



# Digital Supply Chain Implementation and Supply Chain Collaboration: A Study of Oil and Gas Companies in Rivers State

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**Abstract:** *This study examined the influence of digital supply chain implementation on supply chain collaboration of oil and gas companies in Rivers State of Nigeria. The population of the study comprised 295 registered oil and gas companies in Rivers State. The Krejcie and Morgan's formula was used to conclude on a sample size of 169 oil and gas companies. More specifically, the study adopted the simple random sampling technique to draw two (2) management staff from each of the 169 companies studied, to arrive at 338 management staff for the complete sample. The study adopts a quantitative research design and data was gathered using self-administered questionnaire, and 338 copies of structured questionnaire was distributed to the respondents, of which out of the 338 copies, of which out of the 338 copies of designed questionnaire distributed, 278 copies accounting for 82% were recovered from the respondents. However, 246 (88%) of the questionnaire were properly filled and subsequently used for analysis. The analysis was executed by means of the simple regression method to test the hypotheses at 0.05 level of significance and it was revealed that, digital supply chain implementation moderately, positively and significantly influences supply chain collaboration. The study therefore, concludes that digital supply chain implementation significantly influences supply chain collaboration of oil and gas companies in Rivers State, and recommends that, the management of oil and gas companies should examine the value creation capacity in their current supply chain by a detailed review process that will identify digital supply chain advantages on currently perceived ways to enhance supply chain collaboration and best practices in their industry. Further, the oil and gas companies should contemplate adopting DSC in their occupational practices to stay dependable in the competitive market by providing good supply chain collaboration and best business practices as in one piece.*

**Keywords:** *Digital supply chain implementation, Oil and gas companies, Rivers State, Supply chain collaboration.*

## INTRODUCTION

A number of businesses have recognized collaborations with other supply chain members (Ramanathan & Gunasekaran 2014), because sustaining enduring planned synchronization between associates, fosters teamwork, and the swiftness with which it envisage benefits have all shown the way to collaborative

gratification (Fawcett & Magnan, 2002; Daugherty *et al.*, 2006). It is clear as crystal that, supply chain collaboration ranges from the necessity for harmonization of operational resources to evolving the basic competences prerequisite for realizing positive collaboration in the supply chain. Therefore, collaboration of all the manifold functions and chain of organizations cannot be competed independently by different partners of a supply chain, so an unceasing energetic organism of supply chain is essential, through which all partners turn out to be part of the cohesive arrangement and come together to collaborate with other associates of the chain. For that reason, supply chain collaboration is an answerable affiliation amongst associates of supply chain, who shares information with each other to advance the multiparty performance, and remodel industry practices to increase profit margin (Whipple *et al.*, 2010). Seeing that supply chain collaboration aims at exploiting the proficiency and skillfulness of discrete companies to mutually deliver benefits to final consumers, it is possible to infer that a digital supply chain agenda could be a reliable conduit to this end.

As a result of globalization, the existing objective of the supply chain is to guarantee the satisfactory incorporation of operations from suppliers to consumers (Wong *et al.*, 2017). The incorporation of the supply chain embraces coordination, knowledge exchange and standardization of the structure, trailing shared cost, inventory and customer service resolutions from the perception of the all-inclusive supply chain (Kang *et al.*, 2018). This assimilation necessitates the use of embryonic tools to augment the interchange of information and to empower, in the progression, the observing of physical goods. Ever since 2010, when computerization was hosted to the supply chain so as to control demand, complexity and integration (Bahrin *et al.*, 2016), the application of supply chain 4.0 machineries have augmented, leading in the digital supply chain transformation (Manavalan & Jayakrishna, 2019). To generate and measure longstanding significance, it is imperative for a business to integrate digital creativities into the inclusive supply chain scheme.

The digital economy is shifting industries considerably, and it is energized by consumer necessities and conduct. The business processes and strategies of companies are now moving towards re-shaping their strategies to turn into fully crystal clear operations, together with their supply chain management. There will even now be a key influence on the multiplication of contemporary supply chain 4.0 technologies (Ferrantino & Koten, 2019). The supply chain is progressively energetic and globally within reach (Manavalan & Jayakrishna, 2019), resulting to the enormous application of evolving technology. Digital supply chain is a shrewd, value-driven organism that powers new data analytics technologies and techniques to engender worth and income (Merlino & Spro'e, 2017). Hence, this area of supply chain digitalization is beginning to fascinate mounting consideration; yet, its investigation distinction remains indistinct (Seyedghorban, *et al.* 2020)

The existing research on digital supply chain reveals that little thoughtfulness has been concentrated at conducting scholarly investigations, and those endeavors have been typically qualitative and narrative-based in nature with diminutive quantitative substantiation (Buyukozkan & Goçer 2018, Hofmann & Rusch 2017, Wu *et al.* 2016). This is a methodological gap. Additionally, a number of these studies merely emphasis on a particular facet of digital supply chain such as big data (Nguyen *et al.* 2017). This affords the researchers an all-encompassing rationalization to conduct a systematic study on the subject of digital supply chain implementation and supply chain collaboration. Hence, this study sets forth an investigation to comprehensively examine the impact of digital supply chain on collaboration of oil and gas companies in Rivers State by means of quantitative technique.

## **LITERATURE REVIEW AND HYPOTHESIS**

### **Theoretical Underpinning**

This research is anchored on the dynamic capability theory which Teece (1997) referred to as ‘the firm’s ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments’ (p. 516). Further, Teece (2007) opines that dynamic capabilities embraces ‘difficult-to-replicate enterprise capabilities required to adapt to changing customer and technological opportunities’ (pp.1319-1320). Grant (1996) noted that resources are merged to build up capabilities and such an amalgamation of capabilities subsequently generates competences or capabilities that can spread crosswise people, function and organizational thresholds (Day, 1994). As a result, dynamic capabilities are over and over again developed over time as an alternative of being procured in the market and are not only being decided upon by a business’ substantial and insubstantial supply foundation at a specified point in time, but also by the resolution it has instituted all the way through its earlier period (Eisenhardt & Martin 2000, Ambrosini *et al.*, 2009).

Dynamic capabilities therefore, connote a meticulous course of actions or schedules that merge, renovate or refurbish resources into spanking new competencies in the course of development of markets. Dynamic capabilities symbolize cultured and established blueprint of conduct through which a company methodically generates and transform its practices; to achieve additional effectiveness. This present study conceptualizes digital supply chain implementation as such a dynamic capability fashioned by a pinnacle of a number of obtainable resources and proficiency a company generates to deliver successful supply chain collaboration based outcomes.

### **Digital Supply Chain Implementation**

Digital supply chain or Supply chain 4.0 has been referred to as an intelligent, customer-centric, scheme incorporated, internationally linked and data determined apparatus that pulls innovative technologies to transport priceless products and services that are more easily reached and reasonably priced (Bhargava *et al.*, 2013, Buyukozkan & Goçer, 2018). The seals of a really digital supply chain are extremely computerized end-to-end processes, multi-purpose hustling of undertakings and augmented visibility. The implementation of a new digital technology does not intrinsically imply being digitized, but in order to appreciate the unexploited prospective of obtainable resources and proficiency, the bringing into line digital stratagems with supply chain precedence and carrying out a digital functional ideal is absolutely necessary. This is because, the implementation of digital functioning model results in a sophisticated level of competence (Raab & Cryan, 2019). A digital supply chain management that is successful put into practice is rewarded with speed, flexibility, global connectivity, intelligence, transparency, scalability, and so forth. (Hanifan *et al.*, 2014, Schrauf & Berttram 2016).

### **Supply Chain Collaboration**

Supply chain collaboration is typically created across the following organizational interfaces: In the past three decades, a number of firms have established collaborations with other supply chain affiliates (Ramanathan & Gunasekaran 2014). Supply chain collaboration is an accountable association among cohorts of supply chain, who share information with each other to progress the shared performance, they also remodel business practices to increase profit margin (Whipple *et al.*, 2010).

For Cao and Zhang (2011), realizing these benefits has need of the supply chain members to integrate the seven dimensions indispensable to collaborative relationship. These dimensions are: information sharing, goal congruence, decision synchronisation, incentive alignment, resource sharing, communication and

joint knowledge creation. Though, collaborations are pigeonholed by in determinate settings (Langroodi & Amiri, 2016; Qu & Yang, 2015), composite structural relationships (Arkhipov & Ivanov, 2011; Cheng, Chen, & Chen, 2014), unbalanced information sharing (Ganesh *et al.*, 2014) and decentralized individual decision-making (Lu *et al.*, 2012) amongst others. Supply chain collaboration is an answerable association among partners of supply chain, who share information with each other to advance the joint performance, they also remodel business practices to increase profit margin (Whipple *et al.*, 2010).

Two or more companies are involved in partnership sharing information and achieve additional surpluses towards reaching a joint objective (Cao *et al.*, 2010). Supply chain collaboration generates a pledge to supply chain partners to function as a partnership and working together on fundamental procedures to attain shared objective (Cao & Zhang 2013). Supply chain collaboration is a business process founded on the affiliation and communication over and done with the chain and all associates of supply chain (Liao & Kuo 2014). Collaboration is a trustful relationship among the businesses where rewards and risks are shared between partners (Olorunniwo & Li, 2010).

Supply chain collaboration according to Ikegwuru and Nwokah (2022) is “a firm’s capability to sense, work in partnership, synchronize and reconfigure the elements in a supply chain as well as internal cross-functional integration and external integration with suppliers and customers”. (P.77).

Supply chain collaboration is therefore, an extensive notion for teamwork between humans, as addressed by strategic initiatives within a supply chain that facilitates interactions that support the achievement and conservation of desired objectives. Supply chain collaboration hinges on a calculated process of pinpointing and working concerns and prospects with precise professional intents amid two or more parties in a manner that upsurges inclusive supply chain value.

### **Empirical Review**

Khai *et al.* (2022) investigated the outcome of the digital supply chain on the supply chain and organization performance in the Malaysia manufacturing industry, and equally evaluated the mediating effect of supply chain performance in the affiliation between the digital supply chain and the organizational performance. The population of the study was 1160 manufacturing companies listed in the Federation of Malaysian Manufacturers (FMM) directory. By means of the Partial Least Square Structural Equation Modeling (PLS-SEM), three hypotheses are not sustained and seven hypotheses are sustained, which take account of all the hypotheses of moderating effect. .

Ikegwuru and Nwokah (2022) examined the influence of block chain technology application on supply chain collaboration of energy companies in Rivers State of Nigeria. on a population of 295 registered energy companies operating in Rivers State of Nigeria. The Krejcie and Morgan’s formula was used to determine a sample size of 169 Energy companies. Using the simple regression technique to test the hypotheses at 0.05 level of significance, it was revealed that, BTC-enabled visibility strongly, positively and significantly influence supply chain collaboration. It was also, established that BTC-enabled traceability moderately, positively and significantly impacted on supply chain collaboration.

From the review of literature, the following hypothesis was formulated:

**H<sub>01</sub>:** Digital supply chain implementation does not significantly influence supply chain collaboration of oil and gas companies in Rivers State.

## METHODOLOGY

This study adopts a quantitative research design and data was gathered using self-administered questionnaire. The population of this study constitutes two hundred and ninety-five (295) oil and gas companies registered in Rivers State. The Krejcie and Morgan's formula was used to determine a sample size of 169 oil and gas companies. More specifically, the study adopted the simple random sampling technique to draw two (2) management staff from each of the 169 companies studied, to arrive at 338 management staff for the complete sample. A 4-point likert-scale designed questionnaire was distributed to the respondents, of which out of the 338 copies of designed questionnaire distributed, 278 copies accounting for 82% were recovered from the respondents. However, 246 (88%) of the questionnaire were properly filled and subsequently used for analysis. The analysis was executed by means of the simple regression method to test the hypotheses at 0.05 level of significance.

## RESULTS

### Regression Analysis

**Table 1: Summary of Regression Model for Digital Supply Chain Implementation and Supply Chain Collaboration (n=246)**

Model	R	R square	Adjusted Square	R std error of the Estimate
1	.442 <sup>a</sup>	.195	.191	3.576

a. Predictors: (Constant), Digital Supply Chain Implementation

b. Dependent Variable: Supply Chain Collaboration

**Source: SPSS Window Output, Version 22.0 (based on 2022 field survey data).**

The sum of supply chain collaboration was regressed with the sum of digital supply chain implementation to examine the influence of digital supply chain implementation on supply chain collaboration. The value of R is 0.442. The R (coefficient of correlation) value of 0.442 represents the correlation between digital supply chain implementation on supply chain collaboration.. It represents a moderate correlation between the two variables. The R<sup>2</sup> (coefficient of determination) which indicates the explanatory power of the independent variable is 0.195. This means that 19% of the variation in supply chain collaboration is explained by the independent variable. It shows that digital supply chain implementation makes a contribution of 19% to every change in supply chain collaboration. The R<sup>2</sup> value as revealed by the result is quite low which means that about 0.81% of the variation in the dependent variable is unexplained by the model, denoting a moderate relationship between digital supply chain implementation and supply chain collaboration.

## **DISCUSSIONS**

The study was conducted to determine the influence of digital supply chain (DSC) implementation on supply chain collaboration. The results show that digital supply chain implementation moderately influences supply chain collaboration. This is evident from the statistical result (0.442: 0.000<0.05), where the P-value for the model on the influence of digital supply chain implementation on supply chain collaboration was moderate. The moderate influence in the current study could be because the respondents do not adequately reflect on digital supply chain implementation as providing them with value for given supply chain collaboration. This study therefore, accept as true that most oil and gas companies in Rivers State still have no strong understandings on just how DSC implementation can affect their supply chain collaboration. Most of these companies still possess deficient knowledge, specifically on the benefits of espousing DSC in their industry procedure. This implies that oil and gas companies are not so conscious or very much concerned with adopting digital supply chain which can result in enhanced supply chain collaboration.

However, since previous academic studies have reported positive relationship between digital supply chain and supply chain collaboration (Degroote & Marx, 2013; Srivastava & Sushil, 2013), and based on the outcome of this current study's regression model assessment, it was proved that digital supply chain implementation enhances supply chain collaboration ( $H_1$  accepted), indicating a positive and significant influence of digital supply chain implementation on supply chain collaboration. This is expected as oil and gas companies who embrace digital supply chain would have favorable supply chain collaboration. This result is consistent with Rachinger *et al.* (2018) whose study revealed that the application of digitalization in the supply chain is advantageous to supply chain performance and equally assists companies to grow and trigger an inclusive good performance, and Ikegwuru and Nwokah findings that blockchain technology application positively and significantly influences supply chain collaboration.

## **CONCLUSION**

This study examined the influence of digital supply chain (DSC) implementation on supply chain collaboration of oil and gas companies in Rivers State. The empirical findings symbolize a moderate relationship between digital supply chain implementation and supply chain collaboration. The implementation of DSC can help companies develop their businesses well, improve the level of services in the entire level of supply chains, achieve competitive values in the market, and always stay ahead of the changing industries besides cutting down unnecessary expenses. The inclination to face firsthand encounters of a rapid changing world and speedy growth of technology is the foremost fundamental to sustaining the organization stirring onward and realizing competitive advantages. The researchers can bring to a close that most Nigerian oil and gas industries now realize the positive potential of adopting digital elements in their supply chains. The study therefore, concludes that, there is a significant influence of digital chain implementation on supply chain collaboration of the oil and gas companies in Rivers State.

## **RECOMMENDATIONS**

1. The management of oil and gas companies should examine the value creation capacity in their current supply chain by a detailed review process that will identify digital supply chain advantages on currently perceived ways to enhance supply chain collaboration and best practices in their industry.
2. The management of oil and gas companies should contemplate adopting the DSC in their occupational practices to stay dependable in the competitive market by providing good supply chain collaboration and best business practices as in one piece.

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