

Antecedents and Consequences of Supply Chain Integration: Empirical Evidence from a Developing Economy

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Abstract- The purpose of this study is to investigate the firm resource and external environment drivers and operational performance consequences of supply chain integration. The study's theoretical model is tested on a sample of small and medium-sized firms located in Liberia, a Sub-Sahara African economy that is recovering from several years of civil strife and economic turbulence. Findings from the study suggest that increases in inter-firm networking resource and a high degree of dysfunctional competitive conditions drive greater degree of supply chain integration in Liberia. Additionally, findings indicate that increases in supply chain integration enables firms in Liberia to create superior customer value and boost operational efficiency. These findings, therefore, help extend the supply chain integration literature by showing how firms operating in developing economies can integrate their supply chains and how this integration can help firms enhance their operational efficiency.

Key words: Supply chain integration, networking resources, dysfunctional competition, customer value creation

1.0 Introduction

The benefits and costs of supply chain integration (SCI) have been the focus of several scholarly research and practitioners are increasingly paying attention to the

phenomenon [1]; [2]. As today's world of business continues to exhibit intense competition and globalization, arguments have been mounted that supply chains need integrating to boost firms' competitiveness operational performance outcomes [2]; [3]; [4]. However, knowledge of drivers of SCI is still very limited and extant knowledge about how SCI influences operational performance of firms operating in environment of great uncertainty is dearth [5]. Interestingly, several scholarly works have identified environmental uncertainty as a contextual issue that may condition the effectiveness of SCI [2]; [6]. Yet, empirical works are lacking on the drivers and the performance outcomes of SCI in an environment characterized by extreme uncertainty such as civil disruptions.

While some recent studies have argued that environment uncertainty should be modelled as a moderator of SCI-performance relationship (e.g. [7] ; [8]), the problem with these extant studies is that virtually all such studies are conducted in an environment of institutional certainty such as North America and Western Europe (e.g. [9]; [10]. Additionally, extant research has ignored the fact that perception of uncertainty and its consequences may actually drive firms to seek greater integration of supply chains, especially in societies where law enforcement is weak and infrastructure is underdeveloped and the risk of civil disruption is real. Indeed, firms operating in such weak institutional environments face many risks which can disrupt their operations. Taking Liberia's economy as an empirical setting, this study investigates how greater supply chain integration (SCI) is triggered by networking resources and dysfunctional competitive forces, and how variation in SCI impact operational performance in an economy that, for several decades, has been engulfed

with severe disruptions including chronic civil wars, disease pandemics, droughts, energy shortage, and mass exodus of skilled workforce. By so doing, this study provides a new insight to inform supply chain scholarly community about how firms manage their supply chains in an economy of great uncertainty.

Given that contextual consideration helps enhance precision and accuracy of conclusions reached in an empirical research [11], this study relies on primary data from small and medium sized enterprises (SMEs) in Liberia, a Sub-Sahara African economy, to empirically examine how levels of inter-firm networking resource and dysfunctional competition shape the extent to which firms integrate supply chains, and how levels of SCI is related to customer value creation and operational efficiency. We contend that while extant studies have examined several drivers of SCI [12]; [13], little empirical research has examined how inter-firm networking resource and dysfunctional competition drive SCI. To shed light on the networking resource antecedent factor, this study draws insight from the resource-based view and network theory to argue that inter-firm networking, a firm specific idiosyncratic resource, provides incentives for firms to seek greater SCI. In view of SMEs' lack of critical resources (e.g. modern technology, skilled personnel) and given that belonging to a network of businesses provides firms access to external resources and know-how that might not be internally available, we argue SMEs with stronger inter-firm networking resources are more likely to seek SCI.

Moreover, the institutional literature underscores the fact that developing economies such as Liberia hardly have institutions governing business transactions functioning. As a result, from an institutional perspective functional competition tends to be replaced by dysfunctional competition when institutions fail to regulate the behavior of market players [14]. The literature suggests that under such conditions of marketplace dysfunction, firms tend to rely on informal governance mechanism to regulate their relationships with market actors [15]; [16]. From this institutional governance perspective, we contend that when firms perceive competition in their operating environment to be increasingly dysfunctional, they are likely to integrate their supply chain activities with other firms' supply chains. In sum, we propose that high levels of inter-firm network resource and greater perception of dysfunctional competition will lead to greater levels of SCI.

Further, authors e.g.[17] have pointed out that evidence on the effects of SCI on performance has been inconsistent over the years and thus suggest that more rigorous empirical studies should be conducted to better understand the link between supply chain integration and firm performance. In light of this call, this study examines the operational performance outcomes of SCI. By so doing, this study enhances current scholarly understanding of SCI and its performance impact of

SMEs in a developing economy with severe institutional challenges.

2.0 Theoretical background and Hypothesis Development

2.1 Supply Chain Integration

The supply chain management literature suggests that integration among SC participants leads to improved business performance in terms of delivery, quality, flexibility and cost of operation -; [18]; [19] ; [20] ; [21] ; [2] .In particular, some authors have argued that “the integration of business processes from end user through original suppliers that provides products, services and information to add value for customers” and “supply chain management is the coordination of activities, within and between vertically linked firms, for the purpose of serving end customers at a profit”. The notion is that supply chain integration begins with customer orders, triggering production process and extends back through the firm which does the manufacturing and then to the supply of raw materials through procurement by both material and service suppliers. Thus, integration is needed both internally (intra-organizationally) and externally (inter-organizationally). Accordingly, [21] defines SCI as “the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra-and inter-organizational processes, in order to achieve effective and efficient flows of products and services, information, money and decisions, to provide maximum value to the customer”. With this definition, [21] and colleagues conceptualize SCI to comprise of three reflective dimensions: customer, supplier and internal integration. While the tendency has been to advocate for customer and supplier integration, [21] argues that a comprehensive understanding of SCI should take internal integration into account. Thus, the scope of SCI is not limited to external integration but also incorporate wide scope ranging from supplier integration, customer integration internal integration [21]; [22].

To advance [21], a recent work by [2] defines SCI as the strategic collaboration of both intra-organizational and inter-organizational processes, with integration referred to as a unified control of a number of successive or similar economic or especially industrial processes formerly carried on independently. Applying this of integration to extant definition of SCI, we conceptualize *SCI as the degree to which a manufacturer strategically collaborates with its supply chain partners and collaboratively manages intra- and inter-organization processes*. With this conceptualization, we position SCI on the principles of collaboration, shared decision making, open communication, shared vision, shared technology and high level of trust between a focal firm and its collaborating partners [21]. From the work of

Flynn et al. we reason that customer, supplier and internal integration are the core elements that reflect the notion of SCI, thus, highlighting the construct's multidimensionality [23 ; [24].

Internal integration is defined as the strategic system of cross functioning and collective responsibility across functions, where collaboration across product design, procurement, production, sales and distribution functions takes place to meet customer requirements at a low total system cost [25]. Internal integration efforts break down functional barriers and facilitate sharing of real-time information across key functions [26]. Supplier integration involves strategic joint collaboration between a focal firm and its suppliers in managing cross-firm business processes, including information sharing, strategic partnership, collaboration in planning, joint product development and so forth [27]. Customer integration involves strategic information sharing and collaboration between a focal firm and its customers which aim to improve visibility and enable joint planning [28]. Customer integration enables a deeper understanding of market expectations and opportunities, which contributes to a more accurate and quicker response to customer needs and requirements [20] by matching supply with customer demand [2].

While several studies have examined factors that may give rise to SCI [29] and while some studies have examined performance consequences of SCI, to the best of our knowledge, very little empirical work has examined how inter-firm networking resource (a firm-specific idiosyncratic resource) and dysfunctional competition (a specific form of external environment

factor) impact levels of SCI. More importantly, while most extant studies have focused on SCI in large organizations and conglomerates, very little has been done on how drivers of SCI in small and medium sized enterprises. Further, while previous scholarly work on SCI has focused on firms in industrialized societies of North America and Western Europe, scholarly knowledge on the antecedents to, and operational performance outcomes of, SCI in institutionally underdeveloped societies is lacking. Yet, institutional theory and the development economics literature tell us that less developed societies have informally structured and with consumption pattern that is largely subsistent. The weak institutional context in such societies implies that business transaction is governed differently from what we know in Western societies. For example, given poor infrastructure, businesses in developing societies tend to draw on their ties to managers in other firms to function efficiently [30]. Similarly, in the midst of poor institutions and restricted access to relevant resources, firms tend to align their activities with other businesses to be effective. Poor law enforcement means that the rules of business engagement in developing economies tend to be undermined, producing situations of market inefficiency and dysfunction. For SMEs operating in such environment, greater integration of their business activities is a major approach to remain competitive.

This study proposes a conceptual model (in Figure 1) and develops a series of hypotheses to back our argument that inter-firm networking resource and dysfunctional competition give rise to SCI, and that SCI leads to increases in operational performance.

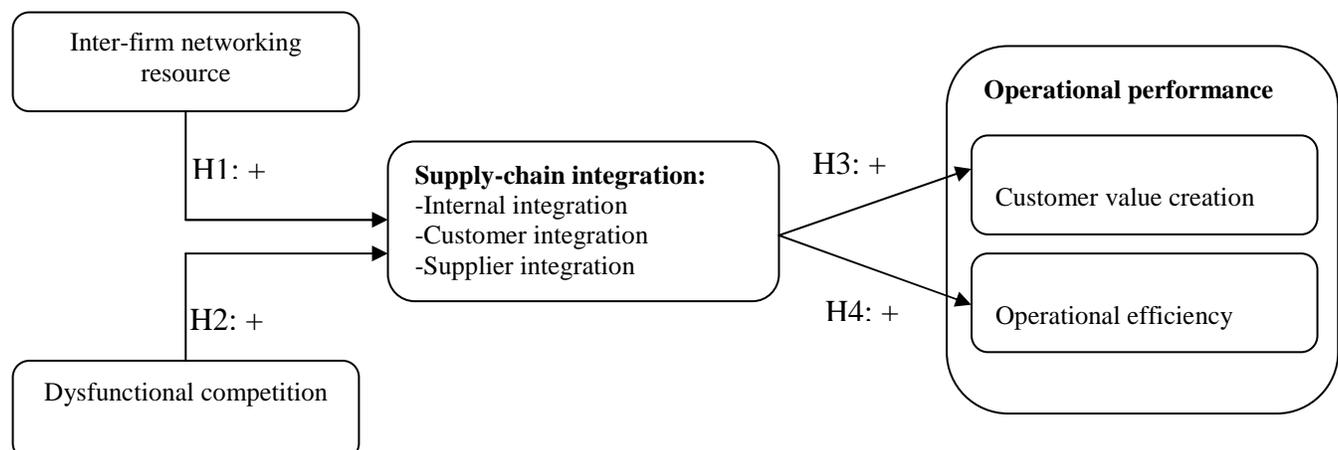


Figure 1: Proposed Model

2.2 Inter-Firm Networking Resource and Supply Chain Integration

According to Huggins and Johnston [31], the resource-based view of the firm recognizes that a firm's resources, including their application and transferability, are critical factors in creating and sustaining competitive advantage [32]. Such resources include the tangible and intangible assets owned or controlled by a firm, and are a source of value creation. These resources are often considered to be concomitant with both the size of firms and their capacity to undertake innovation [33]; [34]. However, [35] note that resource-based view scholarship tends to focus only on the internal stock of resources and capabilities of firms when discussing the value of resources and their value creation consequences. Yet, the resource based view can be used to understand how a focal firm can augment its resource base by building network of relationships with other firms to gain access to external resources [36]. Thus, in extending the resource-based view of the firm, we argue that a firm's external networking skills and know-how can help understand the resource advantages bestowed by networking with other firms [37]; [38]

Resource based view explains that organizational performance variances stem from strategic resources such as core competence [39]. According to [40], a firm capability (such as SCI capability) stems from its stock of relevant resources. Firms with logistics as resource have time and space utilities advantage. Thus, they are capable of delivering the right quantity of goods, in the right place at the right time [41]. Firms that combine their resources in a special way obtain synergies over their less resourced competing firms [42]. In drawing insight from resource based view, supply chain integration is conceptualized as a capability that provides a firm ability to align its own internal cross-functional supply chain processes, and integrate these internal activities with external distributor and supplier activities. Informed by the resource based view, the study argues that when a firm has strong inter-firm networking resources including a proclivity to develop and nurture relationship with customer, supplier and distributor firms, there is a strong possibility that such networking resources would enable a firm to develop competence in managing integrated supply chain activities. Accordingly, we hypothesize that:

H1: inter-firm networking resource is positively related to supply chain integration

2.3 Dysfunctional Competition and Supply Chain Integration

The theory of opportunism can help explain why increases in dysfunctional competition in the business environment will lead to increases in SCIC. When a market arena is highly dysfunctional, competitors have an incentive to engage in opportunistic behavior that may

be detrimental to other market players. For fear of detrimental effect of dysfunctional competition arising from inability of state institutions to stem out marketplace indiscipline, firms may integrate their operations with carefully selected distributors and suppliers for effective monitoring.

On the contrary, an arms-length relationship with suppliers and distributors in an environment characterized by dysfunctional competitive behavior (including the risk of pirating, selling of unbranded products) can be costly and as such it is beneficial for a focal firm to develop closer relations with key supply chain networks to minimize the cost of dysfunctional behaviors. Hence, it is likely that when a focal firm operating in a turbulent institutional environment perceives the marketplace to be characterized by high degree of dysfunctional competitive behavior, the firm is more likely to develop and nurture greater supply chain integration. Thus, we argue that: ***H2: Dysfunctional competition is positively related to supply chain integration.***

2.4 Supply Chain Integration and Customer Value Creation

The ultimate objective of every supply chain system should be to maximize customer satisfaction and optimize overall value created [43]. A key tenet of the resource based view is that a firm's stock of valuable and idiosyncratic resources and capabilities should enable the firm to generate superior marketplace advantage including operational performance and customer value creation.

However, we know resources are scarce to come by and capabilities can be costly to develop and maintain, especially for small and medium sized enterprises operating in resource-constrained societies such as those in Liberia. Thus, it is argued that greater supply chain integration enables firms access valuable collaborative resources and capabilities to create greater market value. Inter-firm supply chain integration, the pursuit of alignment of a firm's internal processes with external channel partners, including distributors (or customers) and suppliers [44], is generally viewed as a viable strategy for pooling of expertise and resources to create synergy and to enhance value creation [45], [46], [47]; [48]; [49]. Scholars have suggested that supply chain alignment is important particularly for SMEs' ability to create market value because such firms are often vulnerable to environmental uncertainty due to their smallness in nature, narrow product lines, niche customer base, and limited market exploitation resources [50], [48].

To overcome their resource deficiency constraint, [51] Tomlinson and suggest that SMEs need to collaborate with other firms, even larger ones, which

own relevant resources and capabilities often not available for purchase in factor markets. [52] submit that SMEs' ability to align their supply chain processes with external entities is likely to positively relate to superior market performance. For instance, [46] illustrate how Mips Computer Systems, a small firm, was able to effectively compete against well-established players such as IBM and Hewlett-Packard by collaborating with several small semiconductor supply chains. Again this background, it is argued that:

H3: Supply chain integration is positively related to customer value creation

2.5 Supply Chain Integration and Operational Efficiency

Efficiency is a cost-related advantage in supply chain management. It is argued that efficiency improvements are achieved through Just-in-Time production and logistic supplier nets [53]. From a resource dependence perspective, efficiency is defined as an internal standard of performance which may be amplified when firm are smart in their management of essential operations [54]. In other words, efficiency can be maximized when a firm collaborate its supply chain activities with other firms in SCI. For example, a firm can reduce its cost of material sourcing if it is in close collaboration with a supplier that is more competent in sourcing materials. Thus, a focal firm is able to reduce its overhead cost when its supply chain activities are aligned with other firm in the supply chain system.

Additionally, social exchange theory implies that when a firm collaborates with other firms, both parties benefit from mutual reciprocity. In particular, greater collaboration of supply chain activities suggests that a firm is able to minimize the cost of serving and monitoring customers and suppliers. High levels of SCI also means that a firm is assured of timely supply of high quality materials and sharing of risk associated with logistic failures. When a firm is highly integrated with distributors, there is a greater degree of assurance that a distributor will give priority to its partner in terms of customer recruitment, which can itself reduce customer recruitment, training and retention costs for the focal firm.

From organizational learning perspective, aligning a firm's activities with suppliers and distributors implies that there is greater understanding of each partners internal procedures and processes, as well as the mind-sets of operating staff. An assurance of supply of materials and a guarantee of distribution of products suggests that a firm can work on long-term plans to cut down cost. Moreover, inventory costs may be reduced when a firm is able to rely on its suppliers to supply materials on, and when a firm is also assured that its interconnected distributor is ready to distribute the firm's products to end-users once they produced. Thus, it is

argued that greater degree of SCI would be associated with greater operational efficiency. Accordingly, it is hypothesised here that:

H4: Supply chain integration is positively related to operational efficiency.

3.0 Methodology

The population of this study was made up of service providers and manufacturers operating in Liberia. To obtain a representative sample, we identified 848 manufacturing firms from the Yellow Pages of Liberia Telecom and the Liberia Manufacturers Association directory in Liberia that were at least 5 years old, had between 5 and 500 employees, and were manufacturers. To balance survey cost and sample size required to obtain statistical power, a cover letter and a questionnaire were administered in person to a random sample of 469 firms. One hundred and thirteen firms declined to participate in the study as a matter of company policy. We ultimately received 199 usable responses, a response rate of 67.4% [20]. Typical key informants were supply chain or logistics managers, CEOs/presidents, or director of operations. An average firm was found to have been in operation for 12.17years (SD=15.314), and with 43 full-time employees on average (SD=52.397). An average informant was found to have 4.01 years managerial experience (SD=2.449).

3.1 Measures and their Operationalization

We insights from the extant literature to measure the study's construct. The items used in measuring supplier chain integration (SCI), customer value creation, and operational efficiency were adapted from extensively revealed literature of prior research (e.g.[21]. The study measured the degree of SCI among firms across three dimensions: supplier integration, internal integration, and customer integration; using a 7-point scale, ranging from 1= "not at all" through to 4= "to a large extent" to 7= "to a much larger extent". In each case, 7-items were employed. Specifically, key items adapted were in reference to: collaborative work, planning and decision making, alignment of goals & interest, share of information, long-term relationships, material/resource/service flows, system and process alignment, visibility, and assistance and supports.

Selecting appropriate performance measures is challenging, due to the inherent complexity and interdependence of supply chains. While [55] argued that financial performance should be the main measure of supply chain performance because of the shareholder profit motive, others have described the limitations of relying solely on financial measures of performance [56] and [57] suggested that supply chain performance measurement should include operational indicators, such as customer service and the ability to respond to a changing environment. [58] listed cost, time, quality,

delivery and flexibility as important measures of operational performance. Although some authors found no direct relationship between internal integration and operational performance [8], others found a positive relationship between internal integration and operational performance, including process efficiency [59] and logistics service performance. Given this background, we capture two aspects of operational performance: customer value creation and operational efficiency, enabling us establish whether SCI has both effectiveness and efficiency consequences. The two performance constructs were measured with five items each on a 7-point scale that ranged from 1= “strongly disagree” through to 4= “indifferent/not sure” to 7= “strongly agree”. The items for customer value creation were in reference to the satisfaction and complain level of customers, product pricing in relation to quality, delivering/fulfilling promises made to customers, product returns/service recovery, and pricing product in relation to the perceived benefits the customers’ get in using products/services. In the case of operational efficiency, the items were about efficiency in managing operational cost, material & inventory costs, wastes in processes and material wastage, transportation and distribution cost, and optimal use of resources, capacity, and time.

Relying on extant literature [14], dysfunctional competition was measure using six items which included: illegal copying of new products/services, counterfeiting of products/services and trademarks, unhealthy marketing campaigns, copying of business processes, unfair competitive practices, and ineffective market competition laws to protect products/services. In the case of inter-firm network resources, four items were adapted from extant literature [30]. These included managers’ ability to utilize their personal connections and networks with managers at (1) buyer firms, (2) supplier firms, (3) competitor firms, and (4) distributor firms. Both constructs were measuring using a 7-point scale, ranging from 1=strongly disagree to 4=indifferent/not sure to 7=strongly agree.

3.2 Measurement Model Evaluation

Before estimating the study’s proposed model, the items employed in measuring the constructs in the model were assessed in terms of reliability and validity. In assessing the internal consistency among the measures for each construct, Cronbach’s Alpha was used. The results obtained are shown in Table 1. All alpha values obtained

were higher than the recommended threshold of .70 [60], indicating that the measures employed in measuring the respective constructs satisfactorily have one underlying concept [61].

To validate the measures, however, a confirmatory factor analysis (CFA) was performed using LISREL 8.8 software package. The Maximum Likelihood Estimation method and a covariance matrix of the measures were used as the inputs for the analysis. After subjecting the items to initial CFA evaluation and having performed various purifications (e.g. removing poorly loading items, items with large error variances and items cross loading on non-specified constructs), a satisfactory model fit to data was obtained: Chi-square (degree of freedom) = $\chi^2(d.f.) = 253.06(94)$; root mean square error of approximation (RMSEA)=.07; non-normed fit index (NNFI)=.92; comparative fit index (CFI)=.93; standardized root mean square residual (SRMR)=.05 (Hair et al., 2014). The retained items for each construct, the standardized factor loadings, composite reliability (CR) and average variance extracted (AVE) values are shown in Table 2. As can be seen from Table 2, all fit indices exceeded their recommended thresholds [60]. Importantly, the positive and significant factor loadings indicate convergent validity of the measures [60]. Additionally, all composite reliability (CR) and average variance extracted (AVE) values obtained for each construct were above the recommended cut-off points of .60 and .50 respectively [61]. Additionally, all AVEs were higher than the highest shared variance between the constructs, and thus indicating satisfactory discriminant validity of the study’s constructs [61].

The inter-construct correlations are shown in Table 2. As can be seen from Table 2, each construct is fairly normally distributed as is indicative of the relationship between the mean and standard deviation values. Additionally, there is no observed extremely high correlation between the constructs with the highest correlation being .566 (correlation between inter-firm network resource and presence of dedicated supply chain function). This high correlation is to be expected because previous research suggests that a dedicated function is a functional resource [62], hence argument can be made that a dedicated supply chain function and inter-firm network resource are both firm resources and should therefore vary in a uniform direction.

Table 1: Measurement model Results

Constructs and measures	Factor Loadings†	CR	AVE	α
Customer integration		.88	.72	.87
We collaborate key customers in planning and decision making	.91			
We have common interest and goals with our key customers	.84			
Key customers share business information with us in real time	.79			
Internal integration		.90	.76	.90
This firm makes use of cross-functional team collaboration	.89			
There is visibility in processes and operations across all levels and functional units in this company	.85			
Systems and controls are aligned across all levels and functional unit areas	.87			
Supplier integration		.92	.80	.92
Key suppliers share business information with us in real time	.97			
Key suppliers have aligned processes and systems with us	.80			
Key suppliers have long-term common interest in our operations	.91			
Networking resource		.96	.87	.96
Managers utilize personal connections and networks with managers at buyer firms/customers	.96			
Managers utilize personal connections and networks with managers at supplier firms	.90			
Managers utilize personal connections and networks with managers at distributor firms	.96			
Dysfunctional competition		.93	.77	.93
There are unlawful competitive practices (e.g. illegal copying of new products/services) in our industry	.71			
Counterfeiting of products/services and trademarks by other firms is common in our industry	.90			
Competitors use and rely on 'unhealthy' marketing campaigns (i.e. competitors say bad things about our products in their adverts)	.96			
There are ineffective market competition laws to protect your firm's products	.91			
Customer value creation		.84	.64	.83
Our customers are mostly satisfied and do not complain much	.75			
This firm offers high quality products at reasonable prices	.92			
Product returns or service recovery has always been low in this firm	.72			
Operational efficiency		.91	.78	.90
We are efficient in managing operational costs	.93			
Material management and inventory costs are managed efficiently	.98			
Wastes in processes and waste of materials is low in this firm	.72			

† = all factor loadings are significant at 1% level; CR = Construct reliability; AVE = Average variance extracted; α = Cronbach's Alpha

Model Estimation

Having demonstrated reliability and validity of the study's constructs, the study's proposed relationships were analyzed using ordinary least square estimator. The analysis started by creating single indicants for all the constructs by averaging the respective items retained after CFA. In the case of SCI, it was necessary that single indicant variables were created for each dimension after which the three indicant variables obtained were firm has a dedicated supply chain unit. In the case of the second model for each analysis, the hypothesized path(s) was/were then added to the first model. Overall, six models were estimated. The results of the analyses are presented in Table 3.

In analysis one where we have supply chain integration (SCI) as the dependent variable, the first model (model 1) was able to account for 17.4% variation in SCI. Adding the two hypothesized paths (i.e. inter-firm networking and dysfunctional competition) to model 1 was able to significantly increase the percentage of variance explained (i.e. R^2) by 22.4%. In analysis two, the dependent variable was customer value creation. The first model (model 3) explained 14.9% variations in customer value creation. In the case the second model (model 4), customer value creation was predicted by model 3 and SCI. Model 4 was able to significantly increase R^2 by 10.7%. In analysis three where we model operational efficiency as our dependent variable, its first model (model 5) was predicted by the control variables, which together explained 16.0% variances in operational efficiency. After adding its hypothesized path to model 5, R^2 significantly increased by 1.5%.

averaged to create an overall SCI and used subsequently for the analysis. Given the multiple dependent variables in the study's theoretical framework, three separate regression analyses were performed. In each case, two hierarchical nested models were analyzed. The first model in each case was predicted by five control variables: industry type, business experience, firm size, number of functional units (structure), whether or not a

4.0 Results

The study argues in H 1 that inter-firm networking resource is positively related to supply chain integration. The analysis provides statistical support for this hypothesis ($\beta = .494$; $t = 7.216$, $p < .01$). This finding implies that the extent to which firms' are successful in integrating their supply chains is significantly influenced by how effectively managers within the focal firm utilizes their personal connections and networks with managers in other firms at the both downstream and upstream portions of their supply chains, to the extent that focal firms' inter-firm network resources are high, it enables the firms to better integrate their supply chains, in the area of information flow, alignment of systems and controls, long-term relationships and common interest, and collaborative planning and decision making.

In H2, the study posits that high levels of dysfunctional competition in a firm's operating market environment are associated with high levels of SCI. The results of the study yields empirical support for this hypothesis ($\beta = .121$; $t = 1.934$, $p < .05$). This finding suggests that in environments or industries where dysfunctional competition is high, where market players are unlikely to play by the rules of the game, firms are more likely to collaborate with other channel members in order to survive.

Table 2: Descriptive statistics and inter-construct correlations

VARIABLES	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Industry type ^d	.69	.46												
2. Experience	12.19	15.23	-.033											
3. Firm Size	42.44	52.03	-.067	.031										
4. Number of functional units	5.58	2.66	-.183**	.109	.249**									
5. Supply chain unit ^d	.77	.41	.240**	-.168*	-.157*	-.016								
6. Customer Integration	4.01	1.59	-.182**	-.090	-.066	-.080	.192**							
7. Internal Integration	4.86	1.55	-.357**	-.074	-.136	-.052	.108	.719**						
8. Supplier Integration	4.00	1.77	-.224**	.036	.518**	.203**	.158*	.156*	.175*					
9. Networking Resource	4.73	1.83	-.226**	.016	-.390**	-.157*	-.195**	.566**	.525**	-.114				
10. Dysfunctional Competition	2.57	1.82	.045	-.059	-.087	-.187**	-.251**	.357**	.201**	.011	.321**			
11. Customer Value Creation	5.65	1.06	-.104	.087	.253**	.137	.077	.185**	.278**	.390**	-.116	.075		
12. Operational Efficiency	5.87	1.09	-.060	.046	.276**	.150*	.010	-.154*	-.028	.355**	-.260**	-.070	.492**	

Note

SD = Standard Deviation

^d = dummy variables

**Correlation is significant at the 0.01 level (2-tailed).

*Correlation is significant at the 0.05 level (2-tailed).

Table 3: Results of Ordinary Least Square Regression Analyses

Independent variables	Dependent Variables						
	Supply Chain Integration		Customer Value Creation		Operational Efficiency		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	
Control paths							
Industry type ^d	-.283 (-4.100)**	-.155 (-2.40)**	-.061	-.866	.041 (.599)	-.130 (-1.859)*	-.108 (-1.492)
Experience	.028 (.390)	.027 (.436)	.139 (1.899)*		.129 (1.878)*	-.045 (-.619)	-.047 (-.647)
Firm Size	.227 (3.150)**	.437 (6.426)**	.321 (4.401)**		.240 (3.418)**	.353 (4.866)**	.336 (4.519)**
Functional size	-.099 (-1.351)	-.044 (-.695)	-.030 (.080)		.006 (.080)	.043 (.583)	.051 (.680)
SC unit ^d	-.086 (-1.249)	.047 (.754)	.173 (3.089)**		.204 (3.089)**	.127 (1.829)*	.134 (1.914)*
Hypothesised paths							
Networking Resource		.494 (7.216)**					
Dysfunctional Competition		.121 (1.934)*					
Supply Chain Integration					.359 (5.243)**		.155 (1.930)*
Goodness of fit indicators:							
R ²	.174	.398	.149		.256	.160	.175
ΔR ²	-	.224**	-		.107**	-	.015*
Adjusted R ²	.153	.376	.127		.233	.138	.140
F-Statistics	8.155	18.047	6.779		11.006	7.355	6.308

Note^d = dummy variables

T-values are reported in parentheses

** p<.01; * p<.05

Critical t-values for hypothesized paths = 1.645 (5%, one-tail tests)

Hypothesis three advances the argument that supply chain integration is positively associated with customer value creation. The results of the study ($\beta = .359$; $t = 5.243$, $p < .01$) statistically support this hypothesis. The implication from this finding is that firms that do well in integrating their supply chains are more likely to improve value created for customers, which could be manifested in their ability to (1) provide products/services that better address customers' need and preferences, (2) offer high quality products/services, (3) minimize product returns/service recovery, and (4) deliver value to customers on timeously.

The study proposes in H4 that supply chain integration is positively related to operational efficiency. Again, the study finds statistically significant support for this hypothesis ($\beta = .155$; $t = 1.930$, $p < .05$). These results indicate that the tendency of firms to be efficient in their operations in the areas of (1) management of operational cost, (2) material and inventory management, and (3) process and material wastage is more likely to be driven by a strong integration across their supply chains.

5.0 Theoretical Implications

The purpose of this study is to investigate the inter-firm network resource and external environment drivers and operational performance consequences of supply chain integration. The study's theoretical model is tested on a sample of firms located in Liberia, an economy that is recovering from several years of civil strife and economic shut-down. Findings from the study suggest that increases in inter-firm network resource and a high degree of dysfunctional competition drives firms to integrate their supply chain activities. Additionally, findings indicate that increases in supply chain integration enables firms in that society to create superior customer value and boost operational efficiency. Several theoretical and managerial implications are derived from these findings, and are the focus of the following discussions.

First, the study reveals that inter-firm networking resource is a significant antecedent to supplier chain integration. As indicated by the resource-based view, organisations are made up of both tangible and intangible resources [39]; [40]. Firms that have specialized and competent personnel (e.g. skilful supply chain personnel) could be useful when it comes to relating and managing relationships with other channel members. As the results of this study indicate, firms that have dedicated supply chain units better integrate their supply chains activities. This reinforces the idea that networking resource is important for enhancing SCI as a strong inter-firm network resource embedded in the skills and expertise of

supply chain personnel enables firms to connect and learn best practices from external supply chain partners.

In a much broader sense, it is noted that building and developing supply chains requires resources external to the focal firm [29]. Firms' lack of resources is augmented by strong connection to the outside world [63], and it is particularly relevant to the context of this study of predominantly SMEs operating in a deprived society where access to resources is hard to come by. The implication of this finding is that, in as much as firms seek to pursue greater integration in a challenging business environment such as one in Liberia, they should be willing to build inter-firm resources boost the chances of accessing external resources from channel partners. For example, it can be argued that today's supply chains are greatly driven by sophisticated information technology (e.g. Enterprise resource planning) that may not be internally available to small businesses in a deprived society like Liberia. To access these scarce resources, firms should be willing to work with others that have access to critical resources as by so doing firms are able to learn how to integrate their own supply chain activities. In fact, by networking with other channel members, not only would a focal firm access critical resources but also help other channel members have in place similar/compatible systems that will help in their integration efforts.

Second, the study finds that dysfunctional competition significantly drives SCI practices in Liberia. In an attempt to guard themselves against opportunistic behavior of non-law abiding competitors and marketplace indiscipline that is prevalence in institutionally underdeveloped societies such as Liberia, firms in that society focus on building alliances to strengthen their relationships with channel members within their value chain in order to survive. For example, a focal firm may be able to block a competitor from entering its target market by locking in major distributors in its internal supply chain processes. In an informal business environment such as one in Liberia, where market rules are barely enforced, supply chain infrastructure is hardly functional, where dysfunctional (as opposed to functional) competition is widespread, and where consumers have a proclivity to consume unbranded goods and services [16], firms get round these challenges by integrating their internal processes with carefully selected channel partners aiming to reduce the negative impact of these market inefficiencies on their internal activities. By bring on board channel partners, a focal firm is able to instil best practice and discipline in the supply chain system, and as a result reduce potential drawbacks and losses produced by the market dysfunction. As this study finds, given the increasing

dysfunctional competition across industries in developing societies such as Liberia, increases in firms' perception of dysfunctional enables these firms to forge greater integration of their supply chains, such that increasingly, the form of competition may be between different supply chains rather than between individual firms [64]; [65].

Additionally, the study's findings suggest that enhancing customer value creation is driven by SCI. The study finds that firms that are more integrated in their supply chains serve their markets better in terms of creating a superior value for their customers. As noted by [43], the ultimate goal of supply chains is to enhance customer satisfaction and value. From supply chain perspective, value created is the difference between the worth of a product or service and the cost supply chains incur in creating the value. Inward-focused firms may find it difficult increasing value to their customer because at each stage of the supply chain, members tend to optimize their own benefits to the detriment of the whole supply chain, and subsequently the customer end up paying higher price for a product/service relative to when processes and flows within supply chains are aligned. In the particular case of firms in Liberia, an economy noted for widespread market inefficiency, it can be argued that greater supply chain integration among channel members helps overcome the inefficiencies in the system, and consequently maximizing customer value creation.

Further, the study's findings indicate that greater integration within supply chains is associated with improved operational efficiency. Through SCI, firms make optimal use of idle resources by sharing resources and competences with other channel members, which helps minimize cost and waste. On the contrary, lack of integration in supply chains can lead to spill over cost such as stock-outs, back order cost, and high inventory cost [43]. With greater SCI, market demand is well forecasted for, and firms are able to effectively plan and make decisions regarding material requirements, operational activities, and distribution requirements. Consistent with [66], findings from our study suggest that efficiency performance is maximized when firms systemically integrate their inbound and outbound supply chains. We contend, therefore, that greater SCI should help small businesses in Liberia minimise the operating cost while at the same time maximising value created to customers.

5.1 Managerial implications

The findings uncovered in this study have important implications for managers of supply chains in institutionally underdeveloped societies. First, findings from the study suggests that a firm's ability to become successful in integrating their SCs is driven by the extent to which it possess inter-firm network resources as well as the nature of competitive behavior in the marketplace.

In particular, results indicate that improving SCI is driven by managers' ability to use their networking skills in relating and managing relationships with other channel partners. Thus, organisations that greatly possess such resources stand a better chance of improving integration efforts. Networking resources are skills and competences evolve overtime. As such, for firms that need to use such a resource to boost integration of their SCs, it is important firms continuously train and educate staff in gaining network and relationship building skills and expertise, and have such skills and competences systematically nurtured and monitored.

In addition, the study's findings reveal that increased dysfunctional competitive activities and practices are more likely to results in firms building greater relationships with other channel members to survive. Notwithstanding this, ability to identify key business partners that compliment a firm's operations is important for surviving in an environment of increased dysfunction. Thus, an important lesson for supply chain leaders is the need to identify the nature and dynamics of dysfunctional competitive forces in the environment and then form alliances with supply chain partners to counter any potential negative ramification of dysfunction in the market.

Additionally, a firm's ability to manage inter-organisational cultural differences and its capacity to align its goals and interest with key business partners is paramount to gaining marketplace advantage. For firms operating in institutional challenging environments such as Liberia, there is a need to deploy skills in forming and managing an integrated supply chain system to boost customer value creation and maximize operational efficiency.

5.2 Limitations and Direction for Future Research

Despite the contributions of this study to extant SCM literature, the study cannot be dissociated from a number of methodological and substantive limitations. First, in testing for the study's proposed model, the analytical technique employed only permitted test for relationships between one dependent and multiple independent variables at a time. Given the multiple dependent variables in the study's model, it was required that three separate regression analyses were run. However, argument can be made that some of the independent variables may have direct effect not only on their immediate dependent variables but also on other dependent variables in the model. For example, inter-firm network resources and dysfunctional competition were regressed on SCI, but it can be argued that, potentially, these independent variables could influence operational performance directly. We suggest that future research employ complexity analytical approaches to tease out some of these relationships.

Second, other competing models were not investigated in the current study. One of such competing models is the contingency (either mediating or moderating) role of operational efficiency in the link between supply chain integration and customer value creation. Within supply chain context, value is both dependent on efficiency and responsiveness, trade-offs which management have to manage subject to market requirements [43].

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- In addressing these issues, future researchers are advised to employ advanced modelling technique such as structural equation modelling to help estimate these complex webs of relationships.
- Third, although this current study did not hypothesize for the effect of industry-type and dedicated supply chain units on SCI and operations performance, the statistically significant results found in the current study suggest that theoretical arguments could be advanced to link these industry related and firm related variables to SCI and operational performance.
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