Supply Chain Risk Assessment and Sales Performance of Petroleum Marketing Firms in Port Harcourt

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Abstract

The study evaluated the association between supply chain risk assessment and sales performance of quoted petroleum marketing firms in Nigeria. Risk assessment was operationalized as the independent variable while sales performance as the dependent variable profit and sales growth were used as measures for sales performance. The population for the study comprised of the eight quoted petroleum marketing firms as listed on the floor of the Nigerian stock exchange 2017. The research design adopted for the study was the quantitative triangulation. Two hypotheses were formulated and tested using the Pearson correlation coefficient, and findings from the study suggest that risk assessment is significantly related profit a measure of sales performance in the petroleum marketing firms in Nigeria. While we did not find any significant relationship for risk assessment and sales growth The study therefore, recommends petroleum marketing firms set up a team that is dedicated to observing the supply chain with a view to assessing the inherent risk issues Also, that the teams also observe the external environment to evaluate, analyze and keep tabs of the events that are happening as they have bearing on the supply chains.

1. Introduction

The value of the supply chain to the success of the organization has been established by scholars, and the lesson of the last few years is that supply chains are constantly being exposed to more risk. Supply chain risks are basically comprised of disruptions that hinders the free flow of finance, information and materials, that can adversely impact the attainment of the firms' objectives (Colin, Pfohl, Gallus & Thomas 2011; Hofmann et al 2014; Spiegler et al 2012). According to, Wilding et al (2012), "supply chain risk can be classified as both internal and external risk respectively. Internal risks refer to forecast inaccuracy, worker's accident, distortion in information, quality issues and cost of capacity while, external risks refer to fluctuations in prices, fires in the plant, labour disputes, customs / regulations and economic meltdown". Scholars like (Wang 2012; Le, et al 2013), stated that "the intention of organizations to remain competitive and viable while, reducing cost had made them resort to subcontracting worldwide thereby increasing the interdependence and connectivity". Thus, the exposure to risk increases as product now experience shorter life cycles, and the dependence on supplier's is appears to be on the high. This expert agrees have contributed to affecting the sales performance of the supply chains by means of disruptions of the easy movement of machine, information and materials along the supply chains which, in turns causes loss of finance (Chakravarty 2013; Punniyamoorty, Thamaraiselvan & Manikandan 2013; Rajesh, Ravi & Venkata Rao 2014). Meanwhile, Liu, Lin & Hayes (2010) describes risk "as any exposure that has the potential of threatening the survival and existence of an organization". In other word the risk that affects the supply chain of a firm can be the difference between its survival or demise. In Nigeria it has been noted that the circulation and transportation of liquid petroleum products are most done by pipelines and tankers (Baghedo and Niyekpemi 2015). This implies that petroleum marketing firms depend entirely on these tankers to convey the liquid petroleum product from the tank farms to their respective filling stations nationwide.

Hence, the process of accessing the situation and conditions surrounding the operations and activities of these tankers (supply chains) become imperative for the petroleum marketing firms. Several of these petroleum marketing firms actually owned their own fleet of tankers, but this does not immune them from the associated risk that affects the supply of liquid petroleum products. The state of the Nigerian roads, the incessant strike action by Nation union of petroleum and natural gas workers (NUPENG), tanker drivers' union all constitute supply chain risk sources. The petroleum industry has had it fair share of disruption. This study seeks to evaluate the relationship between supply chain risk assessment and sales performance of the petroleum marketing firms.

1.1. Purpose of the study

The purpose of the study is to investigate the association between supply chain risk assessment and sale performance, other sub objectives include:
To determine the relationship of demand risk assessment on sales performance
To evaluate the relationship of supply risk assessment on sales performance
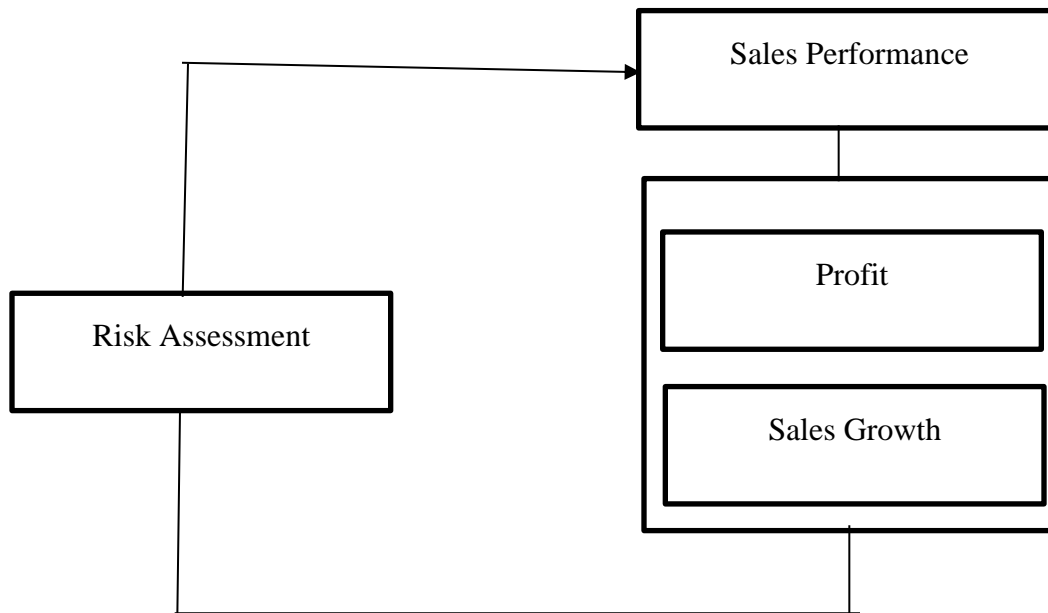

Fig 1 Conceptual framework for Supply chain risk assessment and sales performance

1.2. Research Questions

The following research questions were raised for this study
      i.   To what extent does demand risk assessment relate with profit
     ii.   To what extent does supply risk assessment relate with profit

1.3. Research hypotheses

$H0_1$:   There is no significant relationship between demand risk assessment and profit
$H0_2$ There is no significant relationship between supply risk assessment and profit.

2. Literature Review

2.1. Theoretical foundation

According to, Mutuku, (2014) "agency theory can be used to extended the analysis of an organization to show the separation of ownership, control and the motivation of management". Earlier scholars have reported that the agency theory's primary focus is on the study of challenges that does arise if a member usually called the 'principal' gives work to another member called the 'agent' Mutuku, (2014) citing (Eisenhardt, 1989; Laser & Kerr 1996). Mutuku, (2014), citing (Zsidisin & Ellram (2003), had used the agency theory to evaluate supply risks. This they did by factoring the main firm to be the 'principal' and the 'suppliers' to be the agents, their study considered several risk sources along the supply chain, thus, they were able to examine if a buffer-based risk management is desirable to limit the data irregularities that occurs between the 'principal' and the 'agent'. Agency issues have been seen to be influential in shaping management attitude towards risk taking and risk prevention. It has been agreed that the agency theory highlights the seemingly disparity of interest between shareholders, management and debt holders due to unevenness in earning and distribution (Mutuku, 2014). Consequently, agency theory means that a defined risk prevention policy can have important influence on an organizations value (Fite and Pfliedere, 2010). Agency theory provides strong support for preventing risk as a response to the mismatch between managerial incentives and shareholders (Mutuku, 2014).

2.2 Risk Assessment

Risk assessment is basically concerned with the determining the possibility of a risk factor (Rao and Tobias 2011). This indicates that risk assessment can be used to uncover the uncertainty surrounding the supply chain. However, to properly assess the uncertainty we need adequate and objective information, which enables the observer to determine the probability and distribution for relevant risk issues along the supply chain. Several scholars have described risk assessment "as the probability that an event will occur and the implication or consequences it has on the firms supply chain" (Ho, Zheng & Talluri 2015). within the last decade, several risk assessment techniques have been put forward to evaluate risk, extant literature abounds on the subject of risk assessment and these can be discussed as "macro-risk assessment, demand risk assessment, manufacturing risk assessment, supply risk assessment, financial risk assessment, information risk assessment respectively". We will discuss these several aspect of risk evaluation i.e. demand risk assessment and supply risk assessment.

2.3. Demand Risk Assessment

In the words of Kumar, et al (2010) "Demand risk is the potential deviations of the forecasted demand from the actual demand". It has been noted that the large deviations often experienced when orders are changed makes it cumbersome for producers to accurately predict the expected demand, thus they are faced with higher risk in demand. Also, "some customer activities such as sales promotion and order batching will increase demand fluctuations" (Xie, Tummala, & Schoenherr, 2011). In addition, there have been, situation, when by reason of the stability in the

demands in the market we experience a pattern that is one directional, this has been attributed to the band wagon effect that has magnified the request indicators and lead to increases in the quantity of order inconsistency (Xie, et al 2011). However, Kumar et al (2015) noted that "the unexpected changes in the demand may decrease the accuracy of forecast and make it more difficult to achieve this goal". They argued further that "the discrepancy between the actual orders and forecast will harm the efficiency and effectiveness of the supply chain. If the forecast is higher than the actual demand, it may result in excess inventory, obsolescence, inefficient capacity utilization, or price-markdown" Kumar et al (2010). However, we observe that, the attendant demand fluctuation makes the supply chain to be ineptness. Since all forecasted figures are lower when compared to real demands, this often creates a reduction in the amount of products displayed on the shelf; this has led to the failure of the retailer to effectively serve the customer, which, ultimately indicated that the supply chain is grossly inefficient and ineffective.

2.4. Supply Risk Assessment

Supply Risk *"*is the potential deviations in the inbound supply in terms of time, quality and quantity that may result in uncompleted orders" (Kumar *et al*., 2010). The inconsistency in the performance of the dealer creates uncertainty in the performance of the supply chain which raises the risk in the supply chain unpredictability and thus increase supply risk. Several factors exist that are known to be affecting the effectiveness of the suppliers' these include: the constraint in the capacity of the production plant, poor control with regards to quality, jamming in the production plant, or machine breakdowns. (Zsidisin, and Ellram, 2003) as cited by Pettit, et al (2013), these scholars argue that all the issues listed by earlier scholars are sources of disruptions in the supply chain with reference to 'supply lead time', 'quantity' and 'quality'. Similarly, in a review conducted by AMR research (AMR Research, 2007), as cited by Ellis, Henry, & Shockley, (2010) supplier's disappointment has been adjudged to be the key risk issue. According to scholars like (Ellis, Henry, & Shockley, 2010), owing to the process whereby firms will have to outsource, some aspect of their service or production process; the ability of these supplier's to guarantee supply is crucial to firms that seek to buy regularly. An example, that readily comes to mind is the fiasco that occurred in 2005 at the German company Robert Bosch the company suffered from the incompetency of a key supplier that supplied faulty material that were used to produce pump as a result the pumps were defective and this led to a major loss for the company. Moreover, Thun & Hoenig (2011) agree that "inconsistency in the supply lead-time makes it unpredictable and thus increases the forecast error". However, it has been noted that problems can surface in the event that the dealer is not able to meet the orders placed by his client or even provide the required mix of products. As the firm that is to buy will rely heavily on its vendors to be able to maintain steady production processes, any failure from its vendor will grossly affect the production process and ultimately the ability of the firm to meet customer demand.

2.5.   Related Works On Supply Chain Risk Assessment and Sales Performance

Ji, and Zhu (2012) conducted a study to evaluate the degree area that can be salvaged from the destruction in the area affected by earthquake; they developed "the bi-objective optimisation framework that has difference in 'demand time', 'fill rate maximization' and 'distribution time'

difference in the distribution of materials to those areas highlighted". Radke and Tseng (2012) investigated the impact of volatility in demand on inventory management their study gave relevant information as to the safety stock reduction. Cigolini and Rossi (2010) were only concerned with the three phases of an oil supply chain this they did by ignoring the operational risk assessment that could arise around further critical level such as in the designing level, the construction stage, and outsourcing processes. Meanwhile, Dietrich and Cudney (2011) the risk assessment methods they proposed appears to be simplistic because it is based on only three levels. While Tse and Tang (2011) did not quantify risk and their factors, nor did they propose any mitigating action for risk associated with manufacturing that has been identified. It has been established that assessing supply risk has gained considerable scrutiny as most studies examined supplier's assessment and the problem of selection which considers numerous supply risks issues which include: reduced quality, lateness in supply, and uncertainty in the capability of the firm (Viswanadham, and Samvedi, 2013). Other scholars examined dispersed geographical location dealers' failures, (Ravindran, et al 2010; Ruiz-Tores, et al 2013). Meanwhile, Lockamy & McCormack (2010) examined supplier's financial stress while, (Wu, and Olson 2010; Meena, Sarmah & Sarkar 2011) supply disruption Chadhuri, Mohanty & Singh (2013) examined poor service in the supply chain. Chen, & Wu, (2013) examined "suppliers risk management ability and experience".

2.5.1. Profit

Experts are in consensus that in evaluating profit we examine the differences between earnings and expenditures in order to measure and ascertain the health of the firm financially, thereby giving the insight to forecast it's the potential of future growth in the industry. Scholars have used: Return on Assets (ROA), to measure profit Bloom, Sadun & Van Reenen (2010), this agree that return on investment allows for firm to overcome variation that is premised on the size of total sales turnover. Another measure used to measure profit is "earnings before interest and taxes (EBIT) divided by sales, this measure scholar argue, is very pertinent for managers of business since, there might not be any sort of influenced resulting from low asset base which is prevalent factor in the service sector" (Kiviluoto,2011; Wennberg, Hellerstedt, Wildund, & Nordqbvist 2011). Others say that profit is one of the four cardinal metrics used in the analysis of the sales performance of an organization. The prospect of the company can be evaluated by investors, creditors, and managers with the use of these key components of analysis; they can determine the health of the company. There two important features of profit they are incomes and expenditures. According to experts' incomes represents what revenue accrues to the business. This refers to the volume of cash received from clients through the sale of products/services However, our focus here is on the profit measurements that is can tell us the sales performance of the firms under review. It has been said that profit is the ultimate goal of every business. In fact, firms announce to the world periodically reports indicating what their profit for the period is. Experts have over the years measured profit with an income statement. This they believe will show the true position of the firm. Thus, they list the revenue and expenditures for the period that is normally one calendar year for the organization. So decision tools such as 'income statement-short form becomes useful in the calculation of the income statement analysis. the income statement analysis, according to experts is the traditional parameter to gauge the profitability of any business for the last accounting period. But, when recording profit for the past or for a period, or when projecting for the coming period. In measuring

for profit will require the most relevant parameter to be used which include profit. It has been established as a fact that a business that cannot make profit cannot survive this can be said of the firms under review.

2.5.2. Sales Growth

Despite the huge interest in the subject of sales growth, scholars are yet to come to consensus or what the construct entails. There are mixed opinion especially across industry lines, so the debate rages on as to what constitute sales growth for new firms in other word when can we agree that a firm's sales are growing. Many have considered sales growth to be the reflection of the organization's ability to sell off its products and service, however we can still argue that selling of the product does not empirically prove that the firms' sales is growing in any case some scholars have accepted this to be a strong indicator for measuring the presence of a firm in the industry (Davidson, Achtenhagen, & Naldi, 2010; McKelvie and Wiklund, 2010). But, scholars like Dahl, Ebersbewerg & Jensen 2010), have argued that since sales growth and sales have divergent views in different industry setting, it would be better to deploy the ratio of relative sales growth for individual firms using the differences in sales such as past sales and current sales per year to measure and gauge the attendant growth. This approach many scholars agree appears to be the most suitable indices for measuring sales growth.

3. Methodology

This study adopts the quantitative triangulation because we used both questionnaires and panel data to establish significance of supply chain risk assessment on the organizational sales performance of the quoted petroleum marketing firms in Nigeria. While, the Pearson Moment Correlation Coefficients is adopted for this study we are opting for this techniques because it will enable us to establish the trends of median relation that prevail between the contextual factor the causal and dependent variables.

4. Data Presentation

Table 1   Pearson Correlation analysis depicting the relationship between risk assessment and Profit

Variables 1	Statistics	Risk Assessment	Profit
Risk assessment	Pearson's Correlation	1.000	-539*
	Sig(2-tailed)		.000
	N	33	33
Profit	Pearson's Correlation	539*	1.000
	Sig(2-tailed)	.000	
	N	33	33

[xx] **correlation is significant at 0.01 level (2-tailed).**

H0₁: There is no significant relationship between risk assessment and profit.

From Table 1, indicates the Pearson's correlation analysis by deploying the statistical package for social science (SPSS) version 22.0. The attendant *p*-value of the relationship between risk assessment (antecedent of supply chain risk management) and profit (antecedent of sales performance) was discovered revealed to be significant (where p=0.000). Which, is less than the 0.05. The Pearson's r is estimated at -.539ˣ in the light of this discovery, we reject the null hypothesis and therefore accept the alternative hypothesis. The value of -539 shows that a strong relationship exists between risk assessment and profit amongst the petroleum marketing firms. The negative sign of the correlation coefficient indicates that the construct risk assessment and profit have an indirect/negative or inverse relationship indicating that an increase in risk assessment practices does not necessarily imply an increase in profit for the firms. The relationship is an indirect one in the sense that even if the firm is able to properly identify the prevailing risk some risk, the firm may really not have the capacity to prevent the risk from occurring but can only lessen the impact of the risk after it has occurred.

Table 2   Pearson Correlation analysis depicting the relationship between risk assessment and sales growth

Variables 1	**Statistics**	**Risk assessment**	**Sales growth**
Risk assessment	Pearson's Correlation	1.000	-402*
	Sig(2-tailed)		.020
	N	33	33
Sales growth	Pearson's Correlation	-402*	1.000
	Sig(2-tailed)	.020	
	N	33	33

ˣ correlation is significant at 0.05 level (2-tailed).

H0₂: There is no significant relationship between risk assessment and sales growth
From Table 2, indicates the Pearson's correlation analysis by deploying the statistical package for social science (SPSS) version 22.0. The attendant p-value of the relationship between risk assessment (antecedent of supply chain risk management) and sales growth (antecedent of sales performance) was revealed to be insignificant (where p=0.020) which is greater than the 0.05. hence, we do not find sufficient evidence to reject the null hypothesis implying that risk assessment does not significantly associate with sales growth in the petroleum marketing firms in Nigeria. The results from the Pearson's correlation analysis r estimate of -402. shows a moderate but insignificant relationship between risk assessment and sales growth amongst the petroleum marketing firms. The negative sign of the correlation coefficient shows that the construct risk assessment and sales growth are indirect/negative or inverse associated implying that an increase in risk assessment practices does not necessarily imply an increase in sales growth for the firms.

5. Result and Discussion

5.1 Relationship between Risk Assessment and Profit

Our first hypothesis sought to determine the relationship between risk assessment and profit, using the Pearson's product moment correlation analysis. The result from shows a significant and moderate relationship between risk assessment (antecedent of supply chain risk management) and profit (antecedent of sales performance). We therefore, reject the null hypothesis and accept the alternative hypothesis indicating that risk assessment significantly and moderately impact on profit. Our study is consistent with the work of Kumar et al (2010) they described demand risk assessment as "the potential deviation of the forecasted demand from the actual demand, they further highlighted the fact that large variations reflected in order changes makes it more difficult for manufacturers to forecast the demand and infuse high demand risk". Similarly, other scholars have "established that these changes may result from shorter product life cycle or introduction of new product in the markets as has been highlighted" (Ho et al (2015). Kumar et al (2010) were able to show that the "mismatch between the actual orders and forecast will harm the efficiency and effectiveness of the supply chain. If the forecast is higher than the actual demand, it may result in excess inventory, obsolescence, inefficient capacity utilization, or price-markdown". Also, Haleh and Hamidi (2011) in their study developed a vibrant framework to analyze supply chain process improvement by considering different forecast methods they alleged that the reduction in the "bullwhip effect" and the average on hand inventory level of service can be as a result of the dampening order inconsistency, which they argue eats up. Thus, the continuous assessment of this risk ensures that the firm is able to monitor and plant steps to prevent or mitigate demand fluctuations. This provides support for our position that risk assessment significantly impacts profit though moderately.

5.2. Relationship between Risk Assessment and Sales Growth

Several scholars have described risk assessment as "the probability that an event will occur and the implication or consequences it has in a supply chain of the firm" (Ho, Zheng & Talluri 2015). Supply risk assessment basically involves the process of evaluating the identified risk along the supply chain with a view of planning the proper strategies to prevent the risk from occurring in cases where it is applicable or reducing the impact of the risk in cases where it is not possible to prevent the risk from occurring. The fourth hypothesis was to determine the relationship between risk assessment (an antecedent of supply chain risk management) and sales growth (an antecedent of sales performance). Applying the Pearson's product moment correlation analysis. The result revealed that risk assessment has no significant relationship with sales growth thus we do not find sufficient proof to reject the null hypothesis which, implies risk assessment has no effect on the sales growth of an organization. This view is not consistent with the position of Viswanadham and Samvedi (2013), in their study they examined supplier evaluation and selection which they used as a means to evaluate risk such as poor quality, late delivery and uncertainty capacity of the suppliers, this they argue would ensure that the product is available for the customers. But we did

not find any empirical evidence to support the claims we therefore, argue that risk assessment has no significant link to sales growth.

6. Conclusion

The evaluated the relationship between supply chain risk assessment and sales performance of petroleum marketing firm in Nigeria. We can therefore, conclude that supply chain risk assessment does have a significant relationship with sales performance.

7. Recommendations

The study recommends that the petroleum marketing firms set up a team that is dedicated to observing the supply chain with a view to assessing the inherent risk issues. Also, that the teams also observe the external environment to evaluate, analyze and keep tabs of the events that are happening as they have bearing on the supply chains.

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