SUPPLY CHAIN INTEGRATION AND OPERATIONAL PERFORMANCE IN HEALTH INSTITUTIONS: A STRUCTURAL MODEL FOR MEDIATION EFFECTS

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Abstract: This study has examined the impact of supply chain integration on operational performance among health institutions. The study assessed the direct, indirect and mediated effects of supply chain integration on operational performance among health institutions in Ghana using the Structural Equation Modelling (SEM). In this research, the quantitative descriptive survey research design was used. A total of twenty (20) health institutions were sampled from an accessible population of thirty (30) using the simple random sampling technique. A total of two hundred and fifty-four (254) employees and managers from the health institutions were sampled using the stratified sampling technique. For direct effects, the findings of the study have shown that internal integration positively impacts external integration (customer and supplier integration). Direct positive relationships exist between internal integration and operational performance as well as supplier integration and operational performance. A non-significant relationship exists between customer integration and operational performance. For mediation effects, supplier integration significantly mediates the relationship between internal integration and operational performance, while customer integration does not significantly mediate the relationship between internal integration and operational performance among the health institutions in Ghana. The study has managerial implications for health institutions in strengthening their supplier and customer integrations through advanced database systems to enhance their operational performance.

Keywords: Supply chain integration, operational performance, health institutions, external integration, internal integration.

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Introduction

Health care delivery is an essential part of nation-building because it ensures that as much as possible, the human population are all time in good health to contribute to the development of the economies of the nation's globally (Singha, Vermaa & Koul 2017). Unlike the other industries, the healthcare industry is characterised by a high degree of complexities and dynamism, which must be managed effectively and efficiently in order to improve the lives of patients (Wiengarten et al., 2016; Mossialos et al., 2015, Fianko, Afrifa Jnr). According to Burns and Yovovich (2014), many actors play an important role in health care supply chains including service providers (hospitals and clinics), patients, health professionals, distributors, suppliers and regulatory bodies. Health care service providers often have to handle high-value supplies that demand specialized handling, which increases the operational cost when the coordination and collaboration within the supply chain are poor (Chen et al., 2013). In line with this, Landry, Beaulieu and Roy (2016) indicated that between 30% and 40% of a hospital's budget is dedicated to supply chain costs, which can be reduced through best practices to 8%. According to Huo (2012), one of such important practices that can improve efficiency, effectiveness and long-term performance in the healthcare industry is Supply Chain Integration (SCI). SCI refers to the extent to which collaboration exists among the supply chain partners, which fosters effective management of processes within and outside the organisation (Huo, 2012). It is the extent to which all activities within an organization and its suppliers, customers, and other supply chain members are integrated (Flynn et al., 2010). Supply chain integration is generally categorized into two main groups, which are internal and external integration. External integration is made up of both customer and supplier integration. Customer integration involves core competencies derived from coordination with critical customers, whereas supplier integration involves core competencies related to coordination with critical suppliers (Wook, 2006). In contrast, internal integration focuses on strategies and practices that foster collaboration of activities within an organisation to achieve customers' requirements.

In Ghana's health sector, there are problems compounded with inefficient medical supplies due to supply chain integration deficiencies. In a study that was conducted by Adu-Poku, Asamoah and Abor (2011), it was found that the health care system of Ghana is coupled with delays in payments of suppliers, poor delivery time by suppliers, bids evaluation delays and poor attitude on the part of supply officers, which impedes the efficient flow of medical logistics to patients in real-time. In spite of these supply chain related challenges in Ghana's health sector, studies on supply chain integration in the health sector remain scanty as most studies on supply chain integration and its relationship with operational performance have been conducted in different countries and industrial contexts (Njagi and Muli, 2020; Kumar, et al., 2017; Wright, 2016; Beheshti, Oghazi, Mostaghel & Hultman, 2014; Atnfu and Hussen, 2015). The focus of

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studies on supply chain integration and operational performance outside of Ghana leaves a contextual gap that this current study seeks to fill. That notwithstanding, this study has also discovered that studies conducted on supply chain integration on operational performance have only concentrated on the direct relationships among the variables. There are also studies on supply chain integration and operational performance in different countries contexts that have shown mixed results as some of them showed positive relationships while others showed negative relationships (Zhao et al., 2013; Huo, 2012). In spite of the inconsistencies existing in studies on supply chain integration and operational performance, this study argues that supply chain integration should be examined considering the direct, indirect/mediating effects on operational performance as detailed relationships have not been considered by previous studies. This study used the structural equation modelling to establish the direct and indirect linkages between internal and external integration (supplier, customer integration) on operational performance among health institutions in Ghana.

Literature Review

Supply Chain Integration (SCI) refers to the coordination and collaboration that exist among partners of the supply chain with the aim of fostering effectiveness and efficiency in the flow of material, resources and information in the production of products and delivery of service that are valuable to the customer quickly and at low cost (Flynn et al. 2010). According to Qi et al. (2017), integrated supply chain refers to cooperative activities that pertain among suppliers, warehouse distributors, retailers and service providers and manufacturers aids in the conversion of raw materials into finished products and excellent services for the customers. In an environment like healthcare, which is characterised by uncertainty and dynamism, intra-departmental and inter-organisational integration enables the effective flow of information and resources, such as medical supplies, to promptly ensure quality (Liu and Lee, 2018). In this study, SCI is defined as the reconfiguration of the processes of an organisation to foster better distribution, alignment and utilization of internal and external resources.

According to Kim (2013), internal integration refers to practices of merging resources and information within an organisation to generate a shared knowledge that provides benefit to all departments of the organisation and help it to achieve its goal. Activities, such as joint planning, inter-departmental collaboration and sharing of information through the use of computerized systems, foster internal integration, and they boost performance by ensuring that organisation can achieve timely delivery of goods and service to customers (Pakurár et al., 2019; Flynn et al., 2010; Kim, 2013).

Supplier integration refers to the inter-organisational collaboration between organisations and their suppliers in which strategies, information and processes are shared and synchronised with the aim of providing excellent service to customers (Flynn,

Huo, and Zhao 2010). Supplier integration is characterised by several activities, including sharing information, technology, risk, and establishing long-term contracts and production improvement through coordination (Echtelt et al., 2008).

Customer integration refers to the degree to which customers, manufacturers and service providers coordinate decisions with regards to inventory level planning of production, tracking of orders and delivery of products (Wong et al., 2011). Lotfi et al. (2013) indicated that customer integration comprises of the involvement of the views and opinion of the customer in the production and service delivery by establishing a strong collaboration between service providers or manufacturers with customers.

The adoption of internal supply chain integration provides several benefits to organisations, including the possibility of increasing the market share, profits, customer loyalty and better differentiation of product and service from that of competitors (Pakurár et al., 2019)

Performance refers to all the operational and strategic activities outcomes that are carried out for the organization (Wheelen et al., 2017). According to Li (2015), the main SCI indexes that directly reflect the operational performance of a firm are; cost, customer service, flexibility, delivery, quality and innovation. These indexes are used to measure the operational performance of a firm. In this study, supply chain operational performance was measured by the following dimensions: Flexibility, Time (Speed), Quality and Cost, because they are considered the most common dimensions that were investigated in most of the previous studies.

Yuen and Thai (2016) examined the operational performance of Singapore's shipping industry by investigating the impact of internal and external supply chain integration. The study adopted both quantitative and qualitative research approaches. A sample size of 172 shipping companies was determined for the study. The data were analyzed using regression analysis. The findings of the study revealed that external (supplier and customer) integration contributes positively to operational performances. Han et al. (2013) studied the extent to which firm performance in the pork processing industry in China is impacted by SCI. The study used a sample size of 229 pork processors. The results of the study revealed that internal supplier and logistics integration influence firm performance. On the contrary, information technology integration did not significantly impact performance in the study.

Yuen and Thai (2017) assessed the effect of the internal and external (customer and supplier) integration on operational performance. The study adopted a quantitative research approach. Questionnaires were the main instrument for the data collection from 138 products and 174 service companies in Singapore. The findings of the study revealed that internal integration and external integration have a significant positive relationship on operational performance in product and service supply chains. Also, the relationship between internal integration and operational performance was found to be partially

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mediated by product supply chains, whereas a fully-mediated relationship was observed in service supply chains. Osei and Kagniciogu (2018) investigated the extent to which the performance of food retailers in Turkey is impacted by supply chain integration. Specifically, the study assessed how operational performance is impacted by internal and external supply chain integration. The study used a sample size of 216. The findings of the study revealed that a significant positive relationship exists between external (customer and supplier) and internal integration. The findings of the study showed that both external and internal integration have a significant positive effect on operational and business performance.

Perdana, Ciptono and Setawan (2018) examined the impact of internal integration and external (supplier, customer, and logistics service providers) integration on operational performance. The findings of the study revealed that operational performance was impacted positively by both internal and external integration. Sultan El-Tamimi (2015), in a related study, investigated the influence of SCI on the operational performance of Jordanian Pharmaceutical companies. Using a sample size of 235, the study indicated a significant positive relationship between SCI and operational performance. Njagi and Muli (2020) examined how the performance of manufacturing firms in Kenya is impacted by supply chain integration practices. Mixed research approach and a sample size of 85 were used. The data were analyzed using regression analysis. The findings of the study revealed that the performance of the manufacturing firms in Kenya is positively impacted by technology integration, internal operations integration and customer integration. The results further showed that a significant negative relationship exists between supplier integration and performance.

Mbugua and Namada (2019) also assessed how the operational performance of five selected hospitals in Kenya is influenced by supply chain integration. The study adopted a quantitative research approach — a sample size of 164 employees in the selected health facilities. The main instrument used is a closed-ended questionnaire and the simple random sampling technique. The results show that supplier integration, customer integration and internal integration have a significant positive effect on operational performance. Atnafu and Hussein (2015) assessed the influence of the SCI on the operational performance of 35 Ethiopian chemical manufacturing firms. The study used a quantitative research approach for the study, and the findings of the study revealed that internal integration, supplier integration and customer integration demonstrated a significant positive relationship with operational performance. The study, on the other hand, established no significant relationship between internal and external integration. Som, Cobblah and Anyigba (2019) examined the effect of supply chain integration on the performance of supply chains in Ghana's manufacturing industry using a sample size of 1500. While the findings of the study revealed that there exists a significant positive

relationship between information integration and supply chain performance, relational integration and supply chain performance exhibited a negative relationship.

H1: There is a positive relationship between internal integration and operational performance.

H2: There is a positive relationship between internal integration and customer integration.

H3: There is a positive relationship between internal integration and supplier integration

H4: There is a positive relationship between customer integration and operational performance

H5: There is a positive relationship between supplier integration and operational performance.

H6: Customer integration will mediate the relationship between internal integration and operational performance.

H7: Supplier integration will mediate the relationship between internal integration and operational performance.

Research Methodology

This study employed a quantitative descriptive survey as its research design. According to Saunders, Lewis and Thornhill (2016), the quantitative descriptive survey has been utilized when researchers objectively test for hypotheses to describe the relationships among variables through the use of numerical data. For this study, the use of the quantitative descriptive survey was justified on the premise that the researchers dwelled on objectivity with roots from the positivist paradigm to test for hypotheses that gave descriptions of the direct, indirect and mediation effects on supply chain integration practices and operational performance among health institutions in Ghana (Creswell, 2014). The population of the study comprised of public health institutions operating in Ghana. A total of thirty (30) health institutions formed the accessible population from which a total of twenty (20) were selected using the simple random sampling technique. The use of the simple random sampling technique to select the hospitals was based on the premise that it ensured that each health institution had an equal opportunity to be selected to participate in the study (Singh 2015). Since the study was focused on supply chain integration and operational performance, the procurement, finance, administration and ICT units of the sampled health institutions became the focus for data collection purposes because they are the units that are constantly involved in issues pertaining to supply chain integration. The total population of employees and managers in the procurement, finance, administration and ICT units of the twenty (20) health institutions in Ghana was seven hundred and fifty (750). Using Kregcie and Morgan (1970) table for sample size determination, the appropriate sample size for a population of 750 was two hundred and fifty-four (254). The stratified sampling technique was used to select

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employees from each of the twenty (20) health institutions that participated in the study. The choice of the stratified sampling technique did ensure that employees and managers from the procurement, finance, administrative and ICT units had equal representation in the study (Cohen, Manion, & Morrison, 2013). Questionnaires served as the data collection instruments. Data were collected within a five-month period (July-November, 2019). Questionnaires were self-administered by researchers with support from five (5) research assistants to health officials in their respective health institutions. Research assistants were trained on how to administer questionnaires to respondents and as well adhering to ethical issues, such as privacy of respondents, confidentiality of data gathered and anonymity of respondents.

Supply chain integration was measured using questionnaires from studies by Flynn et al. (2010) and Li et al. (2015). Operational performance was also measured using questionnaires from a study by Baea (2017). The constructs were measured on a five-point Likert scale with ratings as follows: 1=Strongly Disagree, 2=Disagree, 3=Neutral, 4=Agree and 5=Strongly Agree.

Reliability and validity statistics were performed on the scale items used in measuring the constructs using IBM AMOS (see tables 2 and 3). After the reliability and validity statistics, scale items of constructs with good factor loadings from 0.4 and above were maintained as follows: Supplier Integration=5 Scale Items; Customer Integration=3 Scale Items; Internal Integration=3 Scale Items; Operational Performance=7 Scale Items.

Research Results

The results of Table 1 present the demographic profile of employees and managers in health institutions that participated in the study. Most of the respondents were males (62.9%), while females constituted 37.1%. The age of most of the respondents was between 25 and 40 years. Specifically, 28.3% were between the ages of 31 and 35 years; 27.2% were between the ages of 25 and 30 years, while 20.9% were between the ages of 36 and 40 years. The minority of respondents were between 41 and 45 years (16.1%) and 46 and 60 years (7.5%), respectively. The educational distribution showed that 56.3% had attained their first degree, 22.4% had attained Diploma/HND, and 21.3% had attained their masters/postgraduate. Regarding tenure, most of the respondents have worked in health institutions for a period of 6-10 years (54.7%); 30.7% have worked in health institutions for a period of 1-5 years, while 14.6% of respondents have worked in health institutions for more than 10 years.

Table 1. Demographic Profile of Respondents

Gender	Frequency	Percentage (%)
Male	160	62.9
Female	94	37.1
Total	254	100
Age	**Frequency**	**Percentage (%)**
25-30 years	69	27.2
31-35 years	72	28.3
36-40 years	53	20.9
41-45 years	41	16.1
More than 45 years	19	7.5
Total	254	100
Educational Level	**Frequency**	**Percentage (%)**
Diploma/HND	57	22.4
First Degree	143	56.3
Masters/Postgraduate	54	21.3
Total	254	10022
Tenure	**Frequency**	**Percentage (%)**
1-5 years	78	30.7
6-10 years	139	54.7
More than 10 years	37	14.6
Total	254	100

Internal Consistency Analysis

The data collected were analysed using IBM SPSS Statistic version 23 and IBM AMOS version 23. First, the reliability and validity checks were done. To check for internal consistency, Cronbach's alpha was checked whilst the construct reliability was assessed as part of the confirmatory factor analysis. Table 2 below shows the characteristics of the scale in relation to its internal consistency. After the internal consistency checks, 18 out of the initial 31 items were retained for further analysis.

Table 2. Internal consistency statistics

Variable	Scale Items	Factor Loading	Cronbach's Alpha
Supplier Integration	SI4	0.769	0.816
	SI2	0.759	
	SI3	0.717	
	SI1	0.643	
	SI5	0.557	
Internal Integration	IN2	0.749	0.753
	IN1	0.681	
	IN3	0.679	

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Customer Integration	CI4	0.659	0.727
	CI3	0.645	
	CI2	0.638	
Operational Performance	OP17	0.886	0.835
	OP16	0.725	
	OP15	0.712	
	OP6	0.701	
	OP2	0.599	
	OP7	0.583	
	OP1	0.574	

All scale items recorded high values of alpha (all above .7) with significant correlations. The exploratory factor analysis (EFA) conducted using varimax rotation, and principal component analysis showed sampling adequacy found with the Bartlett's test of sphericity (Kaiser, 1970), which was 8.093.

Table 3. Confirmatory Factor Analysis (CFA)

	CR	AVE	MSV	MaxR (H)	CI	SI	IN	OP
Customer Integration (CI)	0.765	0.525	0.310	0.830	**0.724**			
Supplier Integration (SI)	0.826	0.693	0.367	0.852	0.557	**0.832**		
Internal Integration (IN)	0.791	0.531	0.367	0.710	0.445	0.606	**0.729**	
Operational Performance (OP)	0.839	0.631	0.252	0.855	0.318	0.502	0.500	**0.794**

A confirmatory factor analysis (CFA) was conducted in AMOS using maximum likelihood estimation. The CFA showed evidence of reasonable fit though not excellent (Hu & Bentler, 1999): Chi-Square ($\chi 2$) = 982.536, p = .0001, Chi-Square/Degree of freedom ($\chi 2$/df) = 2.453; Goodness of fit index (GFI) = .929; Comparative Fit Index (CFI) = .971; Root Mean Square Error of Approximation (RMSEA) = .056. Bryne (2016) describes an RMSEA value between .05 and .08 as of reasonable fit; hence obtaining an RMSEA of .56, the proposed CFA model may be described as being of a reasonable fit.

The study assessed the validity and construct reliability of the item following Fornell and Larcker's (1981) criterion. The results of the validity and construct reliability are shown in Table 3. The results show that both discriminant and convergent validity were satisfied. The Average Variance Extracted (AVE) values were all above 0.5, indicating the existence of convergent validity, and the AVE values were all more than the square of the correlations supporting discriminant validity (Hair et al., 2006). These measures indicated the acceptability of the constructs for hypothesis testing.

Structural Model Estimation

The entire model (without the mediation analyses) was done using AMOS 23.0. The results suggest acceptable fit of the data. The following fit indices were observed after the structural model was developed: $\chi2 = 647.363$, df $= 306.263$, $\rho < 0.001$, GFI $= 0.976$, AGFI $= 0.957$, CFI $= 0.978$, RMSEA $= .038$.

According to Anderson and Gerbing (1988), in exploratory studies, trimming of the model for comparison is important to satisfy the researcher that the developed model is more robust. Following Osei-Frimpong et al. (2017), the study developed a rival model within which one relationship was removed. The result showed a superior focal model confirming the robustness of the model. Table 4 shows the indices of both models. The comparison was made by assessing the difference between the RMSEA, the Tucker Lewis Index (TLI), CFI and AIC (Akaike Information Criteria) and Chi-square difference test. According to Hu and Bentler (1999), it is appropriate to compare the AIC. The model with the smallest AIC value is deemed to have a better fit. From Table 4, it can be understood that the AIC of the focal model is lower than that of the rival model. Hence the focal model was maintained.

Table 4. Structural parameter estimates (standardized coefficients)

Hypo thesis	Paths	Focal Model			Rival Model		
		β	t-value	R^2	B	t-value	R^2
H1	Internal Integration → Operational Performance	0.39**	2.118	0.320	0.393**	2.118	0.281
H2	Internal Integration → Customer Integration	0.59***	3.668	0.350	0.592***	3.668	0.334
H3	Internal Integration → Supplier Integration	0.72***	6.404	0.518	0.720***	6.404	0.498

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H4	Customer Integration → Operational Performance	-0.48	-0.478	0.320	-0.480	-0.478	0.309
H5	Supplier Integration → Operational Performance	0.24***	3.878	0.320	-	-	-
	Goodness of fit Indices	χ^2	= 647.363	P <0.0001	χ^2	= 536.635	P <0.0001
		GFI	= 0.976		GFI	= 0.955	
		AGFI	= 0.957		AGFI	= 0.932	
		CFI	= 0.978		CFI	= 0.942	
		TLI	= 0.973		TLI	= 0.951	
		RMSEA	= 0.038		RMSEA	= 0.045	
		PCLOSE	= 0.677		PCLOSE	= 0.376	
		AIC	= 545.243		AIC	= 675.293	
***P<0.001, **P<0.05							

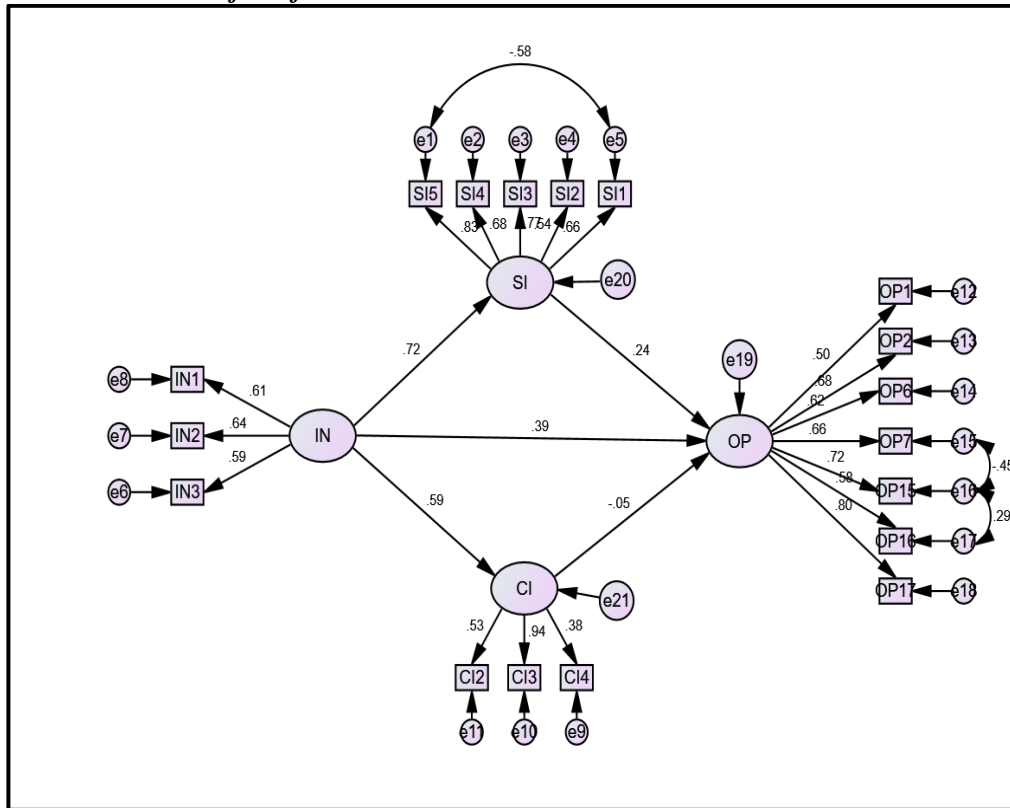*Structural model of the focal model*

Figure 1: Structural model for focal model

Direct and indirect effects

From Table 4, hypotheses 1, 2, 3 and 5 are supported. However, hypothesis 4 was not supported. The results suggest that internal integration influences operational performance and external integration (customer integration and supplier integration). Supporting H1 ($\beta = 0.393$, $p < 0.01$, $R^2 = 0.320$) implies that Internal integration within an organization impacts operational performance. One of the major factors that affect operational performance is the internal integration within the organization. With regard to Hypothesis 2 ($\beta = 0.592$, $p < 0.001$, $R^2 = 0.350$), Internal integration has a strong positive impact on customer integration. Internal integration leads to higher levels of customer integration. Hypothesis 3 ($\beta = 0.720$, $p < 0.001$, $R^2 = 0.518$) was also supported indicating that internal integration significantly results in supplier integration. These prior findings suggest that internal integration is a significant antecedent to external

integration. The fourth and fifth hypotheses draw a link between customer integration and operational performance on one hand and supplier integration and operational performance on another. Hypothesis H4 (β = -0.480, p = 0.791, R^2 = 0.320) was not supported meaning that customer integration does not lead to operational performance. Hypothesis H5 (β = 0.241, p < 0.001, R^2 = 0.320) was supported meaning that supplier integration impacts operational performance. However, the effect is minimal (i.e. a β of 0.241).

Mediation Analyses

H6 and H7 were tested through mediation analyses. To do this, the authors examined the relationships between the independent and dependent variables and found them to be significant. Then, the researchers examined the relationship between the independent variable and the mediating variable and found that they were significant. Hence, mediation analysis could be applied to the model.

Table 5. Mediation of Customer Integration

Path	Standardized Path Coefficient β	P value	R^2
IN $\rightarrow$ OP	0.442	***	0.63
IN $\rightarrow$ CI	0.428	**	
CI $\rightarrow$ OP	0.122	.171	
IN $\rightarrow$ CI $\rightarrow$ OP	0.052	.241	
Model fit indices	x^2= 452.480, df = 245.124; chi sq/df = 2.213; P = 0.000; GFI = 0.956; AGFI = 0.957; CFI = 0.959; RMSEA = 0.047; PCLOSE = 0.032		

*** p < 0.0001 ** *p* < 0.001

The relationship between internal integration and operational performance was not significantly mediated by customer integration. As Table 5 illustrates, the relationship between internal integration and operational performance was significant (β = 0.442, p < 0.001) as well as the relationship between internal integration and customer integration (β = 0.428, p < 0.001). However, the relationship between customer integration and operational performance (β = 0.112, p = 171) and the indirect effect of internal integration and operational performance (β = 0.052, p = 241) were found to be insignificant. The bootstrapped two tailed significant showed a p-value of 0.241. Hence, hypothesis H6 was found to be insignificant. That is to say that Customer integration does not mediate the relationship between internal integration and organisation performance. Hypothesis 7 was also analysed in mediation analysis. Table 6 below

presents results from the mediation of supplier integration in the relationship between internal integration and operational performance.

Table 6. Mediation of supplier integration

Path	Standardized Path Coefficient β	P value	R^2
IN → OP	0.311	**	0.51
IN → SI	0.599	***	
SI → OP	0.308	**	
IN →SI→OP	0.184	**	
Model fit indices	x^2= 376.378, df = 145.294; chi sq/df = 2.590; P = 0.001; GFI = 0.966; AGFI = 0.976; CFI = 0.957; RMSEA = 0.035; PCLOSE = 0.045		

*** $p < 0.0001$ ** $p < 0.001$

The relationship between internal integration and operational performance was significantly mediated by supplier integration. As Table 6 illustrates, the relationship between internal integration and operational performance was significant (β = 0.311, p < 0.001) as well as the relationship between internal integration and supplier integration (β = 0.599, p < 0.0001). Besides, the relationship between supplier integration and operational performance (β = 0.308, p < 0.001) and the indirect effect of internal integration and operational performance (β = 0.184, p < 0.001) were found to be significant. The bootstrapped two tailed significant showed a p value of 0.010. Hence, hypothesis H7 was found to be significant. That is to say that supplier integration mediates the relationship between internal integration and operational performance.

Discussion

The study assessed the direct and mediated effects of supply chain integration practices on operational performance among health institutions in Ghana. Internal integration among health institutions has to do with the use of ICT tools like enterprise resource planning (ERP) to ensure visibility among departmental units and has positive implications on customer integration and supplier integration. This implies that as health institutions integrate their internal departmental units for information sharing purposes and efficient supply chains, it leads to enhancing efficiency in their integrations with suppliers and patients (customers). This finding is in congruence with a study conducted by Kim (2013) in China, who also found that a well-integrated internal process in organizations leads to the achievement of success in supplier and customer integration to enhance organizational productivity.

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The results also showed direct positive effects between internal integration and operational performance as well as supplier integration and operational performance. Customer integration does not have a significant positive effect on operational performance. The findings of this study on direct effects of supply chain integration practices were consistent to a greater extent with previous studies conducted in the shipping industry in Singapore (Yuen & Thai, 2016); food retail firms in Turkey (Osei & Kagniciogu, 2018); hospitals in Kenya (Mbugua & Namada, 2019) and manufacturing firms in Kenya (Njagi & Muli, 2020).

However, the results make unique contributions to supply chain integration and operational performance research by going further to examine the mediation effects among supply chain integration variables and operational performance within the context of Ghanaian health institutions. The mediating analysis also showed that supplier integration significantly mediated the relationship between internal integration and operational performance. The implication is that internal integration and its positive relationship with operational performance is explained by strong supplier integration. This indicates that, as health institutions pay attention to both internal and supplier integration, it enhances their operational performance. On the other hand, the study found that customer integration does not significantly mediate the relationship between internal integration and operational performance. This finding implies that customer integration does not explain the relationship between internal integration and operational performance among health institutions.

Conclusion

The challenges confronted by the Ghanaian health sector in its dealings in supply chain management efficiency, such as delays in supply of medical logistics, poor delivery by suppliers and poor integration of supply chains, coupled with the identification of contextual gaps necessitated the need for this study. The results of this study have found that although internal integration and supplier integration enhance operational performance among health institutions in Ghana, customer integration does not enhance operational performance. This study contributes to academic novelty by moving a step further to examine the mediating effects of external integration variables (customer integration and supplier integration) on the relationship between internal integration and operational performance in Ghana's health sector, which have not gained much attention in supply chain integration and operational performance research.

The study recommends the need for health institutions in Ghana to put in place the right technological mechanisms to strengthen customer integration by having an advanced database for patients. This advanced database for patients will enable health institutions to better forecast for supplies needed to enhance operational performance in the delivery of quality health care to patients. The study also recommends the need for health

institutions in Ghana to continually strengthen their internal and supplier integrations since both types of integration have meaningful impacts on operational performance, which is a key indicator of quality health care delivery.

This study also has a methodological limitation as only the quantitative research approach has been used by the researchers. Although the study has made meaningful contributions to research in the area of supply chain integration and operational performance, future researchers can adopt a mixed research approach (qualitative and quantitative) to provide detailed explanations on the relationships of constructs from the quantitative results, thereby enhancing data triangulation.

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INTEGRACJA ŁAŃCUCHA DOSTAW I WYDAJNOŚĆ OPERACYJNA W INSTYTUCJACH OPIEKI ZDROWOTNEJ: STRUKTURALNY MODEL SKUTKÓW MEDIACJI

Streszczenie: W badaniu tym zbadano wpływ integracji łańcucha dostaw na wydajność operacyjną instytucji opieki zdrowotnej. W badaniu oceniono bezpośredni, pośredni i pośredniczący wpływ integracji łańcucha dostaw na wydajność operacyjną instytucji opieki zdrowotnej w Ghanie przy użyciu modelowania równań strukturalnych (SEM). W badaniach wykorzystano model badań ilościowych opisowych badań ankietowych. W sumie dwadzieścia (20) instytucji opieki zdrowotnej pobrano próbkę z dostępnej populacji trzydziestu (30) przy użyciu prostej techniki losowego doboru próby. Metodą warstwowego doboru próby pobrano ogółem dwustu pięćdziesięciu czterech (254) pracowników i kierowników instytucji ochrony zdrowia. W przypadku efektów bezpośrednich wyniki badania wykazały, że integracja wewnętrzna pozytywnie wpływa na integrację zewnętrzną (integrację klienta i dostawcy). Istnieją bezpośrednie pozytywne relacje między integracją wewnętrzną a wydajnością operacyjną, a także integracją dostawców i wydajnością operacyjną. Między integracją klienta a wydajnością operacyjną istnieje nieistotny związek. Jeśli chodzi o efekty mediacji, integracja dostawców znacząco pośredniczy w relacji między integracją wewnętrzną a wydajnością operacyjną, podczas gdy integracja z klientami nie pośredniczy znacząco w relacji między integracją wewnętrzną a wydajnością operacyjną wśród instytucji opieki zdrowotnej w Ghanie. Badanie ma implikacje zarządcze dla instytucji opieki zdrowotnej w zakresie wzmocnienia integracji dostawców i klientów poprzez zaawansowane systemy baz danych w celu zwiększenia ich wydajności operacyjnej.

Słowa kluczowe: integracja łańcucha dostaw, wydajność operacyjna, instytucje ochrony zdrowia, integracja zewnętrzna, integracja wewnętrzna.

医疗机构的供应链整合和运营绩效：中介效应的结构模型

卓别武:施特雷什切尼 本研究考察了供应链整合对卫生机构运营绩效的影响。该研究使用结构方程模型 (SEM) 评估了供应链整合对加纳卫生机构运营绩效的直接、间接和中介影响。本研究采用定量描述性调查研究设计。使用简单随机抽样技术从可访问的三十 (30) 人口中抽取了总共二十 (20) 个卫生机构。使用分层抽样技术对来自卫生机构的总共两百五十 (254) 名员工和管理人员进行了抽样。对于直接影响，研究结果表明内部整合对外

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部整合（客户和供应商整合）产生积极影响。内部整合与运营绩效以及供应商整合与运营绩效之间存在直接的正相关关系。客户集成和运营绩效之间存在不重要的关系。就中介效应而言，供应商整合显着中介了内部整合与运营绩效之间的关系，而客户整合并未显着中介加纳卫生机构内部整合与运营绩效之间的关系。该研究对卫生机构通过先进的数据库系统加强其供应商和客户的整合以提高其运营绩效具有管理意义。

关键词：供应链整合，运营绩效，卫生机构，外部整合，内部整合。