


# Supply chain management practices and agribusiness firms' performance: Mediating role of supply chain integration



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**Background:** Globally, there have been a dramatic upward surge in the total number of agribusiness firms serving as a chain in strengthening of their activities. Interestingly, the impact of supply chain integration (SCI) on agribusiness firms is deficient in a developing country like Ghana.

**Aim:** The study looks into the nexus between supply chain management practices (SCMP) and agribusiness firms' performance. The study further examines the mediating role of SCI on the relationship between SCMP and agribusiness firms' performance in Ghana.

**Methods:** A research framework was proposed and subjected to tentative assessment using data amassed from selected agribusiness firms from the Northern Region of Ghana. Statistical Package for Social Sciences 22.0 version and LISREL 8.0 were used to test hypotheses on the nexus between supply chain management practices and agribusiness firms' performance, as well as the role of SCI.

**Results:** The findings revealed that SCMP relates positively to both financial and internal process performance. Also, it was discovered that SCI completely or partially mediates the effects of SCMP on the two variables of the firms performance, and this difference could be attributed to the different cultural settings.

**Conclusion:** In support of management theories, this study justifies that using SCI as an organisational core strategic tool will help boost agribusiness performances to remain and sustain competitive edge over rivals. Therefore, agribusiness managers, policymakers, governments and other interested bodies are encouraged to broaden the scope of advocacy in streamlining SCI culture to ensure effectiveness and speedy attainments of organisational objectives.

## Introduction

Agribusiness plays a crucial function in the economic transformation through the development of agro-based industries and provision of employment and income(s) (Katua 2014; Olaoye 2014). Agribusiness investments accelerate agricultural expansion through the establishment of new markets and the development of a vibrant input supply sector. Comparatively, Sub-Saharan Africa investments in agribusiness and agriculture production is expected to rise to US\$ 1 trillion by the year 2030 as against US\$ 313 billion it had in 2010 (Byerlee et al. 2013) which would be a powerful catalyst for economic transformation and development (Abrokwah et al. 2015; Avgerou et al. 2016).

With respect to this, both local and international markets are facing robust demand which would continue as domestic demand increases. Food markets are set to spur by 2030, exceeding US\$ 400 billion (Byerlee et al. 2013) because of urbanisation, thereby necessitating agribusinesses investment in operational activities such as processing, logistics and market infrastructure. Growing demand from both local and international markets, fierce competition and dynamics at the market in today's business environments are influencing organisations and businesses to engage in connected activities. Tarafdar and Qrunfleh (2017) stated that adopting an integrated move towards supply chain management (SCM) relationship is a great path to conforming to the changing needs of the customer. For firms to remain focused and sustain competitive advantage and performance goals at both local and international markets, the most successful approach is through SCM (Li et al. 2006). The study on SCM depicts the way of using and utilising resources over the entire firm, thereby optimising the value of the firm. Agribusiness firms adopt SCM

strategies to minimise cost by leveraging production and distribution activities to the enterprise suppliers and to fulfil customer request by delivering standardised products that meet customer's satisfaction (Ince et al. 2013; Sukati et al. 2012). A supply chain consists of manufacturers, suppliers, transporters, warehouses, wholesalers, retailers and finally the customers. This entire supply chain of each of the organisations within the network of companies contributes to delivering value to the customer. These also include new product development, marketing, operations, distribution, finance and customer service (Chopra & Meindl 2015); thus, the effectual management of a supply chain is imperative to establish and withstand competitive advantage in products and services of the firms.

In addition, researchers Alfalla-Luque et al. (2013), and Prajogo and Olhager (2012) detailed that integrating and handling the main components of information was paramount to the successful performance of supply chain and the firm. Hence, to attain valuable integration within the supply chain, the applicability of information technology needs to be acknowledged (Prajogo & Olhager 2012; Yang & Maxwell 2011). Furthermore, Singh et al. (2014) and Li et al. (2006) probed the nexus existing between the performance of the firm and supply chain practices, and the outcome stated that SCM practices have affirmative control on the performance of the organisation and its sustainability. This confirms the need to enforce SCM strategies among agribusiness firms.

Similarly, Ince et al. (2013) worked on the impact of enterprise resource planning systems and SCMP on firm performance, and their finding supports that effective SCM practices have an appreciable effect on the competitive advantage and firm performance. However, SCMP and the ERP systems could perhaps be influenced by contextual factors such as the type of the industry and size of the firm.

With the growing interest of scholars and experts over the last decades on SCM, Bechtel and Jayaram (1997), and Burgess, Singh and Koroglu (2006) regarded it as a vital constituent for operational success and the integration of numerous business procedures including demand scheduling and predicting, purchasing, engineering and assembly, delivery, resource management and customer management (Lummus et al. 1997; Mentzer et al. 2001). However, organisations must have blueprints to integrate and connect cross-functional activities internally and externally with the procedures of suppliers and customers so as to enhance firms' performance in the supply chain (Bechtel & Jayaram 1997; Lambert et al. 1998; Woo et al. 2016). The supply chain integration (SCI) approach builds worth for a firm's customers and lures suppliers and customers into the value creation process (Droge, Jayaram & Vickery 2004; Vickery et al. 2003). Despite the pivotal function of supply chain practices on firms' performance in SCM occurrences, many scholarly articles on SCM were conducted in developed countries. Moreover, previous research focused on the correlation between SCMP and organisational performance

(Gunasekaran, Subramanian & Rahman 2017; Kurien & Qureshi 2011; Li et al. 2006; Yap & Tan 2012).

However, empirical research on SCMP and firm performance focusing on SCI as a mediator in Ghana are almost lacking in the literature (Hillenbrand, Money & Pavelin 2012); as such, there still exists a gap in the literature (Vicente et al. 2015) for further research. To bridge the gap, the researchers seek to probe in the nexus existing between SCMP and firm performance by testing various variables such as leadership, stakeholders' involvement and commitment, continuous improvement and innovation, and, lastly, management and strategic planning in the financial and internal process performance of selected agribusiness firms in the Northern Region of Ghana.

## Theoretical foundations and research hypotheses

Supply chain management practices are imperative to the firm as such, setting an explanatory examination to entail a robust theoretical attention and contributory literature review to bolster the liaison existing among the component under consideration is relevant. The conceptual framework of the research is relying on the earlier work of Fernandes, Truong and Sampaio (2017) which principally focuses on proportion taxonomy and instrument of measurement. The theory footing the conceptual framework of this research was settled on the resource-based view (RBV) of the firm (Barney 1991; Penrose 1959; Wernerfelt 1984), posited that competitive advantage is sustainable and attainable when the firms' resources such as human capital cannot be copied or replaced by competitors, thereby placing the firm above its competitors inside and outside the supply chain.

According to the RBV, firms should continually appraise the network of companies involved in the activities of the chain to assess whether they have the correct people in place with the requisite skills to deliver value to the firm and customer to maintain a nonstop competitive edge (Wernerfelt 2007). The key factor to a firm's strength and weakness roots from the kind of suppliers, manufacturers and distributors integrated either internally or externally within the supply chain and their quality of relationship to the host firm such as financial and internal process performance; thus focusing extensively on the skills and procedure enrichment of the organisation offering unique products and services to the end user (Barratt & Oke 2007; Fawcett, Ellram & Ogden 2007).

This study focused specifically on the RBV theory to ascertain the nexus existing between SCMP and firms' performance with emphasis on agribusiness. The theory of the firm posits the unique function core competencies play in the financial and internal process performance of the firm. The theory of the firm also pinpoints unique characteristics of resources the organisation owns (Conner 1991; Nonaka et al. 2014) which differs across firms (Penrose 1959; Wernerfelt 2007). As a result of the assorted types of resources owned by the firm, performance can be ascribed

to the dissimilar resources owned. According to Tzokas et al. (2015), knowledge, technological resource, capabilities, skills and experience of workers, management and organisational competency are mostly noted as intangible assets to the firm. However, the dynamics of the business environment turned other scholars like Teece, Pisano and Shuen (1997) to focus on the dynamic effect of capabilities and resources on the performance of the firm, while synchronising dissimilar parts of production cognition and the elementary competency, and skills of integrating dual technology effusion (Danilovic & Leisner 2007; Prahalad & Hamid 1990). Furthermore, the uniqueness a firm adds to performance influenced the works of these researchers (Barney 1991; Conner 1991; Nonaka et al. 2014; Penrose 1959; Teece et al. 1997). As a result, the dynamics of the business setting, internal factors, firm scheme, organogram, arrangement and labour, capabilities and competences, property size and financial capacity serves as informative in explicating performance.

In all, the tangible and intangible assets of the firm serve as a competitive gain and bolster performance. Accordingly having SCM capability as a firm, is an essential asset for the focal firm or organisation (Bhakoo, Singh & Sohal 2012; Gandhi et al. 2016; Trkman et al. 2007). Consequently, to try to fathom dissimilar opinions of academicians within the RBV could help in improving the topic under consideration such as SCMP and agribusiness firms' performance with integration as the mediator.

### Supply chain integration (leadership and integration)

SCI is explained as the extent to which an organisation cooperates with partners of the supply chain and supportively regulates internal and external organisational practices to accomplish proficient movements of products, services, data, finance and decisions with the aspiration of rendering paramount value to its customer (Flynn, Huo & Zhao 2010). The aptitudes of the firm in making strategic alliances, sharing information, coordinating processes and integrating resources are deemed as SCI. It thus shields three scopes: internal integration, integration of suppliers and, finally, integration of customers (Flynn et al. 2010; Zhao et al. 2011). According to Zhao et al. (2011; 2013), the extent to which an organisation or firm arranges its operational strategies, systems and procedures into synergetic mixed processes is termed as internal integration. Thus, the ability of leadership to cooperate and share information among internal arms, strategically creating partnerships among cross-functional units and working as one beyond functions (Zhao et al. 2011). Leadership is a management philosophy in SCM, aimed at crafting and preserving, enabling surrounding where employees are wholly engaged and dedicated to accomplishing the imperative objective of the firm. Thus, leadership engaged in SCM is accountable for promoting and sustaining consistency within the supply chain through integration and, as a result, leading to improvement in performance (Gosling et al. 2017). Based on the previous discussion, we formulate that:

H<sub>1a</sub>: Supply chain integration mediates the effect of leadership on agribusiness' financial performance.

H<sub>1b</sub>: Supply chain integration mediates the effect of leadership on agribusiness firms' internal process performance.

### Stakeholders' commitment and integration

According to the RBV, integration of supply chain could be remarked as a resource that is prime to competitive advantage (Barney 2012), and the integration of internal and external functions need sophisticated systems and skills that are hard to copy and replace (Chen, Daugherty & Landry 2009). Therefore, supplier integration, customer integration and process integration are deemed as stakeholders in the supply chain, performing specific functions within and outside the boundaries of the organisation and integrating their unique functions that are essential to the success of the business. In addition, the commitment of workers and their engagement at all positions of the firm is critical, and the usage of the capabilities and competencies they possess for the benefit of the organisation (Salanova et al. 2013). Also, the commitment of stakeholders helps internal and external processes to move on smoothly, because resources and capabilities acquired externally also produce competitive advantage (Das & Teng 2000). On the other hand, stakeholders' commitment plays a significant function in skill development of activities that contribute to SCM success (Waller & Fawcett 2013). Hence, stakeholder's commitment paves the path for the utilisation of integration within and outside the supply chain (Alfalla-Luque et al. 2015). Additionally, stakeholders' commitment and understanding to the norms and values of the firm creates the avenue to uphold and formalise the strategic plan of the firm, and as employees in other departments are committed to the organisation and would be energised to also take responsibilities beyond their specialised domain (Abbott, White & Charles 2005; Kehoe & Wright 2013), thereby leading to higher levels of internal performance of the firm. In line with the foregoing argument, we propose that:

H<sub>2a</sub>: Supply chain integration mediates the effect of stakeholders' commitment on agribusiness financial performance.

H<sub>2b</sub>: Supply chain integration mediates the effect of stakeholders' commitment to agribusiness internal process performance.

### Continuous improvement, innovation and integration

According to the focus of management literature, the sustainability of the firm relies on the ability to have the requisite skills and competence to continually innovate and improve on procedures, systems, products and services. This aims to boost growth in revenue and enhance profit margin (Crossan & Apaydin 2010; Wales, Gupta & Mousa 2013). On the other hand, changes and dislocation of many markets decrease cycle of products, and dynamic changes around the globe and taste of the customer call for continuous



innovation and improvement (Tewari 2006). For example, the culture of continuous improvement and innovation placed Apple Company at the edge of its competitors at the market and provided wider market and revenue growth (Lindgardt et al. 2009).

Continuous improvement and innovation give a new way of brainstorming about how the core competencies such as capabilities and resources of the firm could be utilised well to continuously have an advantage ahead of its competitors, as way of lighting growth and increasing profitability of the supply chain thus enhancing the financial and internal process of the firm (Lindgardt et al. 2009). The aptitude of the focal firm to connect with all the partners within the supply chain to create and deliver sustainable products and services to the customer, at the right place and at the right time and in the right quantity in modernised fashion is deemed as continuous improvement and innovation (Bessant & Francis 1999; Scott, Wilcock & Kanetkar 2009; Teeratansirikool et al. 2013).

Additionally, integrating different modes of reaching employees, suppliers and manufacturers requires enhanced and systematic approaches such as sharing information, training of employees and suppliers on standard products development with partners in the supply chain to be in place (Cao & Zhang 2011; Finney & Corbett 2007; Koçoğlu et al. 2011). Similarly, integrating the culture of continuous improvement and innovation internally adds a significant contribution to the internal process of the firm. Thus, agribusiness' internal process performance is a footing to sustain competitive advantage outside the firm (Hamidianpour et al. 2015; Santamaría et al. 2012). Because poor internal process operations could result in failure in integrating with external partners (Danese & Romano 2011), the authors suggest that:

$H_{3a}$ : Supply chain integration mediates the effect of continuous improvement and innovation on agribusiness firms' financial performance.

$H_{3b}$ : Supply chain integration mediates the effect of continuous improvement and innovation on agribusiness firms' internal process performance.

## Management and strategic planning and integration

According to Lummus et al. (1997) and Mentzer et al. (2001), SCM is the management of various business processes such as information management, demand planning, suppliers' management, warehousing, transportation and distribution, inventory management, production planning and resource management. Because SCM is a complex system, the firm has to strategically plan to deal with uncertainties which come up with the supply chain. Strategically partnering suppliers is seen as the long-term relationship between the organisation and its suppliers which influences the strategic and functioning proficiencies of the participating firms or company to attain momentous continuing welfares (Li et al.

2005; 2006; Monczka et al. 1998). Strategic planning, management and integration affect financial improvement on the firm when suppliers in the supply chain respond to quick demand orders (Bhagwat & Sharma 2007; Hassini, Surti & Searcy 2012).

In addition, customer relationship was validated by Li et al. (2006) as a key function of strategic planning and management. They stated that customer relationship is a series of actions exercised for the reason of dealing with customer complaints, creating lasting relationships with customers and enhancing customer satisfaction. Establishing a closer relationship with customers is of importance to SCI, as this practice empowers the organisation or firm to respond quickly to the needs of the customers (Droge et al. 2004; Vickery et al. 2003). Furthermore, the focus of SCM is the sharing of information within internal and external supply chains (Koçoğlu et al. 2011; Li et al. 2005); thus affirming the essence of the information sharing to SCM integration. An organisation can act more efficiently to the changing needs of the customers by sharing information across functions of the supply chain (Yang & Maxwell 2011).

On the other hand, internal operations, referred to as internal processes, are defined as the activities connected to the production systems and logistics flows. According to Gunasekaran et al. (2017), in order to respond to market demands, SCM requires flexibility in the production system. Thus, the system must be able to execute frequent modifications in demand configurations. Therefore, the integration of these strategic practices and management amounts to efficiency in agribusiness firms' performance and augmenting financial and internal process performance. Therefore, we propose that:

$H_{4a}$ : Supply chain integration mediates the effect of MSP on agribusiness' financial performance.

$H_{4b}$ : Supply chain integration mediates the effect of MSP on agribusiness' internal process performance.

## Overview of agribusiness in Ghana

The economy of Ghana is recognised as agrarian. Agriculture contributes to the economy of Ghana by recruiting more than 55% of the population, while contributing approximately 25% to gross domestic products (GDPs) and export earnings (Christiaensen, Demery & Kuhl, 2011; Killen 2011). The agricultural sector in Ghana comprises five core subdivisions, namely livestock, crops, fisheries, forestry and cocoa. The crop sector is rising at about 66.2% by GDP, the forestry, cocoa, fisheries and livestock sectors are growing at 12.2%, 8.2%, 7.3% and 6.1%, respectively, to GDP (Benin et al. 2013). The crop subsector includes yam, fruits (bananas, pineapples, onions and shallots), shea nuts, cashew nuts and kola nuts. For Ghana to develop a sustainable local food industry, more consideration is prerequisite to resolve the food security of the country. Ghana's agriculture is principally on a smallholder with farmers having not more than two

hectares in size (World Bank 2012). The farming system in Ghana is also still in the traditional way, where hoe and cutlass are the key farming tools (World Bank 2012).

According to Ghana Statistical Service (2015), the contribution of the agriculture sector to GDP is unceasingly declining and the service sector is rising yearly. Some measures to tackle the continuous poor performance of the agricultural sector have acknowledged the deficiency of vast share to the sector by both government and private firms. Therefore, the Ministry of Food and Agriculture, realising the importance of agribusiness, set up an agribusiness unit inside the Ministry of Food Agriculture to expedite the investment and assist small- and medium-scale local agribusinesses. Programmes such as Youth in Agriculture and the West Africa Agricultural Productivity were also implemented to boost and entice businesses and those inclined into agriculture.

Agribusiness indicates the agricultural associated business activities that are executed from agricultural inputs production and delivery through the fork by covering the supply of agricultural inputs, the production and transformation of agricultural products and their distribution to the final consumer (FAO 2017). The agribusiness firms offer the inputs, expertise and services needed for production on the farm as well as processing and the markets for the farm products. The tenacity of agribusiness firms is to convert the agricultural sector from a way of living to business, to hasten growth in productivity, upsurge revenue and creation of jobs, improve food security and upsurge competitiveness in the domestic and international market. Agribusiness atmosphere continues some level of growth and development. Although agribusiness is seen as an authentic weapon for economic development of the country, the industry is at the crucial level where the industry lacks modernised technology and no connection between the agricultural sector and the market. The agribusiness sector has experienced some development from within the sector. A World Bank (2012) report captured the interventions going on, consisting of a collaboration between the public and private sector. The financing by Ghanaian Agriculture Project (FinGAP), supported by USAID, helped in expediting funding and savings in the soy, rice and maize supply and value chain. Various impediments hinder the growth and performance of agribusiness, numbering from operations, managerial, marketing, human resource, accounting and finance issues. The absence of transport and storing facilities contribute to the poor performance of the agribusiness firms, because storage plays a critical factor in the post-harvest of agricultural produce. On the other hand, agribusiness firms face countless issues which include operational, information technology, managerial and governance, marketing and corporate social responsibility, human resource management and accounting, and finance issues.

Lack of mechanised and technology utilisation limits production units and forbids economies of scale and suboptimal yield (Killen 2011).

## Framework of the research

Figure 1 demonstrates the SCM practices adopted for this research. The framework propositions that SCM practices will have an influence on firm performance both completely and also partially through SCI. The conceptual model of SCM practices and firm performance are identified and classified into four (4) and two (2) measurements, respectively. The four SCM measurements are leadership, stakeholders' commitment and involvement, management and strategic planning, and continuous improvement and innovation. Also, the two (2) firm performance measurements consist of financial and internal process. SCI is the mediating variable between SCM practices and performance variables.

## Research methodology

In meeting the objectives of the study, a descriptive research design was adopted for the study alongside the cross-sectional survey. This research noted population as the total of all units that exist in the area of investigation. Thus, it relates to all possible observations of the Ghanaian agribusiness firms, and special and peculiar performance issues that relate to the agribusiness in Ghana. The study comprises a population of 64 selected agribusiness firms from the national Board for Small Scale Industries located in the northern region of Ghana. For the purposes of generality, a sample was drawn and studied. Then a descriptive sample was drawn and the researchers apportioned the questionnaires proportionately among the agribusiness firms. These include five managers - each from the sector; thus, CEO, HR manager, accounts and finance manager, and operation manager. There were 320 participants in the sample with a response rate of 50.62% (162) which was used for the final analysis. Data were structured and analysed, and figures, tables and descriptive statistics, which involve mean and standard deviation, were generated using the SPSS version 20.0 and LISREL 8.0. Additionally, inferential statistics involve multiple regression and correlation analysis were produced. To assure the validity and reliability of the measures utilised in the analysis and test, internal consistency (Cronbach's alpha), composite reliability (CR) and discriminant validity, that is, confirmatory factor analysis was applied. Furthermore, to evaluate the existence of bias in the data, goodness-of-fit indicators ( $\chi^2(df)$ , root mean square error of approximation [RMSEA], comparative fit index

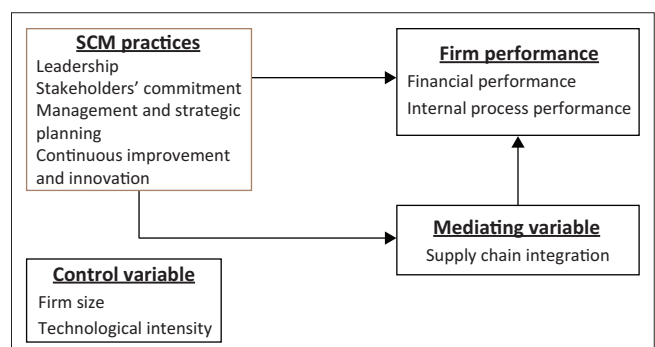


Figure 1: Framework of the research.

[CFI], non-normed fit index [NNFI] and standardised root mean square residual [SRMR]) were calculated. The approach of testing mediation was adopted from Baron and Kenny (1986) and Sobel (1982) to assure the validity of the technique.

Opinions regarding the SCMP were employed from Fernandes et al. (2017) and were sought and measured using eight Likert scale items. Instruments that measure firm performance (financial and internal process) were identified and adopted from Abrokwah (2017). The measure firm performance comprised 10 items each. The researchers adopted five Likert scale items on SCI measures as earlier proposed by Chatzoudes and Chatzoglou (2015). All the above items were measured on a 5-point Likert scale, ranging from 5 = strongly agree to 1 = strongly disagree.

Firm size and technological intensity were considered for control purposes. Firm size, based on the number of employees was measured and, as companies may possess its structure and deploy numerous resources according to their size (Gilman & Raby 2013), the technological intensity was adopted (Sánchez, Marín & Morales 2015).

## Measures of validity and reliability of data

Table 1 exhibits the outcomes of the confirmatory factor analysis (CFA) validity and reliability test. The values of Cronbach's alpha, as a measure of internal consistency, ranged from 0.879 for SCMP to 0.928 for IPP. The cut-off point for ascertaining the reliability of instruments indicates the range of alpha coefficients that exceeded 0.70 which is acceptable reliability coefficient according to Tavakol & Dennick (2011). The reliability of a high alpha value depends on the scale of measurement employed. Therefore, the scales used to measure the objectives of the research are a good fit, as they are internally consistent and measure the underlying construct. Thus, the scales had an acceptable reliability coefficient and were appropriate for the study.

The confirmatory factor analysis produced a satisfactory model fit (Table 1). The respective standardised loadings, *t*-values and  $R^2$  values are presented. Factor loadings were affirmative and significant at 1%, implying a validation of convergent validity of the measures. The model produced  $\chi^2(df) = 479.98$ ; normal chi-square ( $\chi^2(df) = 1.326$ ; RMSEA = 0.044; normed chi-square (NNFI) = 0.959; CFI = 0.963; and SRMR = 0.044. The very large chi-square value indicates poor fit for the model. The RMSEA value produced an acceptable model fit in relation to the degrees of freedom consistent with the rule of thumb of 0.06 or less (Jarvis, Mackenzie & Podsakoff 2004). The SRMR value of 0.044 also suggests an acceptable model fit. The CFI value of 0.963 is indicative of better fit and is therefore an acceptable model fit (Jarvis et al. 2004). Finally, the NNFI was 0.959 and thus denotes a good model fit, because it is equal to the cut-off of 0.95 or greater indicating a good model fit (Jarvis et al. 2004). The results generally indicate satisfactory model fit suggesting that the data have no bias. The results further

**TABLE 1:** Construct measures validity and reliability analysis.

Construct or measures	Standardised loadings ( <i>t</i> -values)			Financial performance
	Supply chain management practices	Supply chain integration	Internal process performance	
SCMP1	0.726 (fixed)	-	-	-
SCMP2	0.680 (8.43)	-	-	-
SCMP3	0.756 (9.37)	-	-	-
SCMP4	0.749 (9.28)	-	-	-
SCMP5	0.829 (12.24)	-	-	-
SCMP6	0.895(14.47)	-	-	-
SCMP7	0.893 (14.42)	-	-	-
SCMP8	0.824 (12.76)	-	-	-
SCI1	-	0.812 (fixed)	-	-
SCI2	-	0.852 (13.11)	-	-
SCI3	-	0.869 (13.49)	-	-
SCI4	-	0.874 (13.62)	-	-
SCI5	-	0.815 (12.28)	-	-
IPP1	-	-	0.779 (fixed)	-
IPP2	-	-	0.807 (11.43)	-
IPP3	-	-	0.842 (12.05)	-
IPP4	-	-	0.769 (10.76)	-
IPP5	-	-	0.812 (11.51)	-
IPP6	-	-	0.814 (11.54)	-
IPP7	-	-	0.819 (11.64)	-
IPP8	-	-	0.802(10.17)	-
IPP9	-	-	0.852(13.20)	-
IPP10	-	-	0.872(13.52)	-
FP1	-	-	-	0.892(fixed)
FP2	-	-	-	0.895(14.47)
FP3	-	-	-	0.893(14.42)
FP4	-	-	-	0.824(12.76)
FP5	-	-	-	0.890(11.86)
FP6	-	-	-	0.841(11.17)
FP7	-	-	-	0.852(11.34)
FP8	-	-	-	0.881(12.56)
FP9	-	-	-	0.913(12.90)
FP10	-	-	-	0.821(12.13)
CA	0.879	0.925	0.928	0.900
CR	0.913	0.926	0.929	0.902
AVE	0.550	0.714	0.650	0.697

CFI, comparative fit index; CR, composite reliability; IPP, internal process performance; RMSEA, root mean square error of approximation; SCMP, supply chain management practice; SRMR, standardised root mean square residual; CFA, confirmatory factor analysis; SCI, supply chain integration; FP, financial performance; NNFI, non-normed fit index; CA, Cronbach's alpha; AVE, average variance-extracted.

Note:  $\chi^2 = 479.98$ ;  $df = 362$ ;  $\chi^2(df) = 1.326$ ; RMSEA = 0.044; NNFI = 0.959; CFI = 0.963; SRMR = 0.044.

indicated the *R* and  $R^2$ , CR and average variance extracted (AVE) results. The corresponding values of CR and AVE for every hypothesis showed satisfactory results, given the rule of thumb of 0.60 and 0.50, respectively. Also, all AVEs attained were greater than the shared variances between constructs; thus, satisfying satisfactory discriminant validity.

## Statistical analysis of data

From Table 2, the descriptive statistics and the correlation coefficient show a normal distribution for both the mean and

**TABLE 2:** Descriptive statistics and correlation of supply chain management practices, supply chain integration and firm performance.

Variables	LD	SC	MSP	CII	FP	IPP	FS	TI	SCI
LD	-	-	-	-	-	-	-	-	-
SC	0.783**	-	-	-	-	-	-	-	-
MSP	0.710**	0.706**	-	-	-	-	-	-	-
CII	0.706**	0.711**	0.793**	-	-	-	-	-	-
FP	0.474**	0.474**	0.531**	0.578**	-	-	-	-	-
IPP	0.421**	0.421**	0.518**	0.574**	0.884**	-	-	-	-
FS	0.031	0.031	0.028	0.044	0.056	0.055	-	-	-
TI	0.000	0.000	0.036	0.052	0.057	0.046	-0.643**	-	-
SCI	0.711**	0.711**	0.729**	0.783**	0.691**	0.624**	0.009	0.034	-
Mean	3.5377	3.5649	3.3349	3.5462	3.4297	3.5105	2.3614	2.4819	3.5482
SD	0.6372	0.7583	0.8961	0.8139	0.7794	0.772	1.1503	0.6298	0.6836

LD, leadership; SC, stakeholders' commitment; MSP, management and strategic planning; CII, continuous improvement and innovation; FP, financial performance; IPP, internal process performance; FS, firm size; TI, technological intensity; SCI, supply chain integration.

\*\*Correlation is significant at 0.01 level (two-tailed).

**TABLE 3:** Regression results for financial performance.

Variables	R <sup>2</sup>	Adjusted R <sup>2</sup>	FS	TI	SCI	LD	SC	MSP	CII
Model 1 <sup>b</sup>	0.003	-0.010	0.052	0.067	-	-	-	-	-
Model 1 <sup>b</sup>	0.477	0.474	0.050	0.034	0.691**	-	-	-	-
Model 2 <sup>a</sup>	0.506	0.503	-0.013	0.034	-	0.711**	-	-	-
Model 3 <sup>b</sup>	0.224	0.220	0.041	0.057	-	0.474*	-	-	-
Model 4 <sup>b</sup>	0.477	0.474	0.050	0.034	0.691**	-0.036	-	-	-
Model 5 <sup>a</sup>	0.329	0.325	-0.012	0.008	-	-	0.729*	-	-
Model 6 <sup>b</sup>	0.282	0.278	0.041	0.083	-	-	0.531*	-	-
Model 7 <sup>b</sup>	0.477	0.474	0.050	0.034	0.691**	-	0.059	-	-
Model 8 <sup>a</sup>	0.613	0.610	-0.026	-0.007	-	-	-	0.783**	-
Model 9 <sup>b</sup>	0.334	0.330	0.030	0.027	-	-	-	0.578**	-
Model 10 <sup>b</sup>	0.477	0.474	0.050	0.034	0.691**	-	-	0.097	-
Model 11 <sup>a</sup>	0.621	0.618	-0.040	0.026	-	-	-	-	0.788**
Model 12 <sup>b</sup>	0.325	0.321	0.021	0.052	-	-	-	-	0.570**
Model 13 <sup>b</sup>	0.477	0.474	0.050	0.034	0.691**	-	-	-	0.069

LD, leadership; SC, stakeholders' commitment; MSP, management and strategic planning; CII, continuous improvement and innovation; FP, financial performance; IPP, internal process performance; FS, firm size; TI, technological intensity; SCI, supply chain integration.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

standard deviation. It also appeared that all the variables have a correlation coefficient of between 0.75 and 0.90 which indicates that the differentiation index is great (Fang et al. 2016; Henseler, Ringle & Sarstedt 2015). Based on the previous discussion, the regression analysis was conducted and a further test was carried out to determine the mediate effect of SCI on the bond amid SCMP and firm performance variables (financial and internal process).

Table 3 highlights the mediating effect of SCI on the relationship between SCMP and FP. Firstly, the control variables (firm size and technological intensity) were used to test the mediating effect of SCI on SCMP variables (LD, SC, MSP and CII) and FP. From the regression table, it can be observed from model 1<sup>b</sup> through model 4<sup>b</sup> that SCI has a strong positive effect on FP at 0.691 at  $p < 0.01$  (two-tailed), LD is positively related to SCI at 0.711 at  $p < 0.01$  (two-tailed), LD is significant with FP at 0.474 at  $p < 0.01$  (two-tailed) and SCI has a significant positive relationship with FP at 0.691 at  $p < 0.01$  (two-tailed). Also, it can be observed from model 5<sup>a</sup>, 6<sup>b</sup> and 7<sup>b</sup> that SC has a significant relationship on SCI at 0.729 at  $p < 0.01$  (two-tailed), SC is significant on FP at 0.531 at  $p < 0.01$  (two-tailed) and SCI has a significant positive effect on FP at 0.691 at  $p < 0.01$  (two-tailed). Again, in model 8<sup>a</sup>, 9<sup>b</sup> and 10<sup>b</sup>, MSP is significant on SCI at 0.783 at  $p < 0.01$  (two-tailed), MSP is significant on FP at 0.578 at  $p < 0.01$

(two-tailed) and SCI has a significant positive effect on FP at 0.691 at  $p < 0.01$  (two-tailed). Furthermore, it could be observed from model 11<sup>a</sup>, 12<sup>b</sup> and 13<sup>b</sup> that CII is significant on SCI at 0.788 at  $p < 0.01$  (two-tailed), CII is significant on FP at 0.570 at  $p < 0.01$  (two-tailed) and SCI has a significant positive relationship on FP at 0.691 at  $p < 0.01$  (two-tailed).

Finally, in line with previous studies, model 1<sup>b</sup> endorses a significant positive effect of SCI on FP at 0.691 at  $p < 0.01$  (two-tailed). Therefore, SCI has a positive effect on all the other variables. This confirms a complete mediation (Baron & Kenny 1986; Sánchez et al. 2015; Sobel 1982), thereby supporting all the hypotheses (Feng, Sun & Zhang 2010; Prajogo & Olhager 2012).

Again in Table 4, we tested the mediating effect of SCI on the relationship between SCMP and IPP. As with Table 2, the control variables (firm size and technological intensity) was used to test the mediating effect of SCI on SCMP variables (LD, SC, MSP and CII) on IPP. Models 2<sup>a</sup>, 3<sup>b</sup> and 4<sup>b</sup> indicate SCI is positively related to IPP at 0.624 at  $p < 0.01$  (two-tailed); LD has a significant positive effect on SCI at 0.711 at  $p < 0.01$  (two-tailed); LD is significant on IPP at 0.421 at  $p < 0.01$  (two-tailed); and SCI has a positive effect on IPP at 0.624 at  $p < 0.01$  (two-tailed). Similarly, it can be observed from model 5<sup>a</sup>, 6<sup>b</sup> and 7<sup>b</sup> that SC has a significant relationship on



**TABLE 4:** Regression results for internal process performance.

Variables	R <sup>2</sup>	Adjusted R <sup>2</sup>	FS	TI	SCI	LD	SC	MSP	CII
Model 1 <sup>b</sup>	0.014	0.002	0.145	0.139	-	-	-	-	-
Model 1 <sup>b</sup>	0.389	0.385	0.050	0.025	0.624***	-	-	-	-
Model 2 <sup>a</sup>	0.506	0.503	-0.013	0.034	-	0.711***	-	-	-
Model 3 <sup>b</sup>	0.177	0.172	0.042	0.046	-	0.421***	-	-	-
Model 4 <sup>b</sup>	0.389	0.385	0.050	0.025	0.624***	-0.046	-	-	-
Model 5 <sup>a</sup>	0.329	0.325	-0.012	0.008	-	-	0.729***	-	-
Model 6 <sup>b</sup>	0.268	0.264	0.041	0.027	-	-	0.518***	-	-
Model 7 <sup>b</sup>	0.389	0.385	0.050	0.025	0.624***	-	0.135	-	-
Model 8 <sup>a</sup>	0.613	0.610	-0.026	-0.007	-	-	-	0.783***	-
Model 9 <sup>b</sup>	0.329	0.325	0.030	0.016	-	-	-	0.574***	-
Model 10 <sup>b</sup>	0.408	0.401	0.042	0.019	0.451***	-	-	0.220***	-
Model 11 <sup>a</sup>	0.621	0.618	-0.040	0.026	-	-	-	-	0.788***
Model 12 <sup>b</sup>	0.292	0.287	0.022	0.040	-	-	-	-	0.540***
Model 13 <sup>b</sup>	0.389	0.385	0.050	0.025	0.624***	-	-	-	0.128

LD, leadership; SC, stakeholders' commitment; MSP, management and strategic planning; CII, continuous improvement and innovation; FP, financial performance; IPP, internal process performance; FS, firm size; TI, technological intensity; SCI, supply chain integration.

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

SCI at 0.729 at  $p < 0.01$  (two-tailed), SC is significant on IPP at 0.518 at  $p < 0.01$  (two-tailed) and SCI has a significant positive effect on IPP at 0.624 at  $p < 0.01$  (two-tailed). Also, in model 8<sup>a</sup>, 9<sup>b</sup> and 10<sup>b</sup>, MSP is significant on SCI at 0.783 at  $p < 0.01$  (two-tailed); MSP is significant on IPP at 0.574 at  $p < 0.01$  (two-tailed) and SCI has a significant positive effect on IPP at 0.451 at  $p < 0.01$  (two-tailed). Furthermore, it could be observed from model 11<sup>a</sup>, 12<sup>b</sup> and 13<sup>b</sup> that CII is significant on SCI at 0.788 at  $p < 0.01$  (two-tailed); CII is significant on IPP at 0.540 at  $p < 0.01$  (two-tailed) and SCI has a significant positive relationship on IPP at 0.624 at  $p < 0.01$  (two-tailed). Finally, in connection with erstwhile studies, model 1<sup>b</sup> confirms a significant positive effect of SCI on FP at 0.624 at  $p < 0.01$  (two-tailed). Thus, SCI has a positive effect on all the other variables. This confirms a complete mediation (Baron & Kenny 1986; Sánchez et al. 2015; Sobel 1982), and thereby supporting all the hypotheses (Chen et al. 2009; Hosseini Baharanchi 2009; Wong, Wong & Boon-Itt 2013).

## Discussion

Even though agribusiness firms have grasped the significance of implementing SCM, exactly what to implement is not often known because of the lack of understanding of what comprises an inclusive set of SCM practices. By recommending, developing and authenticating multiple-dimensional, operational measures of the paradigm of SCM practices and exhibiting its effectiveness in enhancing firm performance, the contemporary study provides agribusiness firms with expedient apparatus for appraising the inclusiveness of their SCM practices.

Therefore, building on management theories, the current study was set to explore the relationship between SCMP and two dimensions of firm performance (financial and internal process) among agribusinesses in Ghana. The study further placed prominence on the influence of SCI on SCMP regarding financial performance and internal process performance among agribusinesses in Ghana.

The findings put forward that SCMP relate positively to both financial and internal process performance (Chen et al. 2009;

Hosseini Baharanchi 2009; Wong et al. 2013) and therefore validating the hypothesis proposed by the researchers. On the other hand, to the best interest of firms and organisations, the study correspondingly disclosed that SCI entirely or moderately mediates the effects of SCMP on FP and IPP (He et al. 2014; Prajogo & Olhager 2012). Thus, in backing previous and existing discoveries, the study indicates that SCMP can improve firms' performance (Ince et al. 2013; Macedo, Pinho & Silva 2016; Moneva et al. 2007; Prajogo & Olhager 2012) if firms SCI is enhanced, because today's competition is not between firms, but how interconnected their supply chain activities remain. Likewise, SCI serves as a key factor in influencing firms' effectiveness, because it serves as a pivotal advocate in making a decision concerning firm's sustainability and success; thus securing competitive advantage (Li et al. 2006).

The study also exonerates preceding affirmations on SCMP which state that SCMP is positively related to SCI and organisational outcomes (Albdour & Altarawneh 2014; Casper et al. 2011; Wiengarten et al. 2015). It is therefore discernible that effective execution of SCMP within an organisation will ensure growth, stability, performance and competitive advantage for agribusiness firms in Ghana (Li et al. 2006; Nyamah et al. 2017). SCM practices might be influenced by background issues such as the type of industry, firm size, technological intensity and the position of the firm in the supply chain.

Finally, in line with the RBV and human capital theory, the study indicates that management is up to the task of gaining and maintaining competitive advantages by sharing of information within its internal and external supply chains (Li et al. 2005; Teeratansirikool et al. 2013; Wong, Lai & Bernroider 2015) which affirms the core of the information sharing to SCM integration. Thus, management is effective and efficient in meeting the changing needs of the customers by sharing information across functions of the supply chain (Li & Lin 2006; Marinagi, Trivellas & Reklitis 2015), and thereby meeting internal and financial performance targets (Hosseini Baharanchi 2009; Wong et al. 2013; 2015).



## Conclusion

With the increasing importance of SCMP, SCI and acknowledgement of different dimensions of firm performance over the preceding decade, it is essential to improve our understanding of these concepts and their associations. The research contributes to the literature by developing and empirically testing the connection concerning SCMP and firm performance, and the mediating effect of SCI on SCMP towards firm performance based on a sample of selected agribusiness firms in the Northern Region of Ghana.

Empirical proof is presented for the accelerating influence of SCI on supply chain management practices towards firm performance and SCMP on firm performance. The study verified that SCI mediates the effects of SCMP and firm performance (financial and internal process). Findings from this study also provide some recommendations for managers to direct their management actions for achieving better SCI. Enhanced performance may be achieved by paying more attention to SCMP (Di Zhang & Swanson 2013). Thus, management should embrace SCI as an effective tool or a performance driver (Kaplan 2001) among agribusinesses. For the Ghanaian agribusiness to be more efficient and effective (Kondrasuk 2011), it would be appropriate by empowering SCI as a strategic investment to boost the performances.

Although we tested the mediating effect of SCI on SCMP towards financial and internal process performance, it is without limitation which paves the way for future studies. It would be more appropriate to broaden the span of the research to avoid biases in landing a general conclusion.

Also, it would have been better if this research was designed to measure individual organisational performances by extending it to other parts of Ghana for generality purposes.

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## Competing interests

The authors declare that they have no financial or personal relationships which may have inappropriately influenced them in writing this article.

## Authors' contributions

M.K. did the introduction, literature review, data collection and conclusion. E.A. worked on the data analysis and the discussion, while D.L. supervised and revised the final manuscript.

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