
External Actors, Integration and Supply Chain Performance of Bottle Water Manufacturing Firms in Rivers State of Nigeria

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Abstract: *This study focused on external actors' integration and supply chain performance of bottle water manufacturing firms in Rivers State of Nigeria. A causal design research model was initiated to handle two (2) hypotheses raised for the study. The population of the study was 79 bottle water manufacturing firms in Rivers State and the Taro Yemen's formula was used to obtain 47 firms out of the population. The simple random sampling technique was adopted to select five (5) respondents per firm to arrive at 235 respondents. A 5-point likert-scale questionnaire was administered to respondents, of which 200 copies of the questionnaire were returned, obtaining an 85 percent response rate. The study espoused the simple regression and analysis of variance arrangements to institute that external actors' integration has a very strong, positive and significant influence on order fulfillment and a strong, positive and significant influence on delivery precision. The study concludes that, external actors' integration positively and significantly influences supply chain performance of bottle water manufacturing firms in Rivers State of Nigeria and recommends that management of bottle water manufacturing firms should be proficient in packaging external actors' integration to relate realistically with order fulfillment and delivery precision to magnetize supply chain performance in their organizations.*

Keywords: *Delivery precision, External actors' integration, order fulfillment, Supply chain performance*

INTRODUCTION

Supply chain partners tend to possess different and conflicting interests and objectives (Wang & Chan, 2010). Therefore, long term relationship cannot be attained unless the supply chain actors feel that there is mutual understanding in the relationship (Zhang & Huo, 2013). Reciprocated consideration is a necessary condition for the workability of relationship among actors in supply chain. Supply chain actors who attain mutual understanding will have a higher degree of satisfaction with their relationship and will dedicate resources to ensure its continuity (Nyaga *et al.*, 2010). Mutual understanding and the willingness to sustain the relationship becomes essential in order for companies to be integrated in their supply chains (Flynn *et al.*, 2010). Hence, mutual understanding and long-term relationships are essential components of successful supply chain integration (Chen *et al.*, 2009), which will eventually metamorphous into a successful competitive advantage for firms.

A number of studies revealed a positive relation between external actors' integration and organizational performance (e.g. Stank, *et al.*, 2001). Stank *et al.*, (2001) revealed that customer

integration positively influenced firm performance. Frohlick and Westbrook (2001) describing the “arcs of integration” introduced five classifications for the manufacturer’s degree of downstream and upstream integration in the supply chain. They revealed that the greater the degree of integration with the downstream customer and upstream suppliers, the better is the performance improvement. Frohlick and Westbrook (2001:185) state that “the most successful manufacturers appears to be those that have carefully linked their internal processes to external suppliers and customers in unique supply chains” Schoenherr and Sink (2012), revisiting Frohlick and Westbrook study also stressed the importance of integrating with suppliers and customers for enhanced operational performance. Nevertheless, the study of Schoenherr and Swink (2012) suggested that future research on integrating requires the introduction of empirical evidence in other contexts.

In the supplier-facing component of integration, a number of studies have found a positive association between supplier integration and operational performance (Petersen *et al.*, 2005; Devaraj *et al.*, 2007). However, others have reported no direct association between supplier integration and operational performance (Stank *et al.*, 2001; Flynn *et al.* 2010) or supplier integration and business performance (Flynn *et al.*, 2010), and yet others find a negative association (e.g., Stank *et al.*, 2001; Swink *et al.*, 2007) between supplier integration and operational performance. Although failing to uncover direct effects, Flynn *et al.* (2010), for instance, find that the interaction between the external dimensions of integration is associated with operational performance. As for business performance, similar to customer integration, the few existing studies focusing on this aspect have not found a direct positive association between supplier integration and business performance (Flynn *et al.*, 2010) or between integration intensity and business performance (Rosenzweig *et al.*, 2003). This study adds to the existing stock of literature by investigating external actors’ integration and supply chain performance of bottle water manufacturing firms in Rivers State of Nigeria.

LITERATURE REVIEW AND HYPOTHESES

External Integration

As supply chain integration involves coordination and collaboration between trading partners, companies need to demonstrate willingness to continue to integrate with their supply chain partners (Zhao *et al.*, 2011). Long-term relationships with both customers and supplier are important to external integration between trading partners (Zhao *et al.*, 2011). The ability of supply chain partners to demonstrate willingness to share information is a resource that can lead to a sustainable competitive advantage (Fawcett *et al.*, 2009). When mutual understanding is present in a supply chain relationship, it can be viewed as a scarce resource which is according to Resource-Based View theory can generate a competitive advantage (Zhao *et al.*, 2011). Hence, success in supply chain operations starts with a complete reciprocal understanding that will produce superior value and satisfaction for members.

The Concept of Supply Chain Performance

Performance is a deposit of metrics employed to reckon the good organization and value of supply chain progressions and relationships, across several organizational tasks and numerous firms and facilitating supply chain assemblage (Maestrini, Luzzini, Maccarrone & Caniato, 2017). Beforehand, performance was measured by cost, but with the passage of time more financial indicator like return on asset, return on investment, sale and etc were added. (Anand & Grover, 2015). Financial indicators were seen not to be enough to measure overall and accurate performance, consequently, with the intent of balance scorecard approach, some operational indicators were added (Attia, 2015 Shahbaz, Rasi, Zulfakar, Bin & Asad, 2018). The aim of every organization is to enhance performance, but for improvement, they have to measure it accurately first (Gunasekaran & Kobu, 2007). This is because improvement of performance in a supply chain is a perpetual process that have need of a meticulous performance measurement system (Ikegwuru & Harcourt, 2018). This study adopts order fulfillment and delivery precision as the measures of supply chain performance

Order Fulfillment

Building products to customer order enhances the link between manufacturing operations and customer needs (Alptekinoglu & Corbett, 2010). At the same time, it presents challenges related to product design, production planning, inventory control, product allocation mix, and service levels (Cettani *et al.*, 2010). In a traditional mass production context, products are manufactured to stock based on either manufacturer or dealer forecasts of anticipated sales (Olhager & Ostlund, 1990). The order information included the terms of order fulfillment (BTO or BTF), as well as the sales incentives provided to dealers to help sell specific products. Lawson, Pil and Holweg (2017) suggest that firm's face concrete trade-offs: they reduce available variety or increase stock headings to meet service delivery time alternatively; they can produce to customer order. Thus, there is either an emphasis on cost reduction, or on value creation for the customer Alptekinoglu and Corbett (2010) use a dynamic programming approach to model the optimal product portfolio for integrated product variety, delivery lead time, and pricing decisions. Lambert (2004) defines order fulfillment as the supply chain process that involves more than just filling orders. According to Misra and Sharan (2014), order fulfillment in values: number of order delivered in full delivery on customer commit date and accurate documentation and perfect condition of the number of order delivered in full is considered perfect if the products ordered are the products provided and the quantities ordered matched the quantities provided (% in full). Delivery on customer commits date entails that a delivery is measured perfect if the location, specified customer entity and delivery time ordered is met upon receipt. Accurate documentation supporting the order line is considered perfect.

Delivery Precision

Delivery dependability is the ability to exactly meet quoted and anticipated delivery dates and quantities (Leong, Snyder & Ward, 1990). Lu and Ramamurthy (2011) state that to attain agility, firms need to develop a greater firm-wide capability to efficiently manage their IT resource. As stated by Liu *et al.* (2011) and Huo (2012), the impact of supply chain integration on delivery precision is associated with internal capabilities, thus supporting the need for consistency

between external and internal process. A firm's ability to identify, assimilate and exploit external knowledge to commercial ends is referred to as absorptive capacity and has a mediating effect on information system integration and delivery performance (Lu & Ramamurthy, 2011). In this study, delivery precision is the criterion variable predicted by supply chain external integration, asserting that increase or decrease in delivery will affect performance.

Empirical Review

Mofokeng and Chinomona (2019) examined the influence of partnership, collaboration and integration on supply chain performance, particularly within the small and medium enterprise (SME) sector by means of 700 SMEs operating in Gauteng, South Africa. A structural equation modeling (SEM), anchored on SmartPLS statistical software was assumed to look at the study's data. The findings exposed that partnership; collaboration and integration have positive influence on supply chain performance.

Mose (2015) evaluated the impact of supply chain integration strategies on performance of pork processing industry in Rwanda by means of a quantitative research design. The target population was the 52 employees of German butchery in Kigali, and questionnaires that were used to assemble information on internal integration, supplier integration, customer integration and performance of the firms, were disseminated through drop and pick technique to steer clear of troubling the respondents for the duration of working hours. Data collected was edited and analyzed with the Pearson Correlation analysis using the statistical package for social science (SPSS). The results specified that there was a positive and significant correlation between internal integration, supplier integration, customer integration and performance of the firm.

Fredricksson (2011) examined how the production outsourcing transition from making to buying a product affects material supply. The broad aim of the study is to figure out how to guarantee constant and quick-witted material supply during the intact outsourcing process. Data were based on case studies which were predominantly drawn together through interviews with staff operating in the outsourcing companies. The study reveals that to guarantee materials supply, the entire outsourcing process has to be in spotlight i.e., from before physical transfer where the decision to outsource is made in anticipation of a stable situation is arrived at with an uninterrupted supply from the new source.

Prajogo and Olhager (2009) investigated the integration of both information and materials between supply chain partners using a data set from 232 Australian firms. The study demonstrated that logistics integration has a significant outcome on operations performance. Information technology capabilities and information sharing both have significant outcomes on logistics integration. Besides, strategic supplier relationships have both direct and indirect effects on the operational performance of the firm; with the indirect effect through information integration and logistics integration.

Based on the review of literature, the following conceptual framework was constructed:

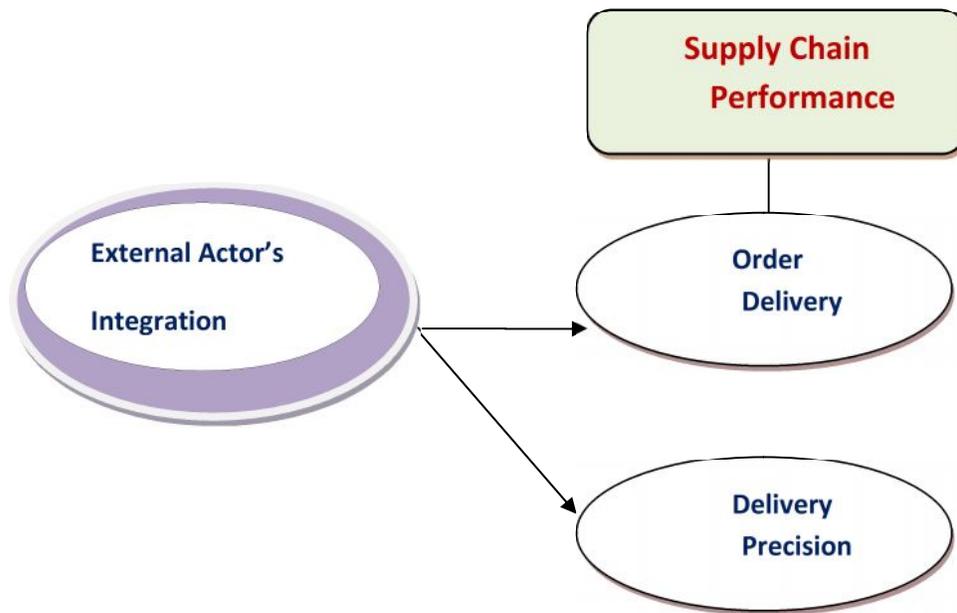


Figure 1: Conceptual Framework of External Actors' Integration and Supply Chain Performance

Sources: Adopted from Schoenherr and Swink (2012). Flynn, Huo and Zhao (2010).

Based on the review of literature, the following hypotheses were raised:

H₀₁: External actors' integration does not significantly influence order delivery of bottle water manufacturing firms in Rivers State of Nigeria.

H₀₂: External actors' integration does not significantly influence delivery precision of bottle water manufacturing firms in Rivers State of Nigeria.

RESEARCH METHODOLOGY

A causal outline research model was engaged for the study and the population consists of 79 bottle water manufacturing firms in Rivers State. The Taro Yemen's formula was used to sample 47 firms out of the population; while the simple random sampling procedure was adopted to select five (5) respondents per firm to arrive at 235 respondents. A 5-point likert-scale questionnaire was administered to the respondents made up of Quality managers, Production managers, Marketing managers, Logistics managers and supervisors, of which 200 copies of the questionnaire were returned, attaining 85 percent response rate. Data analysis was with the

simple regression analysis and analysis of variance (ANOVA), with SPSS version 22 providing support.

RESULTS

Effect of External Actors' Integration on Order Fulfillment

Table 1: Effect of External Actors' Integration on Order Fulfillment (N=200)

Model	R	R Square	Adjusted R Square	Std. Error of the estimate
1	.983	.963	.963	2.6751

a. Predictors: (Constant), External actors' integration

b. Dependent Variable: order fulfillment

The sum of order fulfillment was regressed with the sum of external actors' integration. The value of R is 0.983. The R² value of 0.963% represents the correlation between external actors' integration and order fulfillment. It signifies a very strong correlation between external actors' integration and order fulfillment. This means that 96% of the change in order fulfillment is spelt out by the independent variable. It shows that external actors' integration makes a contribution of 96% to every change in order fulfillment, while 4% of the changes are not spelt out. Since for hypothesis one, the significant is .000 which is less than 0.05; there is a significant, influence of external actors' integration on order fulfillment.

Table 2: One way ANOVA for the difference in mean between External Actors' Integration and Order Fulfilment (N=200)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	0.63	1	0.63	233.264	.0000
With in Groups	.002	199	.000		
Total	0.66	200			

a. dependent variable: order fulfillment

b. Predictor: External actors' integration

The suitability of the model can also be made lucid by the value 233.264 (F-ratio), at $p < 0.05$. This implies that there is proof to extrapolate that external actors' integration is linearly related to order fulfillment. This establishes that the model is considered to be fit and that external actors' integration has wide-ranging influence on order fulfillment.

Effect of External Actors’ Integration on Delivery Precision

Table 3: Effect of External Materials Integration on Delivery Precision (N=200)

Model	R	R Square	Adjusted R Square	Std. Error of the estimate
1	.776	.603	.553	.08878

a. Predictors: (Constant), External actors’ integration

b. Dependent Variable: delivery precision

The sum of delivery precision was regressed with the sum of external actors’ integration. The value of R is 0.776. The R² value of 0.603 represents the correlation between external actors’ integration and delivery precision. It characterizes a strong correlation between external actors’ integration and delivery precision. This means that 60.3% of the change in delivery precision is spelt out by the independent variable. It shows that external actors’ integration makes a contribution of 60.3% to every change in delivery precision, while 39.7% of the changes are not spelt out. Since for hypothesis two, the significant is .000 which is less than 0.05; there is a significant, influence of external actors’ integration on delivery precision.

Table 4: One way ANOVA for the difference in mean between External Actors’ Integration and Delivery Precision (N=200)

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.096	1	0.96	12.146	.0000
With in Groups	.063	199	.000		
Total	.159	200			

a. dependent variable: delivery precision

b. Predictor: External actors’ integration

The satisfactoriness of the model can also be made clear by the value 12.146 (F-ratio), at p < 0.05. This implies that there is proof to extrapolate that external materials integration is linearly related to order delivery precision. This establishes that the model is considered to be fit and that external actors’ integration has wide-ranging influence on delivery precision.

Discussions of Findings

On the sum total, external actors’ integration is a significant dynamic that affects supply chain performance. External actors’ integration is remarkable as indicator that contributes to supply chain performance, as it has significant influence on supply chain performance through order fulfillment and delivery precision.

The first and second hypotheses designate that, there was no significant influence of external actors’ integration on order fulfillment and delivery precision. The result bears out a significant

influence of external actors' integration on order fulfillment and delivery precision. If businesses show signs of sound appreciation of the predictive effect of external actors' integration on order fulfillment delivery precision, they will unquestionably realize optimal supply chain performance. Therefore, appreciating of the positive influence of external material integration on order fulfillment and delivery precision should be unfalteringly epitomized and echoed upon by all concerned participants in the bottle water manufacturing industry.

The study's finding is in line with Fredricksson (2011) who found that materials supply in the whole outsourcing process is focused before physical transfer where the resolution to outsource is made until a steady state is arrived at with a continuous supply from the new source. Our finding is also in line with Prajogo and Olhager (2009) findings that external material integration has both direct and indirect effects on the operational performance of the firm.

Conclusion and Recommendation

This work focused on investigating the influence of external actors' integration on supply chain performance in bottle water manufacturing firms in Rivers State of Nigeria. It is obvious from the result of the study that an enclosed influence of external actors' integration on supply chain performance exists, hence the study's analysis results shows evidence that external actors' integration as defined by the current study have the latent to envisage supply chain performance. The study therefore, concludes that the external actors' integration significantly influences supply chain performance in bottle water manufacturing firms in Rivers State of Nigeria, and recommends that, management of bottle water manufacturing firms should be proficient in packaging external actors' integration to relate realistically with order fulfillment and delivery precision to magnetize supply chain performance.

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