International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

Influence of Technology Integration on Delivery Precision and Profit Maximization of the Petroleum Products in Pipelines and Products Marketing Company Limited in Nigeria

Nabs, J.N., Ohale L. and Otto G.
Centre for Logistics and Transport Studies, University of Port Harcourt, Port Harcourt, Nigeria

\

Submitted: 01-09-2021 Revised: 09-09-2021 Accepted: 12-09-2021

Abstract
The study examined the influence of technology integration on delivery services and profit maximization of the petroleum products in Pipelines and Products Marketing Company Limited in Nigeria. Survey design (cross sectional investigation) adopted, and structured questionnaire gathered the data of the study. A sample of 274 respondents was studied, of which 231 copies of questionnaire representing 84.31% response rate were actually studied. Pearson's Product Moment Correlation Co-efficient (r) was specifically used to test the hypotheses in this study. The study revealed that supply chain functionaries engage in supply chain functions to improve on transportation optimization of their organisations. Moreso, technology integration has significant influence on delivery precision; and profit maximization of Pipelines and Products Marketing Company Limited. The study recommends that: Petroleum products Marketing Companies should be engaged in adequate technology to ensure accurate delivery and facilitate optimum profit maximization. The study recommended that Nigerian government should conform to the technology integration that elicits dynamism and innovation that will give equity and marketing shares of the petroleum sector being harnessed with profit maximization in mind.

Keywords: Technology, Profit maximization, Delivery precision, Pipelines and Products

I. INTRODUCTION

In today's competitive business landscape, most firms focus on delivering value to their customers. The focus of these organizations borders on making available goods created to reach their customers before their competitors. This makes it necessary or awakens others to be more responsive and to create competitive advantage. The overriding belief amongst scholars is getting goods to customers has relevance and assist firms to become more competitive (Yeung et al., 2009; Zhang and Huo, 2013). Numerous studies reveal that integration globally thus positively influence firm's transportation optimization (Flynn et al., 2010; Zhang and Huo, 2013), whilst others have shown that integration definitely directs transportation optimization (Lee et al., 2007; Narasimhan and Kim, 2002) and operational transportation optimization (Flynn et al., 2010; Chen et al., 2007).

Over the last decades, value chain management is being studied broadly and its significance to practitioners and academics has been acknowledged with vastness and popularity. However, notwithstanding major inputs in value chain management and supply chain merger recent surveys demonstrates that organisations struggling to gain acceptance and relevance as a result of supply chain silos. The goal of this study is to discover the benefit of supply chain on transportation optimization of Pipelines and Products Marketing Company Limited in Nigeria. This study also, assesses the need for supply chain external integration relating to external actors' integration, technological integration and information integration on transportation optimization.

Some prior studies have examined similar studies of the title of this research. For example, Martinez, Aranda and Gutierrez (2010) investigated IT integration, operations flexibility and

transportation optimization in manufacturing firms, Maria-Garcia, Alfalla-Luque, and Medina-Copez (2013) examined supply chain integration scales validation and benchmark value, based the HDM Project database (2005-2007) across ten countries: Austria, Finland, Germany, Italy, Japan, Spain, Sweden, and the USA. Barratt and Barratt (2012), studied the impact of supply chain integration strategies on transportation optimization of Pork processing industries in Rwanda, Wong, Wong and Boom-Itt (2013) examined the combined effects of Internet and external supply chain integration on product innovations of Automakers in Thailand.

Though the idea of supply chain integration has been broadly researched, little or may has been done on its nexus with transportation optimization of production companies in Nigeria. Besides, prior research on supply chain unification may not have provided sufficient knowledge for managers in the Nigerian context on how supply chain unification affects a firm's delivery precision and profit maximization.

Averagely, you can see or hear of firms that are struggling to cope; by spending so many resources to enhance supply chain transportation optimization, but achieve less than they desired or expected. Though several factors could be responsible for this discrepancy, firms are often tempted to look for solutions in the most unlikely programmes or activities.

It is widely established now in literature that competition is placed on supply chain versus supply chain rather than firm versus firm (Caridi et al., 2014; Singh, 2011; Wang and Chan, 2010).

Some firms don't stand alone as single entities but rather seek to increase competitiveness of their supply chains by working closely and building s with others and final consumers (Wang and Chan, 2010). The last few years witnessed a consistent growth of literature in inter-organizational (Williams et al., 2013; Barratt and Barratt, 2012; Zhao, et al, 2011; Flynn, 2010). Despite the popularity and continuous support in literature of the new competitive model placed on supply chain against supply chain (Caridi et al., 2014), In reality, supply chain associates tend to have different conflicting interests and objectives (Wang and Chan, 2010). Thus, the notion of supply chain external integration.

Today, strategic management planning is an area of responsibility in which many organizations are not clearly aware of its effect on achieving supply chain transportation optimization concerning to supply chain integration. An organization's main objective is not to achieve a single sale from consumers but to build a long between its vendors and end users (Williams et al., 2013). To establish long term friendship amidst the firms with its vendors and end users, organizations invest much fund on integration. This much fund is being committed to supply chain alliance with the hope of establishing supply chain transportation optimization which is only rewarded when those variables of supply chain alliance (Internal material integration and external supplier, technological integration) attract vendors and end users. Therefore, it is only when there is adequate validation then will supply chain of external alliance coordination will have significant definite result of transportation optimization.Though, the idea of external supply chain alliance has been broadly researched, little or may has been done on its nexus with supply chain transportation optimization of production firms in Nigeria. Despite the significant role of transportation optimization in enhancing firms' competitive advantage, many manufacturing firms are still faced with poor delivery and profit maximization. There is need to measure the link amidst supply chain external integration and transportation optimization in connection of delivery precision and profit maximization in the production industry with particular emphasis on Pipelines and Products Marketing Company Limited in Nigeria. This current study used non-financial measures of transportation optimization (delivery precision and profit maximization) and seeks to thoroughly check the association amidst supply chain and transportation optimization of Pipelines and Products Marketing Company Limited, Nigeria.

II. MATERIALS AND METHODS

The study was carried out in the Pipelines and Products Marketing Company Limited, Nigeria.Pipelines and Products Marketing Company Limited (PPMC) was established as a helpful and crucial trade detachment of the Nigerian National Petroleum Corporation (NNPC). PPMC operates in complying to the authoritative capacity through attributes by the institution of the corporate body, Nigerian National Petroleum Corporation (NNPC).

The population under study was made up of all team members that transport fuel or crude oil comprising. Depot managers, Distribution managers, Department supervisors, Superintendents, Billing clerks andregistered tanker drivers that conveyed fuel or crude oil at the refineries was 862 that defined the people of this study (Table 1).

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

Table 1: Population Allotment of the Stakeholders and Determination of their Sample Size

Status	Population	Sample Size
Managers	76	24
Operations	169	54
Supervisors	208	66
Superintendents	164	52
Tanker Drivers	245	78
Total	862	274

Sample and Sampling Techniques

The procedure of the sampling involved first purposively selecting the tanker drivers randomly. Purposive sampling technique was adopted by selecting a sample unit hinged on acriteria and generalization of result limited to those who have met the criteria. The following were the conditions: Depot Managers, Distribution Managers, Superintendents, Depot Supervisors, Billing Clerks and Tanker Drivers.The study focused on the above cadre of personnel specifically selected in this thesis who have operated during the period - 1999 to 2018 covering South East and South-South Nigeria. Using Taro Yamane (1967) formula to calculate the population sampled, this study adopted significance level of 95% while the precision level was 0.05. The sample bigness being calculated thus:

$$n = \frac{N}{1 + N(e)^2}$$

Where; n= sample size, N =Population of analysis and e = level of precision(0.05)

Systematic sampling techniques were employed to select the outcome of this study.

Hence; n = 862

$1+862(0.05)^2 = 862$

$3.155 = 273.217 = 274$

Sample Size = 274

Resting on the above calculation, the samplesize of 274 with error limit of 5% was considered appropriate for this study.

Both primary and secondary data were used for the study. The primary source was through administering questionnaire and the secondary data were facts derived out of books, gazettes, publications, newspapers, cyberspace, etc. The questionnaire was structured in two parts: Part A consisted of the numerical figures from respondents, while Part B consisted of facts on supply chain alliance and transportation optimization. Each part consisted of questions with five different options (of Likert Scaling) and calibrations as follows: Strongly Agree= 5, Agree = 4, Disagree = 3, strongly Disagree= 2 and Undecided = 1. However, in measuring the variables in the study, the ordinal scale that is a quantitative scale was applied. Reason being; a self-rating instrument which allows the respondents to be placed in the category he or she feels is most appropriate.

To ensure reliability and validity, certain question items were tested (pretested) before the final test. Further, the hypotheses formulated were discussed with some specialists when collecting data that confirmed their connection of the topic under discussion. The research instrument was validated through experts' opinions; thus, the questionnaire items were confirmed to test the hypotheses and offered solutions to the questions raised. The study used Cronbach Alpha in deciding the uniform inner flexibility among the measurement items.

From the alpha results, it is revealed that the instrument is reliable and generally connected for the subject matter examined in this study. The data collection instrument was tested for accuracy capability using Cronbach's Alpha and study confirmed acceptability within the acceptance range of 0.70 and above as the overall reliability test of instruments is 0.8054. Validity test was also done, using experts knowledgeable on the subject under investigation, pears review and supervisor's approval to ascertain that the instruments were relevant and measure what they were expected or designed to measure. The dimensions and measures of the constructs have alpha ideals in a Nunnery threshold of 0.7 and are therefore considered reliable.The analytic tools consist of descriptive and inferential statistics with SPSS version 22 providing aid. The inferential statistics involved two parametric inferential tests- Pearson's product moment correlation. Pearson's product moment correlation (r) analyzed how each independent variable explains or predicts supply chain transportation optimization(interactive association) at 0.05 (two-tailed test). Data were presented using tables and graphs.

III. RESULTS AND DISCUSSIONS

Demographic Characteristics of Respondents

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

The demographic issues raised here included gender, age, marital status, educational background and job experience of the respondents.Table 2 shows the gender details of the people and this section enables the study in knowing the number of men and women that participated in this study. The Table reveals that 214 males (93%) responded correctly to the questionnaire while 17 females (7%) responded correctly to the questionnaire. This indicates that the male respondents are in the majority.Table 3 shows the elderliness of the people. The data reveal that 69(29.87%) feedback gotten were between the age of 19 - 29 years; 62(26.84%) of the people were between the age of 30-39 years; 46(19.91%) of the people were between the age of 40-49 years; 34(14.72%) of the people were between the age of 50-59 years. Finally, Table 3 shows that 20(8.66%) other response were between the age of 60 old age and above. Table 4 shows the marital status of the people. The data reveal that 126(54.50%) of the people were married; 62(26.80%) others were single; 17(7.40%) of the women were widows; 14(6.10%) of the rest were divorced. Finally, Table 4 shows that 12(5.20%) were separated. Table 5 shows that 35(15.20%) of respondents got their jobs with SSCE/OND or its equivalent; 86(37.20%) of the people are holders of HND/BA/B.Sc.; 79(34.20%) possess Masters/ MBA/M.Sc.; 31(13.40%) are PhD holders. Table 6 shows the years of job experience of the people. The data reveal that 41(17.70%) of the people have been on the job for `1-5 years; 39(16.90%) others have been on the job for 6-10 years; 52(22.50%) have worked for 11-15 years; 55(23.80%) have been on the job for 16-20. Finally, Table 6 shows that 44(19%) of the rest have been on the job for 21 years and above.

Table 2: Gender Details of the People

Sex	Number of Respondents	Proportionate Percentage
Male	214	93.00
Female	17	7.00
Total	231	100.0

Table 3: Age of Respondents

Options	Number of Respondents	Proportionate Percentage
19 - 29 years	69	29.87
30-39	62	26.84
40-49	46	19.91
50-59	34	14.72
60 and above	20	8.66
Total	**231**	**100.00**

Table 4: Marital Status of Respondents

Marital Status	Number of Respondents	Proportionate Percentage
Married	126	54.5
Single	62	26.8
Widow	17	7.4
Divorce	14	6.1
Separated	12	5.2
Total	231	100.0

Table 5: Educational Status of Respondents

Options	Number of Respondents	Proportionate Percentage
SSCE/OND	35	15.2
HND/BA/B. Sc.	86	37.2
MBA/M.Sc.	79	34.2
Ph.D.	31	13.4

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

Total	231	100.0

Table 6: Job Experience of the People

Options	Number of Respondents	Proportionate Percentage
1 - 5 years	41	17.7
6 – 10 years	39	16.9
11 - 15 years	52	22.5
16 – 20 years	55	23.8
21 years and above	44	19.0
Total	231	100.0

Information integration as a Dimension of Supply chain

Ascertain the concrete agreement on information integration as a dimension or component of supply chain, the study used 5 question items on the 5-point scale according to Table 7.

Table 7: Information integration as a Dimension of Supply Chain

S/N	Question Items on Information integration	N	$\bar{X}$	SD
1	Our company share operational, tactical and strategic information with our supply chain teams.	231	3.810	1.468
2	Our company's information sharing system facilitates information visibility in our supply chain.	231	3.619	1.478
3	Our company share trusted, timely, meaningful and accurate information with our supply chain teams	231	3.346	1.409
4	Our company's supply chain bosses enables us to make profit after a successful supplies	231	3.602	1.229
5	Our company's information sharing system helps our firm to optimize profit.	231	4.134	1.101

Seen in Table 7, the responses of the results indicated the mean and standard deviation scores of 3.810±1.468, showing that the respondents collectively agreed that our firm share operational, tactical and strategic information with our supply chain teams. Also, mean and standard deviation scores of 3.619±1.478 is quite obvious that the people as pointed out on the aggregate that the company's information sharing system facilitates information visibility in the supply chain. As to the company share trusted, timely, meaningful and accurate information with the supply chain members, the mean and standard deviation scores of 3.346±1.409 indicate aggregate agreement. The data additionally agreed that the people affirmed that the company's information sharing system helps the company to optimize profit; this is shown by mean and standard deviation scores of 3.602±1.229. Finally, the mean and standard deviation scores of 4.134±1.101 indicate that the people noted that the company's information sharing system helps the firm to optimize profit.

Technology integration

Table 8 shows the descriptive results on the statement of agreement concerning technology integration as a dimension of supply chain. The outcomes from the five statement-items on the 5-point-scale show a distribution indicating that technology alliance is a veritable platform for supply chain.

Table 8: Descriptive Results on Technology integration

	QUESTION ITEMS	N	MEAN	S. D
1	Our company adopts technological integration in synchronizing integration within supply chain members.	231	3.844	1.231
	Our company adopts technological integration as an essential feature for successful logistics integration	231	3.567	1.085

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

	and information integration.			
3	Our company adopts technology integration to hasten communication channel among the different departments within the firm and between firms occupying different positions across the supply	231	3.537	0.767
4	Our company adopts technological integration and elicits successful logistics integration and information integration for efficient supplies	231	3.610	1.385
5	Our company's technological integration helps for successful information integration for reliable and dependable supply efficiency	231	3.892	0.705

Table 8 shows that the first question item having mean and standard deviation scores of 3.844±1.231, showing that the respondents generally agreed that the work force adopts technological integration in synchronizing integration among supply chain partners. The 2nd statement item showed the mean and standard deviation scores of 3.567±1.085, indicating that the people noted that the firm adopts technological integration as very vital for successful logistics integration and information integration. For the 3rd statement item, there was an inclined the agreement continuum in the mean and standard deviation scores of 3.537±0.767. This descriptively shows that the firm adopts technology integration to quicken the movement of facts within the different departments of the company and among the firms occupying separate areas in the supply chain. In the case of the 4th statement item, the mean and standard deviation scores of 3.610±1.385 imply that the people gave a favourable answer that the firm adopts technological integration to elicit successful logistics integration and information integration for efficient supplies. The 5th statement revealed a close and accepted change scores of 3.892±0.705 indicating strong agreement by the respondents that the company's technological integration helps for successful information integration that leads to reliable and dependable supply efficiency.

Delivery precision as a Measure of Transportation optimization

Table 9 shows the descriptive statistical results of delivery precision which is measured with five question items on the 5-point scale. The response distribution as shown by the results is indicative that delivery precision enhances transportation optimization.

Table 9: Delivery precision as a Measure of Transportation optimization

S/N	Question Items on Delivery precision	N	$\bar{X}$	SD
1	Our company measures how many request brought in time and to the right place.	231	3.870	1.299
2	Our company experience delivery reliability and dependability	231	4.468	0.664
3	Our company speedily responds to changes in demand and improve delivery time, reduce production or transfer lead times and make better service provided to the customers.	231	3.437	1.372
4	Our company's delivery strategies are reliable and dependable	231	3.784	1.267
5	Our company is strict and prudent in matching orders with supplies promptly.	231	4.429	0.687

Table 9 shows close and accepted charge scores of 3.870±1.299 indicating that the consensus opinion of the people revealed an agreement that the firm measures how many request brought in time and to the right place. Also, another close and accepted charge score of 4.468±0.664 imply the people noted that the firm experience delivery reliability and dependability. The statistical result of 3.437±1.372 (a close and accepted charge scores) show that the people wrote that company speedily responds to changes in demand and improve delivery time, reduce production or

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

transfer lead times and make better service provided to the customers. Table 4.10 also reveals a close and an accepted charge scores of 3.784±1.103 implying that the respondents agreed that the company's delivery strategies are reliable and dependable. Finally, the mean and standard deviation scores of 4.429±0.687 show that the people wrote that the firm is strict and prudent in matching orders with supplies promptly.

Profit maximization as a Measure of Transportation optimization

Table 10 shows how profit maximization as a measure of transportation optimization was examined and empirically expressed through the raising of descriptive statistical analysis of 5 question items.Shown in Table 10, the responses feedback responses have indicated a close and an accepted change scores of 3.792±1.150 showing that their company delivers the accurate quantity of the product as needed. Also, a close and an accepted change scores of 3.407±1.370 imply that the people wrote that their establishment delivers customer order on time.

With further close and an accepted change scores of 3.004±1.370, the respondents indicated that their company delivers accurate shipping documents. Table 4.11 shows a close and an accepted change scores of 2.870±1.424 proving that the respondents indicated that their company delivers the quality product as needed. Finally, the data revealed the mean and standard deviation scores of 3.048±1.424 indicating that their company delivers at moderate price.

Table 10: Profit maximization as a Measure of Transportation optimization

S/N	Question Items on Profit maximization	N	$\bar{X}$	SD
1	We deliver the accurate quantity goods as needed	231	3.792	1.150
2	We deliver customer order on time	231	3.407	1.370
3	We deliver accurate shipping document	231	3.004	1.410
4	We deliver the quality product as needed	231	2.870	1.424
5	We deliver at moderate price	231	3.048	1.424

Information integration and delivery precision of the Pipelines and ProductsMarketing Company Limited

Table 11 shows inferential results on the attribute of connection among the examined variables. The statistical outcomes are indicative of the attribute of .Results showed that rho = 0.860 @ p=0.000 (p<0.05) which indicates a powerful definite and meaningful friendship amidst information integration and delivery precision of the Pipelines and Products Marketing Company Limited. Alternate hypothesis is hereby accepted signifying that; "there is significant connection between information integration and delivery precision of the Pipelines and Products Marketing Company Limited".

Table 11: Results ofInformation integration and delivery precision of the Pipelines andProducts Marketing Company Limited

		Information Integration	Delivery Precision
Information Integration	Pearson Correlation	1	0.860**
	Sig. (2-tailed)		0.000
	N	231	231
Delivery Precision	Pearson Correlation	0.860**	1
	Sig. (2-tailed)	0.000	
	N	231	231

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

Information integration and profit maximization of the Pipelines and Products Marketing Company Limited

Table 12 shows the inferential test outcome of the friendship amidst information integration and profit maximization of the Pipelines and Products Marketing Company Limited. The examined relationship between information integration and profit maximization of the Pipelines and Products Marketing Company Limited showed a significant relationship with rho = 0.828 @ p = 0.000 (p<0.05).

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

Table 12.Correlation between integration and profit maximization of Pipelines and Products Marketing Company Limited

		Information Integration	Profit maximization
Information Integration	Pearson Correlation	1	0.828**
	Sig. (2-tailed)		0.000
	N	231	231
Profit maximization	Pearson Correlation	0.828**	1
	Sig. (2-tailed)	0.000	
	N	231	231

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

IV. DISCUSSION OF FINDINGS

Relationship between Technology integration and Delivery Precision of petroleum Goods

The study addressed the relationship between technology integration and delivery precision. Our findings suggest that technology integration and delivery precision are strongly, positively and significantly related. Research verdict shows that technology integration was considerably connected to delivery precision of petroleum products (0.796). This is evidenced by the aftermath of the scientific examination of hypotheses. Thus, our prior expectation is that technology togetherness has assured friendship with delivery precision and order processing. Technology integration has often been viewed in literature in term of facts processing integration, since it facilitates transmitting same to the different departments inside the company but also between firms occupying several places beyond the supply chain (Cheng, Li, Ou and Kung, 2014).

It facilitates abundant facts among the different departments inside the company but also between firms occupying several places beyond the supply chain. The explanation is that since technology integration enhances effective communication and close relationshipamong buyers, firms and their suppliers, it is possible that the rate at which delivery precision increases because of the influence of technology integration is worthy of generating meaningful weight on transportation optimization. Therefore, technology integration should be undiluted and essential if the firm seeks eagerly to achieve a complete delivery precision that will influence its transportation optimization. This finding coincided with findings of Thun (2010), Grant and Tan (2013).and Malhotra and Mackelprang (2012) who said that the growth of technology integration minimizes doubts that gives a more flexible response to supply chain members.

Considering that petroleum companies operate in an unpredictable and volatile industry, they would require timely flow of data, information and technological know-how amongst different stakeholders and across members in their supply chains. However, this would be difficult to achieve in technology integration where firms sense that staff would need a great utmost check over their responsibilities. Therefore, Zang and Maina (2019) support that non technology integration obstruct collaboration and communication between units, since the line of command forces each employee to remain and report to higher level hierarchy within their function. For instance, if a technical spec needed modifying instead of a work that enables engineering and procurement guys discussing its technical implication on an going project, a highly centralized one would force them to communicate through their departmental leaders. This could lead such company that necessitate top-level managers carrying out the majority of decisions, therefore overstretching their cognitive capabilities and inflict substantial time restriction on them. In the above example higher-level management, would still probably take the engineering managers opinion regarding that the technical spec (since they are not inluded in the daily operations), nevertheless time is wasted in approving such decisions.

Such technology integration will help different departments to better deal with unpredictable alteration in oil supply arrangement. It is argued that such managers require a flow of knowledge and technical know-how across different functional boundaries. In a way that a sudden increase of price in specific supply chain requirement, would affect all the partners concerned. If such operational experts had the autonomy to discharge their tasks, a richer cross-functional integration could take place amongst

International Journal of Advances in Engineering and Management (IJAEM)
Volume 3, Issue 9 Sep 2021, pp: 773-786 www.ijaem.net ISSN: 2395-5252

them, and risks could be identified that might have not been visible to each department by itself. Such interaction amongst domain experts (as a cause of technology integration) creates knowledge, which could also enable strategic level staff to contribute meaningfully to delivery precision in petroleum supply chain.

Relationship between Technology integration and Profit Maximization of petroleum Goods

The findings under this research illustrate that technology integration was significantly connected to profit maximization of petroleum products (0.734). This could imply that multinationals with higher technology integration rely more on strict supervision (rules and procedures) in controlling day-to-day operation. In such companies it is argued that technology integration could result in their profit maximization.

A study conducted by Cattani and Dahan. (2010) found that extracting industry is highly skill based, the majority of individuals working in such companies are some of the skilled and professional workforce (i.e. nearly all have high levels of university degrees). Such individuals with strong academic and/or practical background would not need a strict supervision from higher hierarchy, are viewed to take the initiative, and make better judgment concerning those non-routine policies and procedures that could happen on routine basis. Without doubt, if a company is facing a valve or cladding problem never faced before, having formalized standing orders (strict supervision) could force a site-commissioning manager, to follow protocol and wait for approval (before acting). Such lengthy process could affect lead-time and ultimately profit maximization of petroleum goods. Therefore, in such industry, perceptions of uncertainty rise in situations where change is quick, making hard on someone to predict the direction of such change and consequently creating a situation where staff may need to act outside their job scope. However, if such domain expert were allowed to use informal rules concerning non-routine policies the outcome would have been less serve on company transportation optimization (time saved on decision making).

Also, Cheng, Li, Ou and Kung (2014) found that formalized technology integration could also additionally cause operations conflicts and alienation amongst the professionalized oil and gas workforce. For example, purchasing and engineering managers could be subject to more conflicts, since they deal with one another on a regular basis. The engineers send the invoice of what equipment they require, procurement department. The purchasing team might not understand the specifications and require extra clarification, and therefore time is wasted between two internal functions.

Additionally, Danese and Romano (2011) found that technology integration influences supplies and delivery precision of companies. This could imply that in organisations with high levels of technology integration, end users and vendors deal with policies and systems rather than individuals. This is because such firms have formal strategic plans (coded and put in writing) in getting back to their outside players. For example, in a high formalized technology integration , an expediting manager that needs timely information (technical clarification) regarding pressure valves used in improved oil recovery (e.g. well injection), could face issues regarding supplier order transit (purchase order).

This study finding corroborates with the writings of Perols and Kortmann (2013); Williams, Roh, Tokar and Swink (2013); Cheng, Li, Ou and Kung (2014) which established that technology integration elicits efficient communication and giving information in supply chain oriented organisations. Therefore, they argue that technology integration typically encourages operational managers to obey by written rules and policies in supply chain firms. Consequently, supplier/customer could end up sensing expertise integration, since often they communicate with individuals with technical expertise.

Specifically, established on the discovery of this thesis; the researcher developed a new model and now redefined the attributes of supply chain and transportation optimization. The researcher believes that the new brilliance has contributed to the current body of knowledge in supply chain, logistics and transport management.

V. CONCLUSION AND RECOMMENDATIONS

The study can be concluded that technology integration has significant roles to play in delivery precision and profit maximization of the petroleum products in Pipelines and Products Marketing Company Limited in Nigeria. The study therefore recommended that managers of oil and gas companies should be skilled in packaging information integration and relate it genuinely to profit maximization. Also, the management of oil and gas companies should key into pragmatic and high turnover oriented supply chain that has the proclivity for technology integration in order to

gain precision in delivery of fine products in Nigeria.

REFERENCES

[1]. Akujuru, C. A. and N. C. Enyioko (2018).Social science research: Methodology and conceptualperspectives. Beau Bassin: Lambert Academic Publishing.
[2]. Alpaslan, C., Green, S., and I. Mitroff (2009). Corporate governance in the context of crises: Towards a stakeholder theory of crisis management.Journal of Contingencies and Crisis Management, 17(1), 38-49.
[3]. Alptekinoglu, A.C. and C. J. Corbett. (2010). Lead time Variety trade off in product differentiation. Manufacturing service Operation Management, 12 (4), 567-582.
[4]. Andrews, J. (2012). 2009 peanut butter outbreak: Three years on, still no resolution for some. Food Safety News.Retrieved from http://www.foodsafetynews.com- peanut-butter-outbreak-threeyears-on-still-no-resolution-for-some/#.WbgNysiGOUk.Accessed on 19/7/2019.
[5]. Aranson, P. (1990). Theories of Economic Regulation: From Clarity to Confusion. Journal of Law&Politics. 6, 247–286.
[6]. Atzori, L., Lera, A. and G. Morabito. (2010). The internet of things: A Survey computer networks. Retrieved from Google Scholar.Accessed on April 25, 2019.
[7]. Bagchi, P.K. and T. Skjoett-Larsen.(2002). Integration of Information technology and organizations in a supply chain.The international Journal of Logistics Management, 14(1), 89-108.
[8]. Barney, J. B. (1991). Firm resources and sustained competitive advantage. Journal of Management, 17, 99–120.
[9]. Barr, N. (1999). The Economics of the Welfare State, 3rd edn., Oxford: Oxford University Press.
[10]. Barratt, M. and R. Barrat. (2012). Internal and external supply chain linkages: Evidence from the field. Journal of Operation Management, 29 (5), 51-528
[11]. Barratt, M. and R. Barratt. (2012). Internal and external supply chain Linkages: Evidence from the field. Journal of operations Management, 29 (5), 514-528.
[12]. Battini, D., M. Bogataj and A. Choudhary (2017). Closed Loop Supply Chain (CLSC):
[13]. Economics, Modelling, Management and Control.International Journal of Production Economics, 319-321.
[14]. Bator, F. (1958).The Anatomy of Market Failure.Quarterly Journal of Economics. 72, 351–379.
[15]. Becker, G. (1986). The Public Interest Hypothesis Revisited: A New Test of Peltzman's Theory of Regulation Public Choice. 49, 223–234.
[16]. Brody, A. (2016). Samsung's Galaxy Note 7 recall: Lessons for procurement andsupply chain teams. Supply Chain 247. Retrieved from http://bravosolution.us/blog/samsungs-galaxy-note-7-recall-lessons-procurementsupply-chain-teams. Accessed on 19/7/2019
[17]. Camara, S.B., J.M. Fuentes and J.M. Maqueira-Marin. (2016). Supply chain integration through community clouds: Effects on operational transportation optimization. Journal of practice and supply management 22, 141-153.
[18]. Campi, J. P. (2013). Supply chain risk- your supplier's supplier. Firestorm. Retrieved fromhttps://www.firestorm.com/supply-chain-risk-your-supplier-ssupplier. Accessed on 19/7/2019
[19]. Caridi, M., A. Moretto, A. Perego and A. Tumino. (2014). The benefits of supply chain visibility: A value assessment model, International Journal of Production Economics, 15, 1-19.
[20]. Cattani, K. E. and G.S. Dahan. (2010). Lowest cost may not lower total cost: Using spackling to smooth mass-customized production. Operation Management, 19 (5), 531-545.
[21]. Chen, H., D..Mattioda, and P. Daugherty. (2007). Firm-wide integration and the firm transportation optimization. The International Journal of Logistics Management, 18 (1), 5-21.
[22]. Cheng.J., F. Li, T. Ou and C. Kung. (2014), The strategic research on integrating service model for SMES cloud supply chain in Taiwan, International Journal of Electronic Business Management 12(1), 33-40.
[23]. Danese, P. and P. Romano. (2011). Supply chain integration and efficiency transportation optimization: A study on the interactions between customer and supplier integration. Supply Chain Management. An International Journal, 16 (4), 220-230.
[24]. Dainton, M., and E.D. Zelley. (2015). Applying communication theory for professional life.
[25]. Thousand Oaks, CA: SAGE Publications.

[26]. DeGroote, S.E and T.G. Marx. (2013). The impact o IT on supply chain agility and firm transportation optimization. An empirical investigation international Journal of information management, 33.909-916.
[27]. Disterfano, S., G. Merlino and A. Puliafito. (2012). Enabling the cloud of things: Proceedings of the 6th International Conference on Innovative Mobile and Internal Services in Ubiquitous Computing. Retrieves from Google Scholar.Accessed on April, 25, 2019.
[28]. Dolcourt, J. (2017). Samsung Galaxy Note 7 recall: Here's what happens now. CNET.
[29]. Retrieved from https://www.cnet.com/news/samsung-galaxy-note-7- return-exchange-faq/Accessed on 19/7/2019
[30]. Flynn, B. B., B. Huo and X. Zhao. (2010). The impact of supply chain integration on transportation optimization: A contingency and configuration approach. Journal of Operations Management, 28 (1-2), 58-71,
[31]. Fronhlich, M.T. and R. Westbrook. (2001). Arcs of Integration: An international study of supply chain strategies. Journal of Operations Management, 19(2), 185-200
[32]. Gaudenzi, B. and A. Borghesi. (2006) Managing risks in the supply chain using the AHP method. The International Journal of Logistics Management, 17(1), 114-136.
[33]. Gimenez, C. and E. Ventura. (2005), Logistics-production, logistics-marketing and external integration-their impact on transportation optimization. International Journal of Operations and Production Management, 32 (5), 583-607.
[34]. Gimenez, C., T. Van der Vaart and P. VanDonk (2012). Supply chain integration and transportation optimization: The moderating effect of supply complexity. International Journal of Operations Management, 32 (5), 583-610,
[35]. Grant, Robert M., (1991). The resource-based theory of competitive advantage: implications for strategy formulation. California Management Review 33 (3)114-135.
[36]. Grant, G. and F.B. Tan. (2013). Governing IT in inter-organizational relationships: Issues and future research. European Journal of Information System, 22 (5), 493-497.
[37]. Gupta, P., A.F. Sectharaman and J.R. Raj. (2013). The usage and adoption of Cloud computing by small and medium business. Journal of Information Management, 33 (5), 861-874.
[38]. Held, V. (1970). The Public Interest and Individual Interest. New York: Basic Books.
[39]. Huo, B. (2012). The impact of supply Chain integration on company transportation optimization: An organizational capability perspective. Supply Chain Management: An International Journal 17 (6), 596-610.
[40]. Ireland, R. D. and J.W. Webb.(2007). A Manufacturing perspective on trust and power in strategic supply chain.Journal of Operational Management, 125.
[41]. Jia, F., R. Lamming. (2013). Cultural adaption in Chinese- Western supply chain partnerships: Dyadic learning in an international context. International Journal of Operations and Production Management, 33 (5), 528-561.
[42]. Kalinainen, J. (2013). Delivery reliability: a study about delivery reliability in Large Machine or structure Delivery projects. M.Sc. Thesis, OULU University of Applied Sciences.Retrieved from www.google.com.Accessed on March 10, 2019.
[43]. Kang, C. (2016). Galaxy Note 7 owners are urged to stop using their phones. The New York Times. Retrieved from https://www.nytimes.com/technology/samsung-galaxy-consumer-productsafety.html. Accessed on 19/7/2019
[44]. Keebler, J.S. and D.A. Dutsche. (2000). Keeping Score: Measuring the business value of logistics in the supply chain, Journal of Logistics Management. Retrieved from www.google.com.Accessed on April 25, 2019.
[45]. Kocoglu, 1., S.Z. Imamogw and K. Keskin. (2011). The effect of supply chain integration on information sharing: Enhancing the supply chain transportation optimization. Procedia Social and BehaviouraL Sciences: 7th International Strategic Management Conferences, 24, 1630-1649.
[46]. Koufteros, X. A., G.E. Rawski and R. Rupak.(2010). Organizational integration for product development the effects on glitches, on-time execution of engineering change orders, and market success.Decision Sciences, 4 (1), 49-80.
[47]. Kwon, I. and T. Suh. (2005). Trust, commitment and relationships in supply chain management: A part analysis. Supply

chain Management: An International Journal 10 (1), 26-33.

[48]. Lambert, D. and M. Cooper.(2000). Issues in supply chain management. Industrial Marketing Management, 29 (1), 65-83.

[49]. Lambert, D.M. (2004). The eight essential supply chain management processes. Supply Chain Management Review, 8 (6), 18-26.

[50]. Lawson, B., F.K. Pil and Holweg, M. (2017).Multi-Model Order fulfillment: Concept and application. Production and Operations Management. 1-46

[51]. Lee, C. W., I.W.G. Kwon and D. Severance. (2007). Relationship between supply chain transportation optimization and the degree of linage among supplier, internal integration, and customer. Supply chain Management: An International Journal, 12(6), 444-452.

[52]. Lee, Y., and M.J. Lee . (2016). Rush to take advantage of a dull iPhone started Samsung's battery crisis.Bloomberg Technology News. Retrieved from https://www.bloomberg.com/news/articles//samsung-crisis-began-inrush-to-capitalize-on-uninspiring-iphone. Accessed on 19/7/2019

[53]. Lee, S. Y., and N. Pak. (2016). Timeline-Samsung Electronics' Galaxy Note 7 recall crisis. Reuters. Retrieved from https://www.reuters.com/article/samsungelec-smartphones/timeline-samsung-electronics-galaxy-note-7-recall-crisis. Accessed on 19/7/2019

[54]. Leong, G., D. Snyder and P. Ward.(1990). Research in the process and content of manufacturing strategy.Omega 18(2), 109-22.

[55]. Littlejohn, S. W., A.K. Foss and J.G. Oetzel. (2017). Theories of human communication: Eleventh Edition. Long Grove, IL: Waveland Press.

[56]. Liu, Y. and W. Wang.(2011). Research on collaborative management in supply chain crisis.Procedia Environmental Sciences, 10, 141-146.

[57]. Liv, X., D.B. Grant, A.C.Mckinnon and Y. Feng, (2010). An empirical examination of the contribution of capabilities to the competitiveness of logistics services providers: A perspective from China, International Journal of Physical Distribution and Logistics Management 40 (10) 847-866

[58]. Loten, A., and S. Norton. (2016). Samsung recall puts supply-chain oversight in spotlight. The Wall Street Journal.Retrieved from https://www.wsj.com/articles/samsung-recall-puts-supply-chain-oversight-inspotlight. Accessed on 19/7/2019

[59]. Lu, y. and K. Ramamurthy. (2011). Understanding the link between information technology capability and organizational agility: An empirical examination. MIS Quarterly, 35 (4), 931-954.

[60]. Malhotra, M.K. and A.W. Macketprang. (2012). Are internal Manufacturing and external supply Chain flexibilities complementary capabilities. Journal of Operations Management, 30 (3), 180-200.

[61]. Misra, P. and R.K. Sharma (2014).Investigating the impact of perfect profit maximization on quality level and SCM transportation optimization. International Journal of Modeling in Operations Management, 4 (2) 95-113.

[62]. Matinez, M., D.A. Aranda and L.G. Gutierrez.(2013), IT integration, operation and flexibility. Journal of Engineering and Management

[63]. Narasimhan, R., and S.W. Kim. (2002). Effect of supply chain integration on the relationship between diversification and transportation optimization: Evidence for Japanese and Korean firms. Journal of Operations Management, 20(3), 303-323.

[64]. Narver C.R. and R.S. Slater. (1994). Does competitive environment moderate market orientation transportation optimization relationship? Journal of Marketing 58, 46-52.

[65]. Neely, A., M. Gregory and K. Platts.(1995), Transportation optimization measurement system design.International Journal of Operations and Production Management.15 (4), 80-116.

[66]. Nyaga, G., J. Whipple and D. Lynch. (2010). Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ? Journal of Operations Management, 28 (2), 101-114.

[67]. Olhager, J. and B. Ostlund. (1990). An integration push-pull manufacturing strategy. European Journal of Operations Research, 45 (2), 135-142.

[68]. Pegell, M. (2004).Understanding the factors that enable and inhibit the integration of operations, purchasing and Logistics.Journal of Operations Management, 22 (5), 459-487.

[69]. Perols, Z. C. and S. Kortmann. (2013). On the relationship between supplier integration and time-to-market. Journal of Operations Management, 31 (3), 153-167.

[70]. Perry, P. and N. Towers. (2013). Conceptual framework development: CSR Implementation in fashion supply chains." International of Physical Distribution and Logistics Management, 43 (5/6), 478-500

[71]. Prajogo, D. and J. Olhager. (2012). Supply chain integration and transportation optimization: The effects of long-term relationships, information technology and sharing, and logistics integration. International Journal of Production Economics, 135 (1), 514-522.

[72]. Ragatz, G.L., R.B.Handfield and T.V. Scannell.(1997).Success factor for integrating suppliers into new product development.Journal of Product Innovation Management, 14 (3), 190-202.

[73]. Ringim, K. J. and M.A. Dantsoho. (2016). Mediating effect of process improvement on the relationship between information technology capabilities and organizational transportation optimization. Journal of Business and value creation, 5(1), 175-193.

[74]. Ringim, K.J., M.R. Razall and N. Hasnan. (2012). The relationship between information technology capability and organizational transportation optimization in Nigerian Banks. International Journal of Technology and Management, 1(1), 1 10 ISSN 1927-9000.

[75]. Rungtusanatham, M., F. Salvador, C. Forza and T.V. Choi. (2003). Supply-Chain linkages and operational transportation optimization: a resource-based view perspective. International Journal of Operations and Production Management, 23 (9), 1084-1099. (JIEM), 93) 684-707.

[76]. Schoenherr, T. and M. Swink. (2012). Revisiting the arcs of integration: Cross validation and extensions. Journal of Operations Management, 30 (1-2), 99-115.

[77]. Sinha, P. R., L.E. Whitman and D. Malzahn. (2004). Methodology to mitigate supplier risk in an aerospace supply chain. Supply Chain Management: An International Journal, 9(2), 154-168.

[78]. Stank, T. P., S.B. Keller and D.J. Closs.(2001). Transportation optimization benefits of supply chain logistical integration. Transportation Journal, 41 (2/3), 32-46.

[79]. Stock, J. R. and S.L. Boyer. (2009) Developing a consensus definition of supply chain management: Aqualitative study. International Journal of Physical Distribution and Logistics Management, 39(8), 690-711.

[80]. Taylor, J. (2002). The National Industrial Recovery Act of 1933 and the Compliance Crisis of 1934, (Working Paper), The University of Virginia.

[81]. The Supply Chain Council, (1997). http//www.supply-chain.com/info/faq.html. Accessed on March 10, 2019.

[82]. Thun, J.H. (2010). Angles of integration: An empirical analysis of the alignment of internet-based information technology and global supply chain management. Journal of Supply Chain Management, 46 (2), 30-44.

[83]. Veil, S. R., L.L. Dillingham and A.G. Sloan. (2016) Fencing out the Jones's: The development of response strategies for spillover crises. Corporate Reputation Review, 19(4), 316-330.

[84]. Wang, W.V.C and H.K. Chan. (2010). Virtual Organization for Supply Chain Integration: Two cases in the texture and Fashion retailing industry. International Journal of Production Economics, 127 (2), 333-342

[85]. Williams, B.D., J. Roh, J. Tokar and M. Swink. (2013). Leveraging Supply Chain visibility for responsiveness: The moderating role of Internal Integration. Journal of operations Management, 31 (7-8), 543-554.

[86]. Wong, C.W.Y., C.Y. Wong and S. Boon-Itt. (2013). The combined effects of internal and external supply chain integration on product innovation. International Journal of Production Economics, 146 (2). 566 - 574.

[87]. Yeung, J.H. Y., W. Selen, M. Zhang and B. Huo. (2008). The effect of trust and coercive power on supplier integration. International Journal of Production Economics 120 (1), 66-78.

[88]. Zhang, M. and B. Huo. (2013). The impact of dependence and trust on supply chain integration. International Journal of Physical distribution and Logistics Management, 43(7), 544-563.

[89]. Zang, L and J. Maina (2019). Emerging issues of green logistics in manufacturing firms of china: A literature review. European Journal of Logistics, Purchasing and Supply Chain Management ,7 (4), 35-49,

[90]. Zhang, Y. J., Y.L. Peng, C.Q. Ma and B. Shen (2017).Can environmental innovation facilitate carbon emissions reduction? Evidence from China.Energy Policy, 18- 28.

[91]. Zhao X., B. Huo, B.B. Flynn and J. Yeung. (2008). The impact of dependence Power and relationship commitment on the integration between manufacturers and customers in a supply chain. Journal of Operations Management, 26(3), 368-388.
[92]. Zhao, X., B. Huo, W. Selen and J. Yeung. (2011). The impact of internal integration on relationship commitment on external integration. Journal of Operations Management, 29 (1-2), 17-32.
[93]. Zheng, Z., and W. Yu (2015).Exploration of China's Green Logistics Development.Management Science and Engineering, 50-54.
[94]. Zsidisin, G. A., and B. Ritchie. (2009) Supply chain risk management-developments, issues, and challenges. In G. A. Zsidisin and B. Ritchie (Eds), Supply chain risk: A handbook of assessment, management, and performance. New York, NY: Springer.
[95]. Zuckerman, A. (2002). Supply chain management. Oxford: Capstone Publishing.