particularly, integration. Focusing on the link between SC integration (SCI) and business performance, researchers have drawn insights from various theories (e.g., resource-based view, social exchange theory, relational view, and networking theory) to suggest that SCI directly impacts business performance. Notwithstanding the theoretical assertions, empirical studies have over the years yielded inconsistent and inconclusive findings (see Appendix for a list of empirical studies contributing to the SCI-performance relationship). In an attempt to address the inconsistencies in the empirical literature, Fabbe-Costes and Jahre (2008) proposed a more comprehensive conceptualization of the SCI construct and studied its performance effects. Drawing on Fabbe-Costes and Jahre's conceptualization, recent studies (e.g., Boon-itt & Wong, 2011; Gimenez et al., 2012; Huo, 2012; Huang et al., 2014; Huo et al., 2014) have studied the relationship from a contingency perspective, while others (e.g., Flynn et al., 2010; Schoenherr & Swink, 2012) have employed configuration arguments to explain how SCI shapes business performance.

Despite these previous scholarly efforts, knowledge on why SCI impacts performance and its boundary conditions is limited (Flynn et al., 2010; Boon-itt & Wong, 2011). This study addresses this gap by arguing that failure by previous research to specify when the effect of SCI is experienced may explain the inconsistencies in prior empirical findings. To contribute to the extant literature, therefore, this study categorizes business performance into value creation and financial performance dimensions and argues that the value creation dimension is a short-term outcome of SCI while the financial performance component is a long-term SCI outcome. In line with the social exchange and the networking theories, this study argues that (1) value creation explains why SCI impacts financial performance; and (2) longevity of product life cycle explains when SCI impacts both value creation and financial performance. We contend that SCI enables firms to create greater marketplace visibility and have the ability to coordinate operational activities to create superior customer value (Huang et al., 2014). In addition, SCI enables firms to obtain valuable resources from, and share idle resources

with, channel partners (Yan et al., 2010; Leuschner et al., 2012) to create superior value (Johnson et al., 2008). Along this line, empirical studies have shown that SCI enhances value creation (e.g., customer service, on-time delivery), which in turn enhances financial performance (e.g., Vickery et al., 2003). Specifically, Huo's (2012) study reports that the effects of SCI (i.e. both customer and supplier integration) on financial performance is through customer-oriented performance (i.e. value creation). Thus, argument can be made that the value creation is the channel through which SCI impacts financial performance.

Additionally, in view of the dynamic and turbulent nature of contemporary business environment, a major challenge facing firms is the shortening of their product life cycles (Rao & Goldsby, 2009), driven largely by an increasing customer demand and a rising competition (Chopra & Meindl, 2007; Bolton & Saxena-Iyer, 2009). In view of this, firms' ability to redesign products and respond to changes in the market requires that their SCs are built on robustness, resilience, and agility so that they can quickly reorganize systems and processes within their SCs. This, however, presents a trade-off between efficiency and effectiveness for SCs (Tang, 2006; Chopra & Meindl, 2007; Christopher, 2011). This study addresses the trade-off challenge by identifying longevity of product life cycle as a key business environmental factor that may influence the relationship between SCI and business performance. We contend that because products have limited lifespan on the market and in view of the fact that their sales levels go through various stages (highs, slumps and stagnations), with each stage presenting different opportunities and challenges for firms (Kotler & Keller, 2012), the performance effect of SCI is likely to vary depending upon longevity of a firm's product life cycle. The purpose of the current study is to empirically examine whether or not the effect of SCI on financial performance is channeled through customer value creation and is dependent upon longevity of product life cycles.

2. Conceptual Background

2.1 Supply Chain Integration (SCI)

Over the years, literature has undermined and been unspecific in defining and conceptualizing SCI (Mackelprang et al., 2014), and thus making the concept unclear. This has invoked numerous questions on the concept (see for e.g., Fabbe-Costes & Jahre, 2006; Fabbe-Costes & Jahre, 2008; Vaart & Donk, 2008; Flynn et al., 2010; Leuschner et al., 2012) and it is believed that the incomplete definition of the concept has partly accounted for the inconsistencies in previous research findings (Flynn et al., 2010).

While some authors consider the elements or things which are integrated within the SC (see for eg., Vaart & Donk, 2008; Gimenez et al., 2012; Moshkdanian & Molahosseini, 2013), others focus on the directison/scope of integration (e.g., internal, supplier, & customer – see for example, Frohlich & Westbrook, 2001; Flynn et al., 2010; Schoenherr & Swink, 2012). Similarly, whiles some authors (e.g., Sezen, 2008; Özdemir & Aslan, 2011) conceive and operationalize SCI as unidimensional, others (e.g., Flynn et al., 2010; Huo, 2012) discuss it as a multidimensional construct.

In this study, we make reference to Fabbe-Costes and Jahre's (2006:2008) discussions on the various 'layers, degrees, and scopes' of integration, and define SCI as the degree to which relationships and the SC elements (e.g., SC flows – materials/products, information etc.; SC processes, activities, systems & infrastructure, etc.) are aligned within and across an entity's SC in an effort to maximize value generated for the network.

From the perspective of the focal firm, and in line with recent approaches to understanding SCI, we employ and conceptualize the multi-dimensional nature of SCI in terms of the direction/scope of integration: internal integration, customer integration, and supplier integration (Fabbe-Costes & Jahre, 2008; Flynn et al., 2010) and operationalize each of them in line with the key things or elements that are integrated within the focal firm and across its 'key' customers and suppliers in the network.

2.2 Longevity of Product Life Cycle

Product life cycle refers to the duration from when a product is introduced to the market until the time that it is viewed as a commodity by the majority of customers and its demand declines (Wong & Ellis 2004; *cited by* Hashemi et al., 2013). Saying a product has a life cycle means that (1) products have limited life (on the market), (2) their sales levels go through various stages, with each stage presenting different opportunities, challenges, and problems to manufacturers and sellers, (3) their profit levels rise and fall at each of the life cycle stage; and that requires different sourcing, manufacturing, marketing, financial, and human resources strategies, in order to make the product perform well in the market (Kotler & Keller, 2012).

Existing literature (e.g. Stonebraker & Liao, 2006) indicates that the various stages of a product life cycle (when considered as variables) are associated with the various degrees/dimensions of SCI since at each stage, the product experiences different market issues and that requires appropriate strategies to promote the product's

growth and sustain its survival on the market. However, there has been less emphasis on the "short-or-long" aspects of the time the product survives on the market and how it moderates the link between SCI and performance. Accordingly, this study extends knowledge by investigating into how the overall life cycle of a product moderates the relationship between SCI and value creation and financial performance. Accordingly, we use the term "longevity of product life cycle (LPLC)" in this study to mean 'how long or short' a product stays on the market before any major modification or it dies out.

2.3 Business Performance

Business performance outcomes of SCI has been discussed in previous literature (see Fabbe-Costes & Jahre, 2008; Mackelprang et al., 2014) as a multi-faceted construct, and often construed as comprising of operational, marketing and financial performance criteria. Along this line, this study conceives business performance as a broader construct, comprising of value creation and financial performance outcomes.

2.3.1 Value Creation

As described by Kotler and Keller (2012), value is "the sum of the tangible and intangible benefits and costs" (p.10). As a key marketing concept, these authors believe that value represents a combination of quality, service, and price; and value is maximized when both quality and service increase while price is decreased or maintained. In a related sense and within the context of SCs, Chopra and Meindl's (2007) explain 'value as "…difference between what the final product is worth to the customer and the costs the supply chain incurs in filling the customer's request" (p. 5).

The conceptualization of value in this study could be identified with other terms such as 'customer facing' performance (Cadden et al., 2013), or customer-oriented performance (Huo, 2012) which often measure the service performance aspect of the SC (Droge et al., 2012). For the purposes of this study, value creation is viewed as the prime output of the SC, and thus we define it with items such as the SC's ability to offer quality products at 'reasonable' prices, deliver mostly on promises made to customers, minimize product returns/service recovery level, complaint level, and price products relative to the level of perceived benefits that customers get.

2.3.2 Financial Performance

Within SC and logistics studies, authors have defined and used various items to measure financial performance. For example, in evaluating the impact of SCI on performance, Flynn et al. (2010) used items such as growth in sales, return on sales, growth in return on sales, growth in profit, growth in market share, return on investment (ROI), and growth in ROI to capture financial performance, for which they conceived them as "business performance" measures. It must be noted that, the term "business performance" as used by these authors could have a much broader meaning than financial performance as used in other studies (e.g., Kim, 2009).

Notwithstanding this observation, other authors such as Huo (2012) and Huo et al. (2014) operationalized financial performance with same items used by Flynn et al. (2010). Given this lack of consensus, and for the purposes of this study, we conveniently adapted some of the commonly used items (i.e. ROI, return on assets, overall profitability, growth in profitability, and overall sales) in previous research (see Fabbe-Costes & Jahre, 2008) to measure financial performance.

3. Theoretical Framework and Hypothesis Development

The theoretical framework for the study is shown in Figure 1. Our proposed model posits that financial performance is a long-run outcome of SCI while value creation is a short-run outcome of SCI and that the relationships between SCI and both outcome variables are dependent upon longevity of product life cycle. Relying on the networking theory and social exchange theory, we argue that SCI has positive impacts on both performance variables. We further argue that the positive impact of SCI on financial performance is also transmitted through value creation.

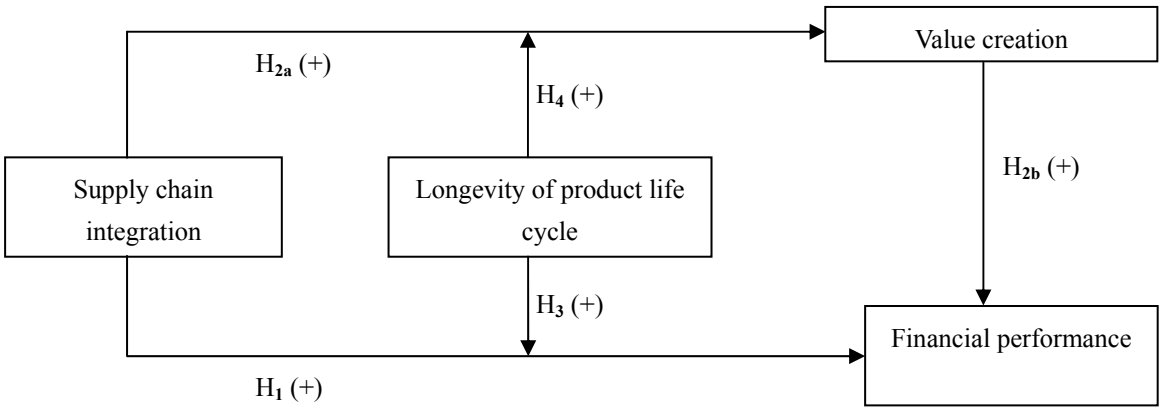

Figure 1. Proposed research model

As a key SC practice, the concept of SCI is underpinned by joint capability development and value creation through collaborative and cooperative arrangements and exchanges between/among firms (Adams et al., 2014). Formally or informally, entities within the SC from time to time identify members who they perceive as primary (Lambert, 2008) and possess some unique strengths and capabilities that are of relevance to their success and survival and focus on building alliance with them with the goal of maximizing benefits for members involved. In this sense, issues of reciprocity, mutuality, and rationality come to play when advancing for integration for a given SC network.

As highlighted by the networking theory, capabilities to enhance business performance could be realized when firms pursue strategic alliance (Johnson et al., 2008). In a related sense and within SCs, the social exchange theory emphasises that partnership within the SC is built on norms of mutual benefits and reciprocity (Cropanzano & Mitchell, 2005; Näslund, 2014). It has been discussed in literature that through social exchanges and networking with other firms make it possible for firms to obtain valuable and rare resources, achieve synergy, increase economy of scope, enhance information sharing, leverage risk, minimize transaction cost or cost of operation, improve product offerings, and enhance a firm's competitiveness in an industry (Johnson et al., 2008; Yan et al., 2010; Zheng et al., 2010; Clercq et al., 2010), and through all that, firms can enhance value and financial performance.

3.1 SCI and Financial Performance

Drawing on the inter-firm networking theory and social exchange theory, this study argues for a positive relationship between SCI and financial performance. Conventionally, local optimization and division of labour strategies led to silo building within SCs and were wise in terms of cost cutting or efficiency. However, this was only realizable in the interim and only at the focal firm level (Christopher, 2011). The overall 'system' performance however suffered, and this manifests in the areas of inability to swiftly respond to changes in the marketplace, poor quality products, inability to meet customers' orders, high inventory cost, frequent stock outs, increased in back orders and its associated costs, high transportation cost, among others, all of which consequently derail financial outcomes of firms.

It should be noted that, most financial performance indicators (such as growth in profitability, ROI, ROA) as employed in SC studies are relatively long-term business performance measures, and to achieve these requires sustained coordinated activities and processes and long-term collaboration between/among members within the SC, which SCI enables firms to realise (Boon-itt & Wong 2011; Flynn et al., 2011). In light of this, we hypothesize that:

H_1: SCI is positively related to financial performance

3.2 The Effect of SCI on Financial Performance via Value Creation

The positive impact of SCI on value creation and also value creation as a source capability for enhancing financial outcomes are well established in literature. It is noted that value can be added to either products or services through integrative efforts by channel members (Westbrook, 2002; Vickery et al., 2003; Done, 2011). SCI ensures a more accurate forecast of demand and proper planning. It is noted that, failing to forecast and plan accordingly is a doom for all operations within the SC since it is the customer's order/demand that triggers all

processes and functions within the SC (Chopra & Meindl, 2007).

Through SCI, firms are able to have better knowledge of the customer's needs, have much visibility and coordinate activities seamlessly and deliver on the customer's order better than it would have when there existed fragmentations within entities and or across the network (Boon-itt & Wong, 2011; Huang et al., 2014). In this regard, firms who better understand the market needs and have the right information on demand would be able to provide (customized) products and services that actually meet the needs of the market at a relatively lower operational cost (resulting from SC visibility, efficient inventory levels, reduction in back order cost, etc.).

In so doing, firms would be able to provide higher quality products and service levels at a relatively lower prices and thereby end up maximizing value for the customer. In this regard and drawing on previous literature claims that value creation is the main objective of SCs (Chopra & Meindl, 2007; Christopher, 2011), it can be said logically that the main output of SCI initiatives or implementation is value creation. That is, firms who pursue SCI are, first of all, expected to experience improved value for their customers.

It should be expected that, when value to the customer is enhanced, firms would stand a better chance of retaining existing customers, increase market share, and consequently increase sales volume as well as profit levels. Studies by authors such as Vickery et al. (2003) and Huo (2012) report that value creation activities such as customer service, short and consistent lead time, on-time delivery, flexibility, and responsiveness with SCs improve financial outcomes. Accordingly, we hypothesize that:

$H_{2a\text{-}b}$: Value creation positively mediates the effect of SCI on financial performance

3.3 The Moderating Role of Product Life Cycle

Over the years, the life cycle of most products have been shrinking (Croxton et al., 2001; Chopra & Meindl 2007; Bolton & Saxena-Iyer, 2009). Typical products like motor car whose life was measured in several years is now measured in few years. At any point in a product's life, the needs of customers and demand characteristics change. This also affect supply requirements needed to produce products that the market requires. Therefore, SCs have to engage in much reengineering frequently in order to build and introduce new products (i.e. modifications to existing products, service delivery systems, programmes, markets, etc.) and adopt measures that help in achieving competitive advantage and strategic fit (Aitken et al., 2003; Chopra & Meindl, 2007; Kotler & Keller, 2012).

As most markets experience now, customers are becoming increasingly demanding, and competition and or product substitutes tend to be on the rise. As noticed by Chopra and Meindl (2007), the shortening life cycle of products makes it challenging for achieving strategic fit in SCs, as from time to time, managers would have to constantly adapt, reorganise, produce, and deliver "new" products that the market asks for. It should be mentioned that at the conceptual stage, a firm would find it difficult to accurately predict the patterns that its product will go through, from the introduction stage through to the growth stage to maturity stage till it declines (Aitken et al., 2003).

As such, when a product life cycle is long enough, the operations within the SC tends to be more stable as demand becomes predictable. In effect, existing relationships, processes and structures would not suffer much. Hence, the SC can have enough time to plan, coordinate efforts and processes, and deliver on customers' requirements better. Based these, we argue that:

H_3: The positive effect of SCI on financial performance is strengthened (i.e. becomes more positive) when product life cycle is longer.

H_4: The positive effect of SCI on value creation is strengthened (i.e. becomes more positive) when product life cycle is longer.

4. Methodology and Results

4.1 Sampling and Data Collection

In testing our proposed research model, we collected data from firms operating in the Ashanti Region of Ghana. The Ashanti Region was chosen for the study due to its key role in economic activities in the country and also it being the commercial and industrial hub linking the northen and sourthen Ghana as well as the surrouonding landlocked countries. Major commericial and industrial activities in this part of the country is located within the Kumasi Metropolitan area and large proportion of the population are engaged in sales and production work (Ghana.gov.gh, n.d.).

The nature of concepts being investigated required narrowing down the broad sample into a more homogenous group that could provide data on all the constructs. For example, firms considered were to be operating through

(at least, some form of) functional units (for the purposes of assessing internal integration). That is, 'one-man-does-all' firms were excluded. Similarly, the focal firm to be considered in the study was to be one whose product life cycle could clearly be identified. Hence, intermediary firms were not included in the study since products mostly 'pass through' their hands. Specifically, two sample groups: manufacturing and service firms; were considered. The manufacturing firms operated in the following sub-industries: Food & Beverages, Pharmaceuticals & Chemicals, Agri-business, Toiletries & Cosmetics, and Rubber, Plastics & related. Service firms considered were limited to those in the hospitality industry and the financial industry.

In the actual field study, we relied on the online database of Yellow Pages Ghana and Association of Ghana Industries to retrieve contacts (e.g. emails, location addresses) of the firms that fit into our study. For firms that we were able to obtain their email addresses, emails were sent to key informants explaining the need for the study and seeking their consent. In all, 27 emails were sent. After 2 weeks, we got 1 firm responding. This response showed that this strategy would not work within this research context. Hence, we followed two other strategies. In this first case, we approached as many firms as we could and left behind an envelope which contained a letter of introduction and a questionnaire. The letter specified the positions of individuals who were capable of responding to the questionnaire. For firms that we could not contact directly, we spoke with the Executive and Part-time MBA students of KNUST School of Business (Kumasi) and some of these students helped us in reaching out to the remaining firms. Forty-three contacts were made and 36 questionnaires were collected within the time frame for the field study. In the other case, 74 firms were reached. However, 47 questionnaires were returned after 4 weeks when the questionnaires were delivered. In all, 117 questionnaires were distributed and at the end of the field study, 83 were retrieved. A preliminary check on the questionnaires resulted in retaining 79 for the purposes of the study as four questionnaires had severe missing values.

In line with previous studies (e.g., Flynn et al., 2010; Gimenez et al., 2012), for each firm contacted, a key informant was identified and asked to respond to the study. The most targeted informants in previous research have been individuals who hold senior positions such as SC/logistics manager/officer, CEO/president/vice president/, Managing director, or other individuals perceived to have adequate knowledge about the company's internal and external operating environment (e.g., operations manager). In line with previous research, therefore, similar individuals became our targets for the study. Respectively, 15.4%, 41.0%, 17.9%, and 25.6% of the responses were collected from these informants. Also, data was collected on the number of years the informants have held their current positions in their respective organisations revealed that an average informant has had 3.73 years (min=1; max=15; SD=2.502) experience in his/her current position.

Further, using a scale of 1 (strongly disagree) to 7 (strongly agree), the respondents' competence were assessed in terms of knowledge adequacy on the issues (Mean=5.92; SD=1.083), understanding of statement on the data collection instrument (Mean=6.06; SD=.925), confidence in responses provided (Mean=6.16, SD=.940), and assurance that the responses provided represented the realities in the firm (Mean=6.13, SD=1.030). These scores obtained gave a sufficient confidence that informants were competent enough to provide responses for the study. Data on the firms show that the average firm contacted for the study has been in the industry for 15 years (min=2; max=104; SD=18.5), has an average of 130 full-time employees (min=4; max=1200; SD=196), and operates an average of 5 functional areas (min=2; max=12; SD=2). In all, 22 out of the 79 firms have dedicated SC/logistics functional units.

4.2 Instrument Development and Measures

From relevant literature, we adapted items to measure most of the constructs. SCI was conceived as a three dimensional constructs in terms of direction/scope of integration: internal integration (II), customer integration (II), and supplier integration (SI). Each was operationalized with seven items and were all measured with a 7 point scale ranging from 1= "not at all" to 7= "to a largest to extent".

The items for SI and CI were adapted from Flynn et al. (2010), Miguel and Brito (2011), Danese and Romano (2011), and Seo et al. (2014) while most those for II were adapted from Huo (2012). Unlike previous researchers who mostly limited the wordings of the items measuring II to (cross) functional integration, the construction of some of our items considered integration at all managerial levels.

In measuring value creation, a 7-point scale ranging from 1= "strongly disagree" to 7= "strongly agree" was used. The items for measuring value creation were adapted from Kotler and Keller's (2012) definition of value creation and also from Cadden et al's (2013) study. In the case of financial performance, the items were measured using a 7-point scale, ranging from 1= "very dissatisfied" to 7= "very satisfied" and were adapted from Kim (2009) and Huo et al. (2014). Five items each were used to measure value creation and financial performance.

In the case of longevity of product life cycle (LPLC), perceiving the potential difficulty in measuring the exact (quantitative) life cycle of a firm's product and also the lack of literature on how to operationalize this construct, we developed our own items to measure it. In all we came out with five items. A 7 point scale (where 1= "strongly disagree" to 7= "strongly agree) was employed.

As indicated earlier on, the questionnaire also contained the following items: business experience (number of years in the industry), firm size (number of full-time employees), firm-type (0=Service; 1=Manufacturing), and whether or not a firm has a designated SC/Logistics department/unit (0=No; 1=Yes), which were all controlled for in our analysis.

4.3 Reliability and Validity of Measures

In assessing the reliability of the measures, Cronbach alpha was used. The results of this test as shown in Table 1 reveal all alpha values greater than the recommended threshold of .70 (Bagozzi & Yi, 2012) and thus suggests that each scale employed had good internal consistency (Field, 2009). Further, confirmatory factory analysis (CFA) was conducted in LISREL 8.8 by relying on maximum likelihood estimation method. Covariance matrix was used as input data. After necessary modifications, a satisfactory model fit to data was obtained: χ^2 (degree of freedom [df]=298.59(237); normed Chi square [χ^2/df]=1.260; root mean square error of approximation [RMSEA]=.058; non-normed fit index [NNFI]=.963; comparative fit index [CFI]=.968; standardized root mean square residual [SRMR]=.079 (Bagozzi & Yi, 2012; Hair et al., 2014). Table 1 shows the list of the retained items, their respective standardized loadings, t-values, and the composite reliability (CR) and average variance extracted (AVE) values. All factor loadings were significant at 1%. The positive and significant loadings confirm convergent validity of the measures (Boso et al., 2013). The respective values of CR and AVE obtained for each construct were satisfactory; given a minimum cut off criteria of .60 and .50 respectively. All AVEs obtained were also larger than the shared variances between constructs signifying satisfactory discriminant validity (Fornell & Larcker, 1981).

Table 1. Reliability and validity results

Constructs/Measures	Loadings (t-value)
Customer integration (CR=.882; AVE=.654; CA=.890)	
You and your key customers collaborate in planning and making decisions	.719 (fixed)
You and your key customers have common interest and goals	.924 (7.66)
You and your key customers provide supports and assistance to each other	.807 (6.87)
Your business processes & systems are aligned with customers' needs	.770 (6.56)
Internal integration (CR=.841; AVE=.642; CA=.871)	
This firm makes use of cross-functional teams and collaboration	.837 (fixed)
There is visibility in processes and operations across all levels & unit areas	.877 (8.63)
Systems and controls are aligned across all levels & unit areas	.675 (6.35)
Supplier integration (CR=.965; AVE=.672; CA=.944)	
Key suppliers are involved in planning and decision making	.858 (fixed)
Key suppliers are involved in idea generation & product/service design	.849 (9.79)
Key suppliers have visibility in your operations (e.g. inventory level)	.868 (10.19)
You engage key suppliers in process improvement initiatives	.775 (8.40)
You and your key suppliers share business information in real time	.783 (8.55)
You and your key suppliers have aligned processes & systems	.844 (9.69)
You and your key suppliers have long-term alliances and common interest	.753 (8.02)
Longevity of product life cycle (CR=.893; AVE=.676; CA=.894)	
Most product/service offerings die out earlier than expected/anticipated*	.761 (fixed)
Most new products/services launched **do not** get the expected market acceptance*	.828 (7.60)
Most products/services usually **do not** stay on the market for long*	.902 (8.32)
Most products/services introduced record poor sales levels*	.791 (7.22)
Value creation (CR=.761; AVE=.520; CA=.753)	
This firm offers high quality products at reasonable prices	.679 (fixed)
This firm mostly delivers on its promises to customers	.851 (5.26)
Your products are priced relative to the level of perceived benefits that customers get	.611 (4.57)
Financial performance (CR=.850; AVE=.656; CA=.836)	
Overall profitability	.898 (fixed)
Growth in profitability	.736 (7.39)
Overall sales	.787 (8.09)

Notes. *=items were reverse coded, CR=composite reliability, AVE=average variance extracted, CA=Cronbach alpha.

4.4 Common Method Bias Test

Given that one informant from each case firm provided all responses for the study, it became necessary to examine the potential problem of common method bias (CMB) in the study (Podsakoff et al., 2003). By employing method-only model in LISREL, all the retained items after the CFA were set to load on one latent factor. This analysis yielded the following results: χ^2 (df)=893.95(252); χ^2/df=3.547; RMSEA=.181; NNFI=.841; CFI=.855; SRMR=.124. These results generally indicate poor fit to data which indicates that CMB does not sufficiently describe the data collected and hence a conclusion was reached that CMB is not a major concern for the study.

4.5 Structural Model Estimation and Results

With reference to our proposed model and for parsimonious reasons, the three dimensions of SCI (CI, II, & SI) were treated as a single indicant variable. Relying on the retained items, composite variables were created for each sub-construct of SCI using summated scales (Hair et al., 2014). With regard to the moderating effects, an interaction term for the proposed paths was created. Given longevity of product life cycle (LPLC) as the moderating variable, a single indicant variable was created by following the residual centring procedures. The residual centring approach was used to attenuate for the potential multicollinearity problems (Tabachnick & Fidell, 2013). Correlational analysis was first of all used to examine the bivariate relationships between the variables. The results produced as well as the descriptive results are shown in Table 2.

Table 2. Inter-variable correlations and descriptive results

Variables		1	2	3	4	5	6	7	8	9
1	Firm type[d]									
2	SC unit[d]	.223*								
3	Firm size[o]	0.172	.383**							
4	Business experience[o]	.211*	.377**	.723**						
5	SCI	.321**	.293**	.339**	.339**					
6	LPLC	.350**	.220*	.16	.146	.651**				
7	SCI x LPLC	-0.045	0.102	-.058	.115	.000	.000			
8	Value creation	.196*	.217*	.13	.394**	.442**	.211*	.349**		
9	Financial performance	.317**	.403**	.399**	.484**	.641**	.377**	.100	.470**	-
Mean						4.7	5.23	.00	4.88	4.71
Standard deviation						.948	1.206	1.115	.964	1.055

Notes. *p<.05 (1-tailed), **p<.01 (1-tailed); [o]natural logs form; [d]dummy variables [Firm type: 1=manufacturing, 0=service; SC unit: 1=yes, 0=no].

In estimating the proposed model, hierarchical regression analysis was used. Given the two outcome variables in the model, two analyses were run. For analysis one, value creation was the dependent variable while the second analysis had financial performance as the dependent variable. In each case, three hierarchal models were run. Model one in each case was predicted by the four control variables. The second and the third in each case respectively were predicted by the main effects variables and the interaction term. The results obtained are shown in Table 3. The evaluation of the study's propositions was based on selecting a superior model, that is, a model that resulted in a significant change in R^2 over the previous one. In this sense, Model 3 (for analysis one) and Model 2 (for analysis two) were selected for the evaluatioin of the hypotheses.

In reference to the results in Table 3, the study's hypotheses were evaluated as follows. H_1 argues that SCI is positively related to financial performance. The study's results (β= .438; t=3.722) provides support for this hypothesis. Also, H_{2a-b} argues that value creation positively mediates the effect of SCI on financial performance. The results of study: SCI→ value creation (β= .404; t=3.181) and value creation → financial performance (β= .164; t= 1.664); partially support this hypothesis, given that the path from SCI to financial performance is also statistically significant. Further, the study advanced an argument that longevity of product life cycle moderates the links between SCI and financial performance (H_3) and value creation (H_4). While findings do not provide support for H3, the results provide support for H_4 (β= .261; t= 2.719).

Table 3. OLS regression analysis results

VARIABLE	Standardised estimates					
	Value creation			Financial performance		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
CONTROLS:						
Firm type[d]	.110 (1.032)	.044 (.410)	.065 (.638)	.190 (1.921)*	.078 (.876)	.079 (.880)
SC unit[d]	.114 (1.009)	.072 (.664)	.040 (.386)	.228 (2.163)*	.154 (1.685)*	.152 (1.653)*
Firm size	-.336 (-2.253)**	-.383 (-2.703**	-.307 (-2.215)*	.017 (.126)	.016 (.132)	.018 (.146)
Business experience	.561 (3.761)**	.511 (3.600)**	.435 (3.129)**	.349 (2.518)**	.203(1.572)	.202 (1.546)
HYPOTHESISED:						
Main effects						
SCI		.398 (3.006)**	.404 (3.181)**		.438 (3.722)**	.440 (3.686)**
LPLC		-.089 (-.688)	-.094 (-.758)		-.030 (-.278)	-.031 (-.282)
VALUE					.164 (1.664)*	.160 (1.528)
Interaction effect						
SCI*PLC			.261 (2.719)**			.013 (.144)
FIT INDICES:						
R^2	.220	.321	.385	.327	.530	.531
ΔR^2		.101	.064		.203	.001
Adj. R^2	.178	.264	.324	.291	.484	.477
F-statistics	5.219±	5.345±	7.395±	9.005±	10.231±	.021
df	74	72	71	74	71	70

Notes. t-values are in the parenthesis; *p<.05 (1-tailed); **p<.01 (1-tailed); ± model sig at 1%; hypothesized paths were evaluated at 5%; critical valu =1.645 (1-tailed).

5. Discussions and Implications

Generally, the study's results indicate that higher levels SCI integration are associated with higher levels of business performance, in terms of value creation and financial performance. These findings are in line with theories (i.e. networking theory and social exchange theory) that underpin this study and also reinforce previous research findings (e.g., Frohlich & Westbrook, 2001; Flynn et al., 2010; Wong et al., 2011; Huo, 2012; Prajogo & Olhager, 2012). The study's findings buttress that the role of SCI in enhancing business performance cannot be undermined in today's competitive environment. As competition is shifting from among firms to among SCs (Lambert, 2008), it is only when firms within a given network integrate (i.e. collaborate, cooperate, coordinate and streamline their processes and activities) that they can better understand their market well, collect and share information in real-time, and swiftly produce products and services that address the needs of the market at a relatively lower cost. As firms deepen their relationships with other members in the network and share mutual interests and goals, they are more likely to build trust and get the necessary commitment from other members. The study's findings also suggest that firms could obtain unique resources and capabilities to drive business performance when they pursue integration.

At one breadth, literature notes that through integration (e.g., networking and alliance), support and assistance can be obtained from other channel members (Johnson et al., 2008; Yan et al. 2010) and enable a firm to compete favourably, produce and offer products and services that offer greater value for customers, sell more and end up enhancing financial outcomes such as sales and profitability. At another breadth, through integration, firms would be more able to gain focus and build core competencies and capabilities in the area of information, knowledge, expertise, and experience, which when pooled together and shared, would present a greater synergistic edge for a network that dwells on integration than those networks that are inwardly focused.

The findings further reinforce that when firms seek to optimize processes and operations solely at the organisational level, such initiative would become detrimental to performance. And thus, firms are cautioned that when integration is absent in their SCs, system failure is more likely to be recorded, which could manifest in (1) firms' inability to improve customer experience for their products, (2) rising costs and wastes (e.g. high inventory levels, stock-out costs, transportation cost), (3) poor product quality, and (4) reduced sales and profit levels.

Notwithstanding the above, the study specifically finds that the association between SCI and financial performance (β= .438) is relatively stronger than the association between SCI and value creation (β= .404). This

finding somehow seems not surprising. Generally, it is well noted that implementing SCI could require substantial investments in both financial (e.g., investment in information technology, supporting and developing smaller firms in the network) and non-financial (e.g., time, commitment etc.) resources (Awasthi & Gryzbowska, 2014). Hence, the short-run or the immediate positive impact of SCI on business performance, that is, value creation (as in, minimizing cost of producing and delivery products, offering higher quality products/services at a relatively lower prices, adding on more products enhancements etc.), should be expected in some cases to be lower, compared to its long term impact, that is, financial outcomes. In the long-run, firms in the SCs who pursue SCI would have obtained mastery, and become more effective and built greater capabilities and hence would be likely to benefit more from integration in the area of growth in sales and profitability, return on investment and return on assets.

In a related result, the study finds that, the direct effect of SCI on financial performance (unstandardized β=.428) is higher than its indirect effect through value creation (product of the unstandardized β values of the indirect path = .434*.181 = .079). And thus, this finding points out that not all the positive effect of SCI on value creation may necessarily translate into enhancement of financial outcomes. This finding seem to be in contrary with the results from Huo's (2012) study. The relatively weaker association between value creation and financial performance could be explained from a competition point of view. As commonly prevails in most industries, there is high competitive intensity and firms aggressively monitor the actions of other competing firms' processes, products and service offerings, and come out with innovative processes and products which help them offer equivalent value for customers. Hence, the likelihood of value creation (resulting from SCI) leading to increases in financial outcomes such as sales and profitability may be less likely to occur since the customer could hardly differentiate and make purchase decisions by the uniqueness of a firm's value propositions. In such operating environments, keeping products on the market through advertising alone could eat away profitability.

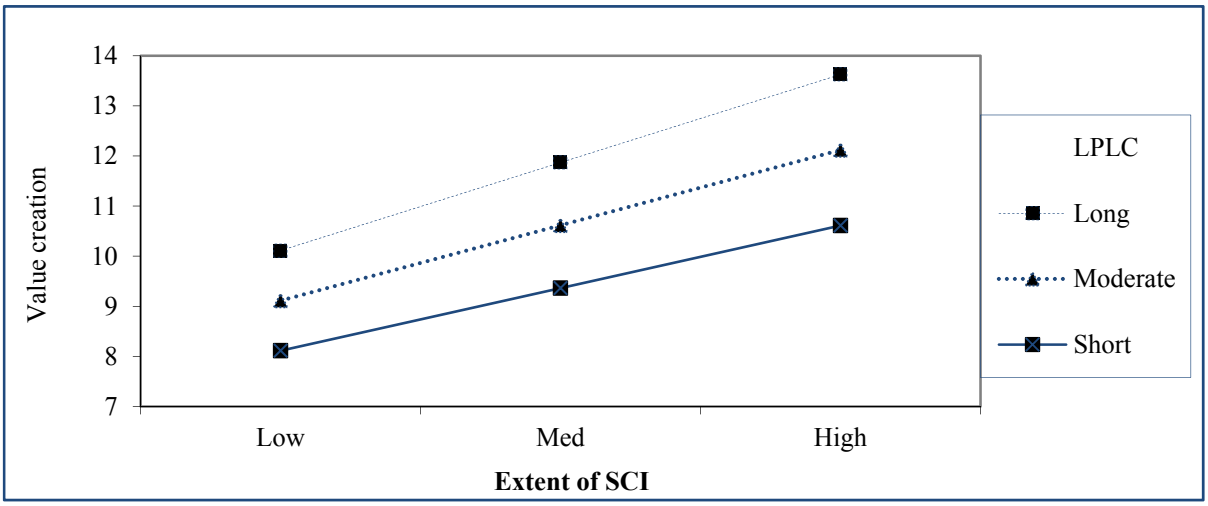

Figure 2. The moderation effect of LPLC on the link between SCI and VALUE

Lastly, the study finds statistical support for our claim that the relationship between SCI and value creation is moderated by longevity of product life cycle. The study finds evidence that when products stay relatively longer on the market, the positive effect of SCI on value creation is strengthened. This is demonstrated in Figure 2. However, there was no statistically significant support for the moderating role of longevity of product life cycle in the link between SCI and financial performance.

Generally, the life cycle of most products are shortening. However, due to the degree of variability in competitive pressure, proliferation of substitute products and the extent to which customer and market needs vary across industries, some firms'/industries' products should be expected to relatively stay shorter or longer on the market. For a more turbulent market which makes the life cycle of products uncertain, firms/SCs could mitigate any potential or consequential negative effects on their value adding activities by becoming proactive and constantly monitoring the market and relying on the voice-of-the-customer (i.e. making operations decisions based on actual information received from the customer) in order to promote the life span of their products. Without this, it should be expected that any positive effects of integration on value will be weakened when the market and demand needs constantly change and competition increases which make their products die out

quicker on the market than anticipated.

6. Conclusion, Limitations and Suggestions for Future Research

The results obtained from the study suggest that winning the 'war' or 'surviving' in today's market requires firms in a given SC to build capabilities and competencies not only through internal resources that they possess or internal performance-improvement practices but also via building strategic alliances and network ties, aligning processes, coordinating activities, and engaging in social exchanges.

The study's results reinforced extant empirical research that found that SCI enables firms to enhance business performance. Notwithstanding this, the study also brings to light the potential role of product life cycle in either strengthening or weakening the positive effect of SCI on business performance. Specifically, we found empirical support to our claim that firms whose products stay relatively longer on the market are more likely to experience greater performance in terms of value creation than those whose products stay shorter on the market and therefore proactiveness, constant monitoring, and gathering information on the performance of products on the market throughout their life cycles are required of firms in order to promote the longevity of products, sustain integrative efforts, and enhance value creation.

Although this study presents interesting findings and sheds new lights from data collected from the study's context, it cannot be absolved from certain limitations. The first limitation of the study has to do with the sample size relied on in estimating the study's proposed model. Relatively, most empirical studies reviewed relied on greater sample size which was more reliable in identifying significant relationships among variables. In this study, the hypothesized moderating effect of product life cycle on the link between SCI and financial performance was non-significant (although positive as specified), which might have been as a result of the sample size used in the study. It is therefore recommended that this proposed path be re-examine by future researchers by employing larger sample size in their studies.

In addition, although arguments were made in the study with reference to the increasing competition from new entrants and substitute products as well as the increasingly demanding nature of customers as potential causes of the shortening life cycle of products, no empirical data were collected to substantiate these propositions. Hence, further studies should focus on verifying if those factors are significant antecedents of the shortening life cycle of products within SCs.

Also, in this study, we were mainly interested in verifying theory, as such no emphasis was placed on examining factors that restrain SCI efforts. It must be noted that, as a developing economy, firms in Ghana are constantly faced with threats and market shake-ups in their respective operating environments which could make it difficult for some to be successful in pursuing SCI. Although existing literature lists many potential barriers to SCI, we perceive that such barriers and the extent to which they are present in firms and SCs and thus affect SCI may vary across contextual grounds. For example, the inter-variable correlational results (Table 2) indicate that manufacturing firms, firms with dedicated SC units, larger in size, and have longer industry experience do better in pursuing SCI. And thus it can be said that these factors could be antecedents of SCI and or serve as contingent factors in the link between SCI and business performance (Mackelprang et al., 2014). However this present study did not focus on investigating into these propositions. Hence, further studies can be undertaken along this direction.

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Appendix

Empirical contributions on the relationships between supply chain integration, value creation, and financial performance

Author(s)	Empirical setting/methodology	Focal learning construct(s)	Performance variables	Key findings
Huo et al. (2014)°	*China.* Data collected from 604 manufacturers using questionnaires. Hierarchical regression analysis was used.	1. SCI: Internal integration (II)[1], Process integration (PrsI)[1], Product integration (PtI)[1] 2. Competitive strategy (CS)[2]	1.Operational performance (OP) 2. Financial performance (FP)	1. Only II and PrsI sig. relate to OP ***positively*** 2. Only II and PtI sig. affect financial performance ***positively.*** 3. CS does ***not*** sig. moderate SCI →OP link

Huang et al. (2014)°	*Taiwan.* Data collected from 164 manufacturers using questionnaires. Hierarchical regression analysis was used.	1. SCI *(unidimensional)*[1] 2. Demand uncertainty (DU)[2] 3. Technological uncertainty (TU)[2]	Supplier's performance (SP)	1. SCI has sig. ***positive*** effect on SP 2. DU ***negatively*** moderates SCI → SP link 3. TU ***positively*** moderates SCI → SP link
Huo (2012) °, ±	*China.* Data collected from 617 manufacturers using questionnaires. Structural equation modelling was used	SCI: Internal integration (II)[1], customer integration (CI)[3], supplier integration (SI)[3]	1. Customer-oriented (COP) 2. Supplier-oriented (SOP) 3. Financial performance (FP)	1. II sig. improves COP, SOP, & FP ***directly*** and ***indirectly*** 2. CI sig. improves COP, but ***not*** FP (***directly***) 3. SI sig. improves SOP, but ***not*** FP (***directly***) 4. Both COP and SOP improve FP
Schoenherr and Swink (2012) ±	*Global.* Data collected from 403 supply chain professionals using questionnaires. Cluster & Discriminant analysis, One-sample Chi-square difference test, and One-way analysis of covariance	SCI: Internal integration (II)[1,2], customer integration (CI)[1], supplier integration (SI)[1]	1. Delivery performance (DP) 2. Flexibility performance (FP) 3. Quality performance (QP) 4. Cost performance (CP)	1. II sig. relates to all performance dimensions ***positively*** 2. External integration (SI and CI) only has sig. ***positive*** relationship with FP and CP 3. II sig. moderates the effect of external integration on DP and FP ***only***
Hosseini et al. (2012) ±	*Iran.* Data collected from 86 firms in the food industry. Structural equation modelling was used.	SCI: Internal integration (II)[1], customer integration (CI)[1,3], supplier integration (SI)[1,3]	Competitive capability: 1. Cost leadership (CL) 2. Differentiation (D)	1. SI sig. relates to both CL and D ***negatively*** 2. CI sig. relates to both CL and D ***positively*** 3. II has ***no*** sig. effect on both CL and D ***directly***, but its effect is channelled through SI and CI
Gimenez et al. (2012) ±	*Netherlands and Spain.* Data collected from 145 manufacturers using questionnaires. Stepwise regression analysis & analysis of covariance were used.	1. SCI[1]: Practices, Patterns, Attitude 2. Supply complexity[2]	Cost performance (CP) Service performance (SP)	1. For high levels of supply complexity, SCI increases performance. 2. There is ***little or no positive*** influence of SCI on performance where supply complexity is low
Danese and Romano (2011) ±	*USA, Asia, Europe.* Data collected from 200 manufacturing plants using questionnaires. Hierarchical regression analysis.	SCI: Customer integration (CI)[1], Supplier integrations (SI)[2]	Efficiency performance (EP)	1. CI does ***not*** sig. relate to EP 2. SI ***positively*** moderates the CI and EP link.
Boon-itt and	*Thailand.* Data collected using	1. SCI[1]: Internal	Delivery performance	1. CI ***not*** sig.

Wong (2011) [±]	questionnaires from 151 1st tier suppliers in automotive industry. Hierarchical regression analysis was used.	integration (II), Supplier integration (SI), Customer integration (CI) 2. Demand uncertainty (DU)[2] 3. Technological uncertainty (TU)[2]	(DP)	related to DP 2. Both II and SI are sig. related to DP ***positively*** 3. Both DU and TU sig. moderate II→DP and SI →DP links
Özdemir and Aslan (2011)[°, ±]	*Turkey*. Data collected using questionnaires from 181 SMEs. Hierarchical regression analysis was used.	SCI (*unidimensional*)[1]	1. Market performance (MP) 2. Financial performance (FP) 3. Customer satisfaction (CS) 4. Competitive capability: Cost leadership (CL), Customer service (CSS), Flexibility (F), Product indicators (PI)	1. SCI sig. relates to all competitive capability dimensions ***positively*** 2. All competitive capability dimensions are sig. related to MP and FP ***positively,*** but ***not*** CS 3. SCI sig. relates to MP 4. SCI ***not*** sig. related to FP and CS
Flynn et al. (2010))[°, ±]	*China*. Data collected from 617 manufacturers using questionnaires. Cluster analysis, Hierarchical regression analysis, Analysis of variance	SCI: Internal integration (II)[1], Customer integration (CI)[1,2] Supplier integration (SI)[1,2]	1. Operational performance (OP) 2. Business performance (BP)	1. II and CI are sig. related to OP ***positively*** 2. SI ***not*** sig. related to OP 3. Only CI*SI sig. related to OP ***negatively*** 4. II sig. related to BP 5. Both CI and SI are ***not*** sig. related to BP 6. ***No*** sig. interaction effects on BP 7. Configuration approach reveal that the SCI as a whole is sig. related to both OP and BP, and the effect is cumulative
Sezen (2008))[±]	*Turkey*. Data collected using questionnaires from 125 manufacturers. Regression analysis was used.	SCI (*unidimensional*)[1] SC info. sharing (SCIS)[1] SC design (SCD)[1]	Flexibility performance (FP) Resource performance (RP) Output performance (OP)	1. SCI ***not*** sig. related to FP, RP, or OP 2. SCIS ***not*** sig. related to FP, RP, or OP 3. SCD sig. relates to RP ***positively***. Has not sig. relation with FP and OP

Notes. [1]Predictor variable; [2]Moderating variable; [3]Mediating variable; [°]had at least an item measuring financial performance as operationalized in this study; [±] had at least an item measuring value creation as operationalized in this study.