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Measurement for Supply Chain Collaboration and Supply Chain Performance of Manufacturing Companies

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ABSTRACT

Supply chain management (SCM) has changed from a strategically decoupled to strategically coupled area of research, as such partners have to improve relationships with one another. Although success of a supply chain (SC) depends on the integration of people, technology, and information, collaboration remains critical to these capabilities and processes. Thus, the aim of this study is to model and measure the relationship between the trust-intertwined SC collaborative process and supply chain performance (SCP) of manufacturing companies. This study followed a post-positivism epistemology based on a cross-sectional survey. Previous measurements of SC collaborative process were investigated, integrated, and tested among 286 top managers of manufacturing companies. These companies are members of the Manufacturers' Association of Nigeria (MAN). Questionnaires were distributed through face-to-face methodology with aid from trained research assistants. Cluster and stratified random sampling were used to select the respondents. SPSS was used during the exploratory factor analysis while covariance structural equation modeling was used to confirm the study's measurement and structural models. Both models had satisfied recommended threshold values. This study found a significant and statistical relationship between supply chain

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collaboration (SCC) and SCP. The data and findings of this study fit the social exchange theory (SET). Thus, this study has implications for theory testing in SCC as well as guidance on ways to pursue collaboration by managers of manufacturing companies.

Keywords: MAN, social exchange theory, SCC, SCP.

INTRODUCTION

In today's hypercompetitive market, the individual action of a firm is not enough to win and achieve better quality, decrease costs, and maintain flexibility. To obtain these advantages, companies have to search for SC collaborative opportunities among efficient and responsive partners (Wu *et al*., 2014). As long as the silo approach to problem-solving is discouraged, SCC shall continue to be a topical research issue. Although many antecedents for SCC such as information sharing, goal congruence, decision synchronization, incentive alignment, resources sharing, collaborative communication, and joint knowledge (Cao and Zhang, 2011), open communication, risks & rewards, joint planning, joint problem solving and joint decision-making (Soosay *et al*., 2008), interpersonal integration, and strategic integration (Vieira *et al*., 2009) have been extensively investigated, the collaborative processes under which these determinants operates is largely under-researched.

SCC begins with a focal firm and extends in cyclical concurrency with other partners. With saturated studies on antecedents of SCC, research on its processes is beginning to take precedent. Literature has argued that collaborative processes are the fundamental preconditions for SCP (Simatupang and Sridharan, 2005). Furthermore, collaborative processes are a sustainable innovative strategy for cost reduction, customer focus strategy, and market performance (Hammer, 2001). Croxton *et al*., (2001) suggest that collaborative processes consist of customer relationship management (CRM), supplier relationship management (SRM), function integration, new product design and development, demand management, and rewards. This paper argues for customer alignment (Engelseth and Felzensztein, 2012), partner participation in forecasting with suppliers and functional units (Nakano, 2009), and supplier integration (Khan *et al*., 2012) as antecedents of SC collaborative processes. On top of these, previous studies have separately examined collaborative trust, thus, the present study argues that trust could be embedded and entwined within collaborative processes.

In this study, collaborative process means supplier integration, customer integration, and collaborative forecasting. Supplier integration is defined as "the combination of internal resources of the buying firm with the resources and capabilities of selected key suppliers through the meshing of inter-company

business processes to achieve a competitive advantage" (Wagner, 2003:6). Supplier integration influences sharing of technology knowhow and other SC information and thus, improves product quality, responsiveness, cost efficiency, and on time-to-market (Eltantawy *et al*., 2009). It also reduces the bullwhip effect, enhances customer satisfaction, competitive advantage, and buyer performance (Azadegan and Dooley, 2010). Furthermore Peng *et al*., (2013) found that supplier integration is significantly related to innovation capability and firm performance. Customer integration as "the degree to which a firm exchanges information, works closely and interacts for feedback with its customers" (Danese and Romano, 2013:375). Essence of customer integration is to build customer confidence and increase satisfaction (Kannan and Tan, 2010) and improve mutual values (Flynn *et al*., 2010). Moreover, customer integration increases market information, operational effectiveness, product quality (Zhao *et al*., 2008), and feedback (Danese and Romano, 2013).

Collaborative forecasting is an important innovative SC process and practice. It is important in designing order fulfillment and demand strategy that helps improve forecast accuracy (Stank *et al*., 1999). It is used to maintain an optimum inventory level and costs and also lessen the bullwhip effect (VanDeursen and Mello, 2014). Previous studies have found significant relationships between collaborative planning and SCP (Jain *et al*., 2008; McCarthy and Golicic, 2002). Jain *et al*. (2008) show that collaborative forecasting lowers inventory costs and increases customer responsiveness and services. Clark and Hammond (1997) indicate that collaborative planning, forecasting, & replenishment (CPFR) increases inventory turnover by 50 to 100 per cent. McCarthy and Golicic (2002) found that CPFR improves SCP through increased customer responsiveness, availability of products, inventory cost efficiency, and profits. Sharing forecast information with SC partners reduces SC cost by 40 per cent (Babai *et al*., 2013). Thus, the aim of this study is to model and measure the relationship between the trust-intertwined SC collaborative process and SCP of manufacturing companies.

BACKGROUND OF THE STUDY

The essence of SC is integration and collaboration, which is explained by sardine strategy called "move as one" (Bolstorff, 2012: 1). SC partners succeed by sharing mutual responsibilities and rewards. SCC is defined as "a partnership process where two or more autonomous firms work closely to plan and execute SC operations toward common goals and mutual benefits" (Cao and Zhang, 2011). Many terminologies have been used interchangeably to describe SCC. Being a multidisciplinary concept, collaboration is conceptualized as coordination (Singh, 2011), strategic alliance (Siew-Phaik *et al*, 2013), buyer-supplier relationship

(Abd. Rahman *et al*., 2009), integration (Yu *et al*., 2013), and information sharing (Vieira *et al*., 2009). Terms such as dyadic partnerships (Yu 2014) are also used interchangeably to mean establishing a relationship with upstream and downstream partners in a SC. Collaborative practices are established to pursue innovation and SC (Fawcett *et al*., 2008; Soosay *et al*., 2008).

In this paper, social exchange theory (SET) is used to explain SCC. The theory states that "any interaction between individuals is an exchange of resources" (Homans, 1958). The theory further posits that each partner in a relationship must have valuable resource to offer. The theory is used in this study because collaboration is a central tenet in business-to-business (B2B) and business-to-customer (B2C) relationships (Lambe *et al*., 2001). Collaborative process bring suppliers, corporate buyers, and other major partners into transactional social exchanges of money, information, and goods. Therefore relational norms, trust, and reward-sharing are critical to sustain a relationship. A transactional and interactional relationship is strengthened when the partners benefit from its outcomes and will lessen or even be terminated when it is not rewarding (Gouldner, 1960). The research framework in Figure 1 was developed in line with previous literature of SC collaboration and social exchange theory.

Figure 1 Proposed framework of the study

Previous studies on SCC demonstrate a significant relationship with SCP. For example, buyer-supplier collaboration has a positive impact on operational and innovation performance (Wiengarten *et al*., 2013). SCC enhances the achievement of competitive advantage and SCP. It helps companies reduce costs and increase customer responsiveness, as well as profit and non-profit performance (Sheu *et al*., 2006). Thus, neglecting collaborative practices and processes is simply disregarding efficient and effective production, internal coordination, customer focus, and innovation while increasing the bullwhip effect, cost, and poor customer responsiveness.

RESEARCH HYPOTHESIS

Relationship between Supply Chain Collaboration and Supply Chain Performance

The success of today's manufacturing hinges on inter- and intra-firm collaboration. SC partners who had higher levels of collaboration practices were able to achieve better operational performance (Fawcett *et al*., 2008; Soosay *et al*., 2008) and innovation activities (Kühne *et al*., 2013; Wiengarten *et al*., 2013). The financial successes of Japanese manufacturers are hinged on innovation and collaboration (Nakano, 2009). Successful collaboration has been equated with the ability and readiness of managers to create trust and build relationships among partners (Panayides and Lun, 2009). SCC has a positive influence on SCP (Liao *et al*., 2010). However, collaboration has no significant influence on innovation performance (Ahuja, 2000). Therefore, in line with the argument above and the reasons for collaboration, this study argues that SCC could have a significant effect on the SCP of Nigerian manufacturing companies. Therefore, hypothesis 1 was postulated:

H1 : Supply chain collaboration has a significant relationship on supply chain performance.

RESEARCH METHODOLOGY

Sample

This study is psychometric and follows a post-positivism epistemology based on a cross-sectional survey. Data was collected from members of the Manufacturers' Association of Nigeria (MAN) between August 2014 and November 2014. MAN is an organized body representing the interest of Nigerian manufacturing companies. With 1574 companies in its database, 1035 clustered companies were targeted and 323 companies were randomly selected from 8 clusters. A questionnaire was self-administered with aid from eight research assistants. These research assistants were staff of MAN in respective branches and had experience in distributing questionnaires to the targeted branches. An introductory letter of MAN was attached to the questionnaire as an endorsement. This had greatly influenced the distribution and retrieval of the questionnaires. Of the 323 questionnaires administered, 292 were completed and returned and 286 were found useful while six were discarded

for insufficient and poor response. Thirty-one companies did not participate in the survey. Company policy and the questionnaire concerning foreign universities were the major reasons for their refusal. Even though a face-to-face administered questionnaire is expensive in terms of time, money, and effort, it typically performs better than mail and telephone surveys (Szolnoki and Hoffmann, 2013). The response rate of 90.4 per-cent is higher than the suggestion of Sudman *et al*., (1965) who point out that self-administered questionnaires have a completion rate of about 76 per cent and rejection rate of 24 per cent.

Measurement

All scales used in this study have been validated in previous literature. However, while all items were adopted from previous measures, they were modified to suit the context of this study. All variables have been measured on a seven-point Likert-type scale from 1 = strongly disagree to 7 = strongly agree. Instruments of SCC were extracted, adopted, and integrated from multiple sources such as Chen and Paulraj (2004), Claro and Claro (2010), Ganesan (1994), Green *et al*., (2012), Iyer (2011), Koufteros *et al*., (2005), and McCarthy-Byrne and Mentzer (2011), while SCP was obtained and integrated from Cirtita and Glaser-Segura (2012), Rajaguru and Matanda (2013), and Ye and Wang (2013).

RESULTS

While a statistical package for social science (20.0) was used to assess the exploratory factor analysis, structural equation modelling (SEM) with Amos 21.0 was utilized to assess the measurement and structural models of the study. Organizational data of the companies comprise of the business sector, job title of respondents, ownership structure, firm age, number of employees, annual revenue, and costs due to SC activities. Frequency statistics and percentage of the sampled companies are given in Table 1.

Table 1 Organizational data

Company data		Frequency	Per cent
Sector	Food, beverages & tobacco	54	19.6
	Chemicals and pharmaceuticals	61	22.2
	Domestic and industrial plastic, rubber and foam	34	12.4
	Basic metal, iron and steel and fabricated metal products	29	10.5
	Pulp, paper & paper products, printing & publishing	27	9.8
	Electrical & electronics	17	6.2
	Textile, wearing apparel, carpet, leather/ leather footwear	22	8.0
	Wood and wood products including furniture	16	5.8
	Non-metallic mineral products	8	2.9
	Motor vehicle & miscellaneous assembly	7	2.5
Job title	Vice president and above	72	26.2
	Director/assistant director	57	20.7
	Manager/assistant manager	146	53.1
Ownership structure	Foreign-owned company	78	28.4
	Local firm	153	55.6
	Foreign-local firm	44	16.0
Firm age	1-5 years	27	9.8
	6-10 years	49	17.8
	11-20 years	50	18.2
	21-30 years	66	24.0
	31 years or more	88	30.2
Number of employees	100 or less	62	22.5
	101-200	45	16.4
	201-500	73	26.5
	501 or more	95	.5
Annual revenue	10 or less million	60	21.8
	11-100 million	38	13.8
	101-999 million	46	16.7
	1-30 billion	122	44.4
	31 or more billion	9	3.3

Table 1 (Cont.)

Company data		Frequency	Per cent
Annual cost	10 or less million	67	24.4
	11-100 million	37	13.5
	101-999 million	56	20.4
	1-30 billion	105	38.2
	31 or more billion	10	3.6

Exploratory Factor Analysis (EFA)

Table 2 shows the principal component analysis with the Varimax and Kaiser Normalization rotation method. The rotation converged in six iterations. The Kaiser-Meyer-Olkin measure of sampling adequacy = .822; Approx. Chi-Square = 1699.439; Bartlett's test of Sphericity df = 171; Sig. = .000. Based on these outputs, it was concluded that the sample is satisfactory and acceptable for further analysis (Williams *et al*., 2012). SCC construct was grouped into three components while SCP into two factors. The five components have a cumulative total variance explained of 59.2 per cent.

Component one was for supplier integration and had four measurement items: (1) there is a strong consensus in our firm that major supplier involvement is needed in product design/development; (2) we involve major suppliers at product design and development stage; (3) major customer was an integral part of the design effort for new product; (4) new product design teams have frequent interaction with other functions. Components two and there were for supply chain performance and had nine measurement items in two groups: (1) supply chain helps us reduce inventory costs; (2) supply chain helps us reduce total costs; (3) supply chain helps us reduce inventory build-up; (4) supply chain helps us develop new product quickly; (5) supply chain helps us improve sales growth; (6) supply chain helps us deliver product on time; (7) supply chain helps us increase customer responsiveness/service; and (8) supply chain helps us reduce out-of-stock rate. The nineth measurement item "supply chain helps us deliver the right quantity" was dropped because it appears as a nuisance item under "collaborative forecasting". A nuisant item is an item that did not load on their intended constructs (Chen and Paulraj, 2004).

Component four was for customer integration and had three measurement items: (1) We often participate in our customer's decisions regarding retail pricing; (2) we get information from buyer's customers, which supports us in defining prices of products for the selected buyers (supplier); and (3) we work with major customers to plan and execute a distribution strategy for the sale of products. Last, component five was for collaborative forecasting and had two measurement items:

Table 2 Rotated component matrix and factor loading

	Kaiser-Meyer-Olkin Measure of Sampling Adequacy = .822; Approx. Chi-Square = 1699.439; Bartlett's Test of Sphericity = 171; Sig. = .000	**1**	**2**	**3**	**4**	**5**
	Supplier integration					
CE2	There is a strong consensus in our firm that major supplier involvement is needed in product design/development	.817				
CE2	We involve major suppliers at product design and development stage	.805				
CE3	Major customer was an integral part of the design effort for new product	.713				
CE4	New product design teams have frequent interaction with other functions	.693				
	Supply chain performance					
SP2	Supply chain helps us reduce inventory cost		.873			
SP3	Supply chain helps us reduce total cost		.820			
SP4	Supply chain helps us reduce inventory build-up		.740			
SP5	Supply chain helps us develop new product quickly		.606			
SP6	Supply chain helps us improve sales growth			.703		
SP7	Supply chain helps us deliver product on time			.702		
SP9	Supply chain helps us increase customer responsiveness/service			.677		
SP11	Supply chain helps us reduce out of stock rate			.572		

Table 2 (Cont.)

	Collaborative marketing			
CM2	We often participate in our customer's decisions regarding retail pricing	.747		
CM4	We get information from buyer's customers which supports us in defining prices of products for the selected buyers (supplier)	.734		
CM8	We work with major customers to plan and execute a distribution strategy for the sale of products	.580		
	Collaborative forecasting			
CP11	Our firm can forecast and plan collaboratively with supply chain partners through integrated information systems		.764	
SP8	Supply chain helps us deliver the right quantity		.741	Nuisance item
CP12	We plan volume demands for the next seasons together with our major supply chain partners		.585	

(a) Extraction Method: Principal Component Analysis.
(b) Rotation Method: Varimax with Kaiser Normalization.
(c) Rotation converged in six iterations

(1) our firm can forecast and plan collaboratively with supply chain partners through integrated information systems, and (2) we can depend on our supply chain partners to provide us with good market forecast and planning information.

Common Method Bias

Based on the recommendation of Podsakoff and Organ (1986), common method variance was assessed through Harmon's one-factor test. Table 3 shows the extraction method using unrotated principal components analysis. The analysis discovered five dimensions with initial eigenvalues greater than 1 (1.109 – 5.189), which accounted for 59.2 percent of the total variance explained. The first components accounted for 27.31 percent, while the other components have a lower percentage of variances. As no component has more than 50 per cent of the total variance explained, common method bias was not suspected as an issue in this study.

Validating the Measurement Model

Confirmatory factor analysis (CFA) was performed based on the output of the exploratory factor analysis. The validation of the measurement model in CFA produced the following fitness indices for the two constructs: RMR = .044, GFI = 0.940, AGFI = 0.914, CFI = 0.960, TLI = 0.949, NFI = 0.895, RMSEA = 0.043, PCLOSE = 0.807, ChiSq/df = 1.526. The fitness indices are good and therefore good for structural modeling. Recommended threshold values are RMR – closer to zero (Jöreskog and Sörbom, 1981); GFI > 0.90 (Tabachnick and Fidell, 2001); AGFI > 0.90 (Jöreskog and *Sörbom, 1989*; Tabachnick and Fidell, 2001); CFI > 0.95 (Hu and Bentler, 1999); TLI > 0.90 (Bentler and Bonett, 1980); RMSEA < 0.80 (Hu and Bentler, 1999); PCLOSE > 0.50 (Kline, 2005); ChiSq/df < 3.000. Normality of data was also checked. It was identified that all items are within the normality (skewness) threshold of -1.96 and +1.96 (Ghasemi and Zahedias, 2012; Goodhue *et al*, 2012).

Construct, Convergent, and Discriminant Validity

Three approaches were used in construct validation. First the four conditions suggested by (Mokkink *et al*., 2010) were followed. Second, bivariate Pearson correlation coefficients yielded a positive correlation of 0.389** (Farag *et al*., 2012). Last, acceptable fitness indices were used and both measurement and structural models had good fitness indices (Bagozzi, 1993). Convergent validity was evaluated based on recommendations by Fornell and Larcker (1981) and Hair Jr *et al*., (2013). First, item loading should be more than 0.70 and significance. Second, composite

Table 3 Principal component analysis: Total variance explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	5.189	27.312	27.312	5.189	27.312	27.312	2.681	14.113	14.113
2	2.319	12.208	39.520	2.319	12.208	39.520	2.656	13.980	28.093
3	1.455	7.656	47.176	1.455	7.656	47.176	2.175	11.446	39.540
4	1.177	6.192	53.368	1.177	6.192	53.368	1.886	9.928	49.467
5	1.109	5.838	59.206	1.109	5.838	59.206	1.850	9.739	59.206
6	.904	4.759	63.966						
7	.803	4.225	68.190						
8	.751	3.950	72.141						
9	.672	3.538	75.678						
10	.659	3.469	79.147						
11	.624	3.283	82.430						
12	.580	3.055	85.485						
13	.538	2.831	88.316						
14	.485	2.553	90.869						
15	.452	2.380	93.249						
16	.410	2.158	95.407						
17	.366	1.929	97.336						
18	.295	1.552	98.888						
19	.211	1.112	100.000						

Extraction Method: Principal Component Analysis.

reliability of construct must be greater than 0.80. Third, average variance extracted (AVE) of all construct must be greater than 0.50. However, on the first condition, Hair *et al*., (2012) argue that items with factor loading above 0.4 should be retained if their deletion would affect content/construct validity and composite reliability. Results from Table 4 show that item loading of both constructs is 0.69 and 0.96. Composite reliability of both constructs is 0.821 and 0.843; average variance extracted (AVE) of both constructs is between 0.646 and 0.699. High composite reliabilities indicate that measurement items are valid and generalizable (Kumar and Banerjee, 2014). Therefore, evidences of convergent validity exists.

Discriminant validity was also assessed based on the criterion recommended by Fornell and Larcker (1981). The criterion states that "the square root of AVE for each construct must be larger than its correlations with all other constructs." In order words, "AVE should exceed the squared correlation with any other construct" (Hair Jr *et al*., 2013). The bold values represented in diagonal in Table 4 show that the square root of AVE (0.804 > .151 and 0.836 > .151) for the constructs is also greater than its correlations with other constructs (Hair Jr *et al*., 2013). The values in the Table 4 provide evidence that each construct is empirically and statistically distinct from other constructs in the study, thus supporting discriminant validity and unidimensionality (Chin, 1998). Reliability was further assessed based on Cronbach's alpha (α) above 0.7 (Nunnally, 1978). The reliability of the constructs in Table 4 was measured on constructs. The table showed that the reliability values of both constructs are above 0.70 while for items between 0.740 and 0.830.

The structural model showing path analysis of the study is presented in Figure 2. The result shows that SCC is statistically related to SCP with r = 0.60 and the coefficient of determination (r^2) = 0.36. The hypothesis that "Supply chain collaboration has a significant relationship on SCP" is significant and therefore supported (r = .579, P < 0.001). Table 5 provide the results for standardized and unstandardized (actual) path coefficients, coefficient of determination (r^2), standard error estimate, critical ratio, and p-value of the regression weights.

Table 5 shows that when supply chain collaboration goes up by 1 standard deviation, SCP goes up by 0.598 standard deviations. When supply chain collaboration goes up by 1, supply chain performance goes up by 0.579. The regression weight estimate of 0.579, has a standard error of about 0.132. The probability of getting a critical ratio as large as 4.387 in absolute value is less than 0.001. In other words, the regression weight for supply chain collaboration in the prediction of supply chain performance is significantly different from zero at the 0.001 level (two-tailed). It is estimated that the predictors of supply chain performance explain 35.8 percent of its variance. In other words, the error variance

Table 4 Convergent and discriminant validity

Mean, standard deviation, correlation, composite reliability, and average variance extracted									
Variable	**No. of items/ dimensions**	**Cronbach's construct reliability**	**Cronbach's item reliability**	**Mean**	**SD**	**SCC**	**SCP**	**CR**	**AVE**
SCC	9/3	.782	.740 - .773	47.687	6.130	**.804**	0.151	.843	.647
SCP	8/2	.830	.798 - .830	47.636	4.222	.389**	**.836**	.821	.699

1. **. Correlation coefficient is significant at the 0.01 level (two-tailed).
2. Bold diagonal values are the squared root of average variance extracted (AVE).
4. Value above the diagonal are the squared correlation of variables.

Table 5 Standardized and unstandardized regression weights estimate the model

Relationship	**Standardized estimates**		**Unstandardized estimates**				
	Std. beta	**R^2**	**Actual beta**	**S.E.**	**C.R.**	**P**	**Remark**
SCC and SCP	.598	.358	.579	.132	4.387	.000	Significant

Std beta = standardized beta, R^2 = coefficient of determination, actual beta = unstandardized beta, S.E. = standard error, C.R. = critical ration, P = probability value.

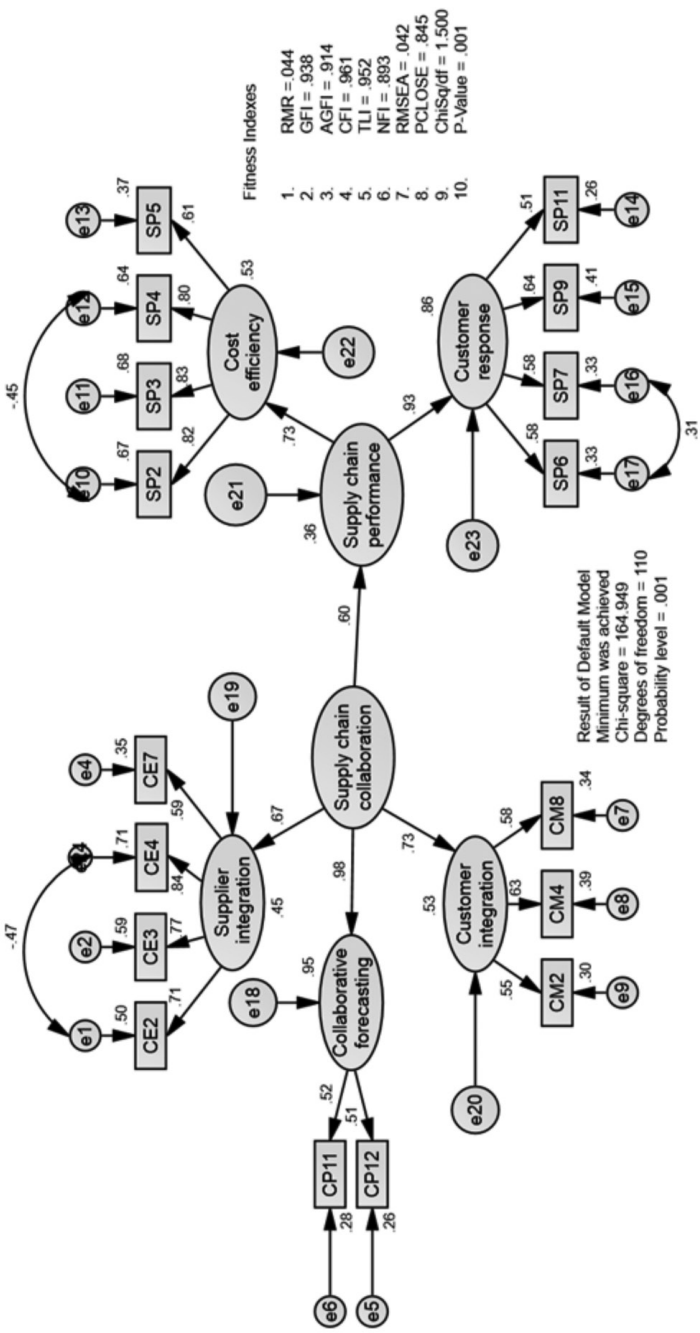

Figure 2 Standardized regression weights of the model

of supply chain performance is approximately 64.2 percent of the variance of supply chain performance itself.

DISCUSSION

This study hypothesizes a significant relationship between SCC and SCP, which has been tested through covariance structural equation modeling. The result is supportive of the research model ($r = .579$, $P < 0.001$) and is adequately explained by the social exchange theory, which proposes that individuals transact and collaborate with one another for mutual benefit (Gouldner, 1960; Homans, 1958) . The results are also consistent with earlier studies. Chen and Hung (2014) used the social capital theory and found a significant relationship among environmental collaboration, green innovation, and competitive advantages. Nix and Zacharia (2014) suggest that collaborative engagement directly influences operational and relational outcomes. van Hoof and Thiell (2014) found that SCC influences cleaner production and sustainable competitive advantages. Ramanathan and Gunasekaran (2014) found that collaborative alliances improve SCP. As such, managers of manufacturing companies can use the outcome of this study to establish new collaborative relationships as well as maintain profitable ones. They could also use the findings as guidelines for ensuring greater SCP. Problematic collaboration should be resolved and should be discontinued if it persists. Therefore, top managers should be proactive with collaboration and provide support across the organizations for everyone to learn from previous collaborative experience and advantages.

CONCLUSION

SCM is a strategic shift in management of modern businesses where companies compete as SC and not as silo enterprises. Thus, collaboration remains an essential element of building integrated and sustainable SC. One major difficulty of SCC is defining what variable to include because it is an all-encompassing variable in SC strategies and processes. Collaboration affects every aspect of manufacturing companies since it is a network of facilities that performs integration functions such as sourcing of material, manufacturing, and distribution of finished products from the supplier's supplier to the customer's customer (Lee and Billington, 1995). This shows that the domain of collaboration is broad. Therefore, this study does not cover all aspect of SC collaborative processes and measurements. Future studies shall therefore, identify other dimensions of SC collaborative processes such as concurrent engineering, CPFR, collaborative marketing, collaboration with competitors, and collaboration with non-supply chain partners such as educational institutions. Furthermore, adopting, integrating, and modifying measurement

instrument is a continuing process which requires refinement across different disciplines and study settings (Chen and Paulraj, 2004; Hensley, 1999). Thus, the study could be considered a major step in strengthening measurement and the theoretical domain of SCC using integrated instruments from different literature.

To the best of our knowledge, this study is among the early stream of research about SCC and SCP in Nigeria. Therefore, future studies should replicate the survey in developing countries in Africa and in South Asian countries such as Malaysia and Vietnam. Having drawn from the database of MAN in 2014, the result of this study should be interpreted with caution. Even though the database comprise of many firms in different sectors, future research should investigate other sectors such as hospitals, banking, and educational institutions in order to extend generalizability. In line with Chen and Paulraj (2004), it is hoped that future researchers will use the measurement of this study to test theory of SCC.

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