

Impact of Aquila Technology on the Supply Chain of Nigeria's Oil and Gas Industry

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Abstract: The intent of this survey was to conduct an appraisal of the impact of Project Aquila on the Oil and gas industry of Nigeria with particular interest on PEF(M)B. The data were sourced from primary and secondary sources. Analysis of result revealed 70 % of respondents are familiar with the Aquila technology and have explored the opportunities with significant impacts made on the efficacy (55 %) of stakeholders as regards loading and discharge of petroleum products, reduction in complaints has achieved 80 % [35 % of end-users and 40 % of PEF(M) staff] and prompt payment of claims to marketers which hitherto were challenges. The paper submits an all-inclusive synergy among stakeholders, development of hard and softwares required to drive the technology and human resource development hinged on innovations for better impact. Imperative to improving on these impact made by Project Aquila also is the need to translate the pamphlets to the three (3) major Nigerian languages to facilitate penetration of the technology to the grassroots.

Keywords: Project Aquila, Aquila Technology, Oil and Gas Industry in Nigeria, Equalization, Supply Chain Management, Logistics Management, RFID, Petroleum Equalisation Fund (Management) Board [PEF(M)B].

I. INTRODUCTION

Nigeria is the largest oil producer in Africa and the eleventh largest in the world, with a capacity averaging 2.5 million barrels per day and proven reserves of over 35 billion barrels and is currently the 5th largest exporter of crude oil to the United States of America with oil revenue making up over 90% of Nigeria's foreign currency receipts (Shehu, 2014). Despite this impressive profile, the Nigerian oil and gas sector's contribution to national GDP has been minimal. According to energy reports in 2008, the sector accounted for less than 38 % of national GDP. This has been a direct influence of the noticeable absence of an agile technology enabled supply chain management and logistic bottlenecks encountered in the downstream supply chain as products seldom get to the end consumers as and when expected. With over 6,000 independent petroleum products marketers and 6 major marketers distributing and marketing petroleum products across the country (Shehu, 2014), there is a huge demand for a proactive dynamic supply chain mechanism anchored on Information Communication Technology (ICT).

Realizing the aforementioned facts, the Federal Government took a giant stride to rewrite the script in the oil and gas industry in the direction of rapid response to the yawning of Nigerians by adopting a technology based supply chain for delivery of petroleum products to various destinations at no additional cost, regardless of the distance and location where the product will be discharged. This was achieved by embracing technical modalities for equalization and the introduction of the National Transportation Average (NTA) allowance under the auspices of the Petroleum Equalisation Fund (Management) Board [PEF(M)B] that has since leveraged Aquila technology to achieve her mandate.

Project Aquila is a technology driven loading system initiated to check leakages, enthrone transparency, facilitate the delivery of products on the supply chain and improve on the due process with the intent of transforming the operational process of the downstream sector of the industry in Nigeria as the delivery of products to discharge points becomes agile.

The aim of this paper is to assess the impact made by project Aquila implementation on Nigeria's oil and gas industry with the intent of postulation options for better implementation of the innovative project of the Fund as it equalizes the transportation differentials in the white product marketing. This research will facilitate penetration of the technology and bridge the knowledge gap hitherto.

The research is original ideas from the researchers which emanate from the urge to reposition the Fund to ensure delivery of their mandate while giving an account of the benefits accrued from the implementation of Aquila project by the Fund.

This section describes the method adopted in conducting the appraisal of project Aquila in the oil and gas industry of Nigeria, bearing in mind the conceptual framework, method of data collection and analysis, and the synergy between the data collected and the subject of the paper. Since simple assumptions and physical appraisal of the impact of project Aquila on the oil and gas industry may be challenging, there is need to adopt a method of gathering and using data from historic forecasts and qualitative data for the purpose of this paper. Basically, sampling method adopted on the target population for the purpose of this essay is herein presented. The section also highlighted data collation and management principles employed as it rounds up with how the accessed facts will be made useful for better consumption of the researcher and the topic at hand.

This paper used a combination of primary and historical data to evaluate the impact of technology enabled loading implementation on Nigeria oil and gas industry. Charts and tables are also among instruments used for presentation of data. The questionnaire was divided into two sections: Section A contains bio-data information of the respondent and section B contains a total of 20 questions comprising items like: popularity of project Aquila, training needs and skills appraisal, impact on speed of job delivery and efficacy, etc. The target population of this paper is the petroleum products transporters, the PEF(M)B and petroleum products end users. Sampled data were strategically obtained to reflect these populations.

The major data used for this paper were gathered through the use of questionnaire which was administered on respondents by hand and retrieved almost immediately by the researchers as respondents were guided through the process to facilitate response time and retrieval rate. Charts and tables were extracted from the questionnaire retrieved and transformed to suite the purpose of this paper. Computations were made where necessary, to break the data down for comprehension.

The research paper tests the principles of Aquila projects to find out if it has made impact on the operational process of the downstream sector of the petroleum industry in Nigeria.

II. LITERATURE REVIEW

2.1 The Petroleum Equalization Fund (Management) Board:

Between 1974 and 1975, most petrol service stations nationwide were characterized by long queues due to frequent severe shortages of petroleum products. The problem was compounded by the haphazard way marketers priced the product on the basis of transportation cost incurred by them. To solve this problem, the federal government of Nigeria set up an inter-ministerial committee comprising the then Ministries of Mines and Power, and Transport, the Nigerian Port Authority, the Nigerian Railway Corporation and the Petroleum Products' Marketers to examine the situation and make appropriate recommendations (PEF(M)B, 2013).

The committee observed that the only variable elements in the provision and sale of petroleum products at uniform prices nationwide was the transportation cost, which made prices to differ from one point to another. It therefore blamed the limited local refining capacity and inadequate distribution facilities for the problem. This gave birth to the Uniform Pricing System (UPS). In cognizance of the inequality in the transportation cost of distributing products throughout the country, the Petroleum Equalization Fund Management Board was established by Decree No. 9 of 1975 (as amended by Decree No. 32 of 1989), was charged with the primary responsibility of reimbursing petroleum-marketing companies for any losses suffered by them, solely and exclusive, as result of sale of petroleum products at uniform prices throughout the nation (PEFMB, 2013).

2.2 Logistics, Supply Chain Management and the Manager:

Over the years, the visibility of supply chain management as a collection of diverse, critical skills has increased substantially. Supply chain management (SCM) has evolved from a loose affiliation among functions such as purchasing, manufacturing, and logistics to an integrated and cross-functional discipline. Similarly, many professional organizations

are modifying their strategy and broadening their charters to cover the full spectrum of supply chain activities. (Stingray, 2014).

When it comes to career progression and human resource management, however, most firms continue to focus on individual functions, but this is not the case in PEF(M)B as the Board focused more on innovating the stabilization and distribution of the petroleum products in the supply chain. (The Equalizer, 2013).

John, et al. (2006) queued behind (Stingray, 2014) that logistics otherwise called transportation was a different entity from SCM and that the interest in integration heightened during the 1990s under the banner of supply chain management. While logistics was traditionally viewed as an individual function focused on distributing finished goods to customers, high-performance supply chain management required that logistics also coordinate with inbound supply to minimize congestion and maximize utilization.

In addition to identifying the trade-offs, the supply chain system must be capable of developing and implementing integrated and comprehensive supply chain solutions. Innovative, end-to-end supply chain solutions will need to be implemented on a broad business scale-across the enterprise on a global basis. Authors also opined that the system also needs to disseminate knowledge that will help their supply chain partners more effectively design and manage their own supply chains, since both are interwoven. They also should be able to apply the principles and methodologies of SCM to other parts of the organization and define enterprise-level architecture for complex solutions. In essence, they need to be supply chain consultants. Finally, the system through her professionals must be able to analyze the business performance of their supply chains to facilitate sustainable competitive advantage (John, et al, 2006). Developing the right skills and knowledge can enhance not only supply chain performance, but also enterprise performance.

Supply chain managers can no longer rely solely on the focused functional skills of the past to ensure a bright future. Instead, they need to develop cross-functional management skills that must be integrated and aligned with the company's overall business strategies. In many cases, this will require a redefinition of the skills, roles, and responsibilities of the supply chain professional and all stakeholders. It is apparent that a variety of skills are needed to manage the complexity and uncertainty inherent in SCM. Furthermore, supply chain managers need to be open to continual learning as today's supply chain skills may not maintain relevance for the future. The importance of possessing the right supply chain skills is underscored by Myers et al. (2004). Their study demonstrates that a supply chain manager's experience and education do not predict work performance; instead job skills predict success. Therefore, it is important to provide aspiring SCM professionals with the appropriate opportunities and guidance to develop the job skills that will enhance their potential for success.

There is some disagreement, however, regarding technical and technological skills. Some researchers have suggested that the SCM profession should not include technical or technological skills. Others consider such skills to be fundamental for developing cross-functional, cross-company managerial competencies. Some experts place special emphasis on IT skills and expertise. From the literature, however, it is clear that researchers are not advocating deep technical or technological skills. The consensus seems to be that supply chain professionals not only must be competent in their technical expertise but also must possess more general skills that are context-independent and can cut across boundaries of function and organization.

From the foregoing, a true SCM system must be built up of skills and capabilities in the following five areas: functional, technical, leadership, global management, and experience and credibility.

2.3 The Technology and Principles of Project Aquila:

PEF (M)B is the first organisation to successfully launch and implement an electronic loading and delivery system for petroleum products in accordance with the aforementioned principles. The platform has automated data capture mechanism which enabled faster processing and payment of claims with an online, real-time information management system. The technology provides data for strategic business decision making and planning in addition to facilitating prompt settlement of marketer's claims accrued during pre-electronic claims management and payment system era.

Project Aquila is a software written to work on Radio Frequency Identification (RFID) technology. RFID is considered by experts to be one of the most effective technologies in use for this type of operations. Nigeria today joins other world leaders like Canada, India and South Africa where RFID technology is in use successfully and is first of its kind in sub-

Sahara Africa. (PEFMB, 2013). This technology uses the RFID as a means of Identification of tags placed on trucks which serves as a chip that monitors the loading of the truck. The RFID reader and the CN3 mobile device combine to provide required data to facilitate the loading of trucks, receiving of loaded trucks and payment of marketer's claims. (PEFMB, 2013).

To win the trust of merchants in the oil and gas industry and in line with the transformation efforts of the leadership to establish minimum standards, facilitates personnel, technology for innovative oil and gas in Nigeria in the area of transportation and claims settlement, transparency and sustainable natures were built into project Aquila. (The Equalizer, 2013).

According to Toyin (2013) core to the success of the Project's key competences are winning mentality, winning team and high innovative capability of the staff which includes but is not limited to self-confidence, enthusiasm, flexibility, technical know-how, etc.

2.4E- Payment in Nigeria Oil and Gas Industry:

The regime of e-payment system in Nigeria oil and gas sector could be traced to the early 2010 when Easy Fuel Limited, a Nigerian company engaged in the provision of e-payment solutions in the downstream Oil & Gas sector, introduced its new range of products in the sector. The integrated e-payment solutions have the potential of revolutionizing payment system in the sector. It is expected that this technology will eliminate the use of cash in buying petroleum products at filling stations across the country. Tayo (2011) also observed that with these new solutions, what a customer needs to purchase fuel is nothing but a bank card or any of Easy Fuel's proprietary e-payment products which may be installed in the vehicle or issued as contactless fobs. With the Speed pass, customers can set predetermined limits on how much a vehicle can refuel, how often and on what kinds of products and services, during what period of time. The Sprint product offers the highest level of control and accountability for fleet managers. The Sprint is a smart RFID device, which is installed in a vehicle and works by identifying the vehicle to the Easy Fuel system (Tayo, 2011).

However, Gbodume (2014) observed that for systems of this nature to be efficient, there must be a way for merchants to verify the validity of the purchase and that such payment solution must also be easily convertible to cash or as good as cash, since most merchants in Nigeria are in business on subsistence basis. The payment system must satisfy transaction motive of demand for money too. This is where e-payment or e-transactions solutions come in. These payment solutions target most of the concerns of merchants and more. However, despite its advantages e-payment solutions have not gained much ground in the country. The Equalizer (2012) queued behind Tayo (2011) while rendering explanation on the principles of the project Aquila.

2.5 Types of e-payment Instruments:

The various e-payment instruments that are obtainable for all operations and those relating to the oil and gas sector are as follows;

2.5.1 The Automated Teller Machine (ATM):

This is the most popular e-transaction solution in Nigeria. ATM is popular because of its convenience. With ATM, it is a lot easier to withdraw money, transfer fund/ cash, make payments for utility bills, purchase mobile phone airtime and check account balance.

However, despite its popularity the ATM has done very little in reducing the amount of cash in the economy. This is because most Nigerians use ATM only for cash withdrawals despite other purposes it can serve.

2.5.2. Credit and Debit cards and e-wallets:

While ATM cards make cash withdrawal convenient, Credit cards, Debit cards, and e-wallets (like mobile money) make cashless shopping a lot more convenient. Hence to turn the country into a cashless economy, the drive should be towards credit cards, e-wallets and debit cards. While ATM cards require machines to operate, Credit and debit cards require a Point of Sale (POS) terminal. POS terminals are located at accredited retail shops (merchant) Gbodume (2014).

2.6 Oil and Gas Micro and Macro Logistics in India:

Transportation decisions affect the other sub-functions, and there is a close linkage between them. Hence, transport decisions cannot be made in a vacuum. This part of the role of transportation in logistics may be termed as “Micro Logistics,” where at the firms’ level; the companies optimize this function for competitive cost advantage.

The importance of transportation should also be seen by looking at the impact of transportation on a country’s economy. Studies reveal that in India the total logistics costs constitute nearly 10 percent of the GNP out of which nearly 40 percent is because of transportation alone. In the U.S., the estimates show that the cost is around 6 percent of the GNP. The major infrastructure required for moving oil and gas products from one place to another in India involve the active roles of Roads, Road Freight Industry, Railways, Ports and Shipping, and Pipelines, all of which are either managed or regulated by the government. The efficient and effective management of this infrastructure to enable the smooth flow of goods constitutes “Macro Logistics.” The situation in India is that because of unprofessional management of “Macro Logistics,” the industries are not able to derive the best out of their “Micro Logistics.” Any improvement in the Micro Logistics will be effective only if the Macro Logistics is effective. Also, Indian companies and the industries have not fully optimized their logistics function, as there is a tendency to live with the lacunae in Macro Logistics and the government’s inefficiency.

In a way to resolve the issues in the transportation of oil and gas products, the Indian government, through the Ministry of Surface Transport (MOST), announced incentives and tax holidays in its efforts to invite and encourage private sector in road infrastructure. Despite these incentives, the industry is still coping with an inadequate and poor quality of road network. It suffers from a near absence of technological improvements in the design and innovations of products and services (Vijayaraghavan, 2007).

The payment system is an operational network - governed by laws, rules and standards - that links bank accounts and provides the functionality for monetary exchange using bank deposits. The payment system is described as the infrastructure (consisting of institutions, instruments, rules, procedures, standards, and technical means) established to affect the transfer of monetary value between parties discharging mutual obligations. Its technical efficiency determines the efficiency with which transaction money is used in the economy, and risk associated with its use. The traditional payment systems use negotiable instruments such as drafts (e.g., cheques) and documentary credits such as letter of credits.

However, with the advent of computers and electronic communications, a large number of alternative electronic payment systems have emerged. These include debit cards, credit cards, electronic funds transfers, direct credits, direct debits, internet banking and e-commerce payment systems. However, some payment systems include credit mechanisms, but that is essentially a different aspect of payment. Payment systems may be physical or electronic and each has its own procedures and processes. Standardization has allowed some of these systems and networks to grow to a global scale, but there are still many country- and product-specific systems. Examples of payment systems that have become globally available are credit card and automated teller machine networks. It is important to note that specific forms of payment systems are also used to settle financial transactions for products in the equity markets, bond markets, currency markets, futures markets, derivatives markets, options markets and to transfer funds between financial institutions both domestically using clearing and Real Time Gross Settlement (RTGS) and Instant Payment systems while SWIFT network is used for international transactions. In this trend of electronic payment platforms, the oil and gas sector is not left out in embracing those platforms for both domestic and international transactions (Vijayaraghavan, 2007).

2.7. Features of the Radio Frequency Identification (RFID):

The Auto ID system applied in the project Aquila as described in this paper draws heavily on past and current developments in the area of Radio Frequency Identification (RFID). The RFID technology provides a simple means of automatically obtaining the unique identity of an item, in the case of Aquila; the item is a truck at increasingly low cost. These low cost RFID systems can then be coupled with networked databases which enable access to additional product data. Much of this functionality can readily be provided by bar code systems (Duncan & Yossi, 2004).

An RFID-based Auto ID system generally comprises the following elements as reviewed in (Duncan & Yossi, 2004).

1. A unique identification number which is assigned to a particular item
2. An identity tag which is attached to the item with a chip capable of storing - *at a minimum* - a unique identification number. The tag is capable of communicating this number electronically.

3. Networked RFID readers and data processing systems which are capable of collecting signals from multiple tags at high speed (100s per second) and of preprocessing this data in order to eliminate duplications and misreads.
4. One or more networked data bases that store the product information.

Similarly, (Duncan & Yossi, 2004). Juxtaposed RFID Based Auto ID Systems and Bar Code Based Systems and observed that the RFID is a logical extension to today's barcode-based systems that have been so successfully applied throughout supply chains. Barcodes identify products at transition points such as shipping, receiving, and checkout. The technology exists, it is inexpensive, ubiquitous and, in principle, very accurate. Thus, one should think about the benefits of Auto ID systems emanating from replacing today's barcode-based systems. There are two advantages of the RFID technology over conventional bar code systems:

1. Bar codes have to be scanned deliberately by a person in a process that is difficult to automate. RFID tags, on the other hand, can be readily scanned automatically without human involvement.

This characteristic of Auto ID implies several benefits:

- (i) The data can be obtained continuously at specific intervals and specific points in the supply chain
- (ii) less expensive and generally more accurate

2. Bar codes require line-of-sight to read, while RFID tags can be read in any orientations as long as they are within the reader's range.

The implications of this characteristic, in combination with the previous one are the following:

- (i) Speed – many tags can be read simultaneously into a computer
- (ii) The content of various conveyances (such as trailers, cases, pallets, shopping carts) can be read automatically
- (iii) Bar codes do not work well when exposed to weather elements, when dirty, or if damaged in any
- (iv) Location – RFID readers can provide rough location information (Duncan & Yossi, 2004).

III. RESULT AND DISCUSSION

A. Popularity and Training Needs Assessment on Project Aquila Technology:

Since the Nigeria's oil and gas industry is a sector which affects almost all other sectors of the economy, from transport through power generating sets to cooking fuels. This made the sector stand out among other contenders in the economy, hence the capacity to generate almost 90 % of Nigeria's foreign currency receipts. With reference to figure 1, the survey revealed project Aquila is a popular e- loading tool with about 70 % of respondents fully establishing this fact. This may be linked to the popularity enjoyed by the sector. The implication of the awareness level gained by this technology depicts it's capability to make quiet a huge impact on smooth operation of the Supply Chain of petroleum products. To buttress this fact, another 30 % of respondents consented to the responsiveness of the Aquila technology to the challenges of delay, tracking and invisibility inherent in the loading and discharging of petroleum products in Nigeria hitherto the introduction of this technology. In addition, the survey inquired about the popularity of Aquila technology to transporters, PEF(M)B officers and marketers. Responses were evenly spread as only 5 % of respondents strongly agreed that beneficiaries (marketers, industry workers, transporters and officers of PEF(M)B) are never aware of the importance and impacts made by Aquila technology on the petroleum sector, especially as regards loading, off-loading and payment of benefits to marketers.

There are reasons to argue that Aquila is not as popular as expected by about 25 % respondents. This could be because they find it difficult to integrate it to relevant operations in their work structures. Some 20 % respondents were unconcerned on the cognizance level of Aquila to transportation of petroleum products. To 30 % beneficiaries, the tool is a performance enhancer hence awareness level of the technology is high. However, another 20 % strongly disagreed to this opinion. By inference, the popularity of Aquila technology was scored lower, when compared with the potentials, among stakeholders and the popularity of the sector understudied. By this result, there is need to keep marketers and relevant stakeholders abreast of the capabilities in Aquila technology.

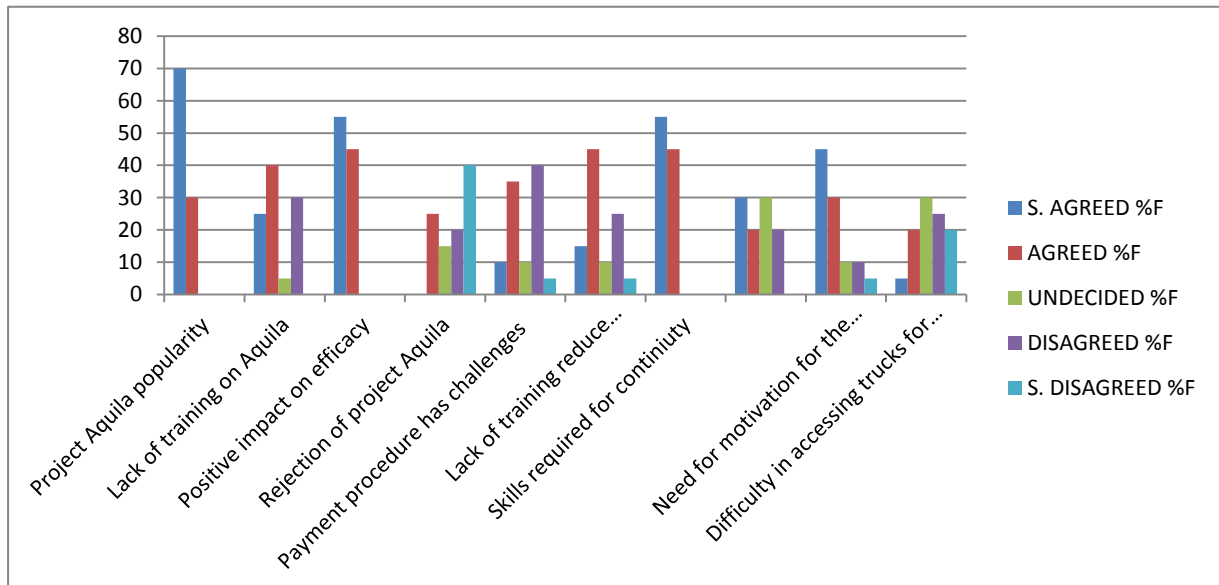


Fig. 1: Popularity of Aquila Technology to Difficulty in Accessing Trucks

On the same hand, 25 % of respondents strongly agreed that there is need for all stakeholders to be trained, figure 1 refers please. This result is an affirmation to the fact that if you do not train them, you do not blame them either. The lack of relevant knowledge hindered marketers and distributors from harnessing the benefits of Aquila technology for the betterment of their businesses. In agreement to the aforementioned assertion, another 40 % consolidated that the know-how is a wheel on which the strategic goal of managing the equalization system of the petroleum products in Nigeria rides even as PEF(M)B strives to discharge her mandates to the populace while optimizing the operations of the Board. The training needs of relevant stakeholders to sustain and even improve the Aquila technology ranges from software development and the modus operandi of the Radio Frequency Identification (RFID) technology used in tagging trucks and reading the database of trucks and that of marketers as they make claims in line with the number of trucks delivered. Such training will eliminate some bottle necks and even provide for slack resources in the case of unforeseen circumstances on the part of human resource management. The research also revealed that such training will eliminate paradigm paralysis suffered currently by marketers who are used to the old method of manual settlements of claims hitherto the innovation of Aquila technology. The basis for this stand taken was when 40 % strongly agreed and 55 % agreed to the fact that if the opportunities presented by Aquila must be employed to the latter, then its sustainability should be of strategic planning and management concern as human resources and other factors of production and operations of the technology are been considered.

The consequence of this is that if the current system can achieve prompt payment of marketers' claims between 2- 4 weeks, with better systems and quality management, it may settle claims in less than 48 hours. If the target is of operating an optimized system manned by expertise from the least ranked officer to the top management on the know-how of Aquila, then there may be no bottle necks; after all the system is technology enabled and payments are made possible on spot with the e-economy policy of the government. When both the hard and software aspects of the Aquila are made of local content, the Board may perform better, rather than waiting on partners who may even leak some of the security tips of the system; making it vulnerable to threats.

B. Impacts of Project Aquila on the Oil and Gas Industry in Nigeria:

Pertinent to this research work are impacts made by project Aquila on the speed of job delivery and efficacy of stakeholders in the discharge of duties as a measuring parameter of technology. The result obtained has revealed that officers of the Board may never like to witness the kind of stress and difficulties they were exposed to hitherto the introduction of the Aquila technology. This fact was brought to bear when an overwhelming 55 % of respondents strongly agreed and 45 % agreed to the statement that project Aquila has made some positive impacts on the rapidity of processing claims and planning discharge of duties. Another implication is that there will be less stress and more job satisfaction since officers may discharge duties better and on targets. In addition, the technology according to the result of the survey has helped in reducing the lengthy queue witnessed hitherto at the filling stations. The reasons for this impact are in two folds, first when marketers are able to load and discharge petroleum products with less stress, they will always be willing

to load more and discharge more as this increases the liters of products dispensed by major and minor markets on the one hand.

On another hand, when marketers get paid earlier than expected, it improves the confidence level on the system and encourages them to do business with the Board. This may reduce the lengthy queue experienced lately at fuel top-up stations. However, 30 % of respondent opined optimization of the operations of the Board may not translate to reduction of queue in the top-up stations. The research contend that even when marketers are paid as and when due, the loading system is Aquilarized, issues of non-visibility of the trucks on transit, logistical hazards and human error may hamper the safety and timely delivery of petroleum products to the top-up stations, discharge points and/or consumers. Only 20 % of respondents have contrary opinion on the possibility of reducing the queue experienced in dispensing stations even when the system is Aquilarized. Should this opinion hold, then optimization of relevant operations of the loading and discharge points have no relevance to consumers of petroleum products; an opinion which negates the target of clearing more than ninety eight percent (98 %) of all outstanding marketers claims piled-up hitherto the introduction of the Aquila, The Equaliser (2011). This is because prompt payment of marketers' claims will facilitate loading and discharge of products.

Attempt to appraise the impact of Aquila on planning, logistics and loading of products, see figure 2, revealed that 35 % of respondents strongly queued behind and 60 % agreed to the statement that the data synchronized by Aquila database has been helping the Board in predicting the consumption pattern of some cities in Nigeria, even as it facilitates the processing of relevant information to stakeholders as may be required from time to time. This is because the historical data can be used to forecast the consumption pattern of the country at large and keep stakeholders abreast of the status of petroleum products in Nigeria. By inference, the more data at the disposal of the Board, the better informed they are about budgeting for marketers' claims as it eliminates payment of fictitious claims, facilitated by on-line, real-time data of trucks and marketers are made available by this technology.

This technology has in no doubt eliminated sharp practices in operations of the Board as the finance management platform provided by Aquila makes the system transparent more than ever, according to stakeholders. This was established in the survey when 50 % of respondents strongly aligned to the statement. The remaining 50 % also agreed that the tool has eliminated human interface and to some extent made the system open and free from human error. It can therefore be assumed that there were some lapses in the areas of false settlements claimed by marketers. The impact made by Aquila may have reduced such practices, cleansed the system and saved quiet a lot of money for the economy. We claim that the more technology enabled a system, the better transparent and accountable it may be as there may be less face-to-face interactions between officers, supply chain managers and markets alike in the industry.

Worthy of reckoning with in figure 2 is whether the implementation has achieved 90 % coverage in both public and private depots especially as regards data capturing, tagging and e- loading and delivery at both ends of the depots. Only 45 % of respondents strongly agreed to the statement with 25 % subscribing the same statement but with some reserved opinion. A different opinion was presented by another 15 % who are ambivalent of the statement while 5 % and 10 % stroke down and strongly disagreed on the 90 % coverage attained by Aquila technology in both private and public depots.

The meaning of the aforementioned facts is that the Board has done a lot more in tagging trucks delivering petroleum products to depots all over the country and has actually achieved an enviable height in the discharge of her mandate. The impact will actually be felt by stakeholders, especially consumers of these petroleum products only when the products are made accessible to all. It is therefore obvious since the coverage is growing from strength to strength as more and more truck are being tagged on a continual basis.

Apparently, the technology has succeeded in reducing to the barest minimum the number of complaints in the payment and loading system which hitherto ranged from inappropriate capturing of correct number of trucks discharged by transporters and marketers alike to delay in settlement of marketers' claims and errors on payment documents to mention but a few. This was established by the survey when 35 % and 40 % of respondents strongly agreed and agreed to the statement that the implementation of Aquila technology has reduced complaints received by the Board from external customers by 80 % in the last two years. Only 15 % of respondents disagreed while 5 % are undecided and strongly disagreed to the statement. By interpretation, the innovation introduced via Aquila has eliminated a lot of shortcomings in the system. These complain were usually made when marketers dissatisfied and may likely wait for months before getting claims settled.

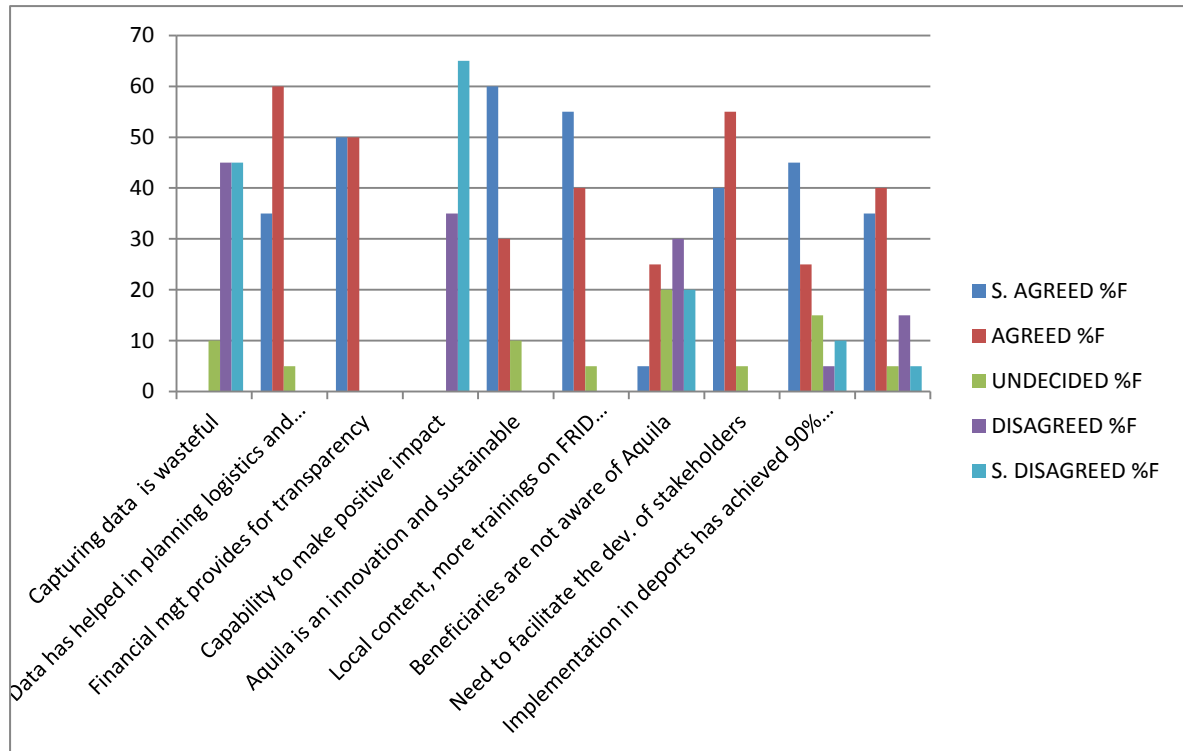


Fig. 2: Impacts of Project Aquila on the Oil and Gas Industry in Nigeria

III. CONCLUSION

This paper appraised the impact of Aquila technology implementation on the oil and gas industry of Nigeria with particular interest in PEF(M)B. On the premise of the result obtained from the survey, the following can be deduced.

The introduction of project Aquila has reduced complaints from stakeholders in the oil and gas industry by about 80 % since the last two years, but can achieve better result if the local content in the areas of software development and RFID technology used in the system can be sustained and improved in the next 5 years since technology is usually a short term horizon planning tool.

The technology is popular in the oil and gas industry. Marketers and officers of the Board are comfortable with the development and are willing to sustain the system even as they believe a robust synergy must be maintained by all stakeholders for sustainability of the impact made by the technology.

Payments of claims are faster and easier in the system and transparency has been introduced into the system by the introduction of project Aquila; an impact lauded by stakeholders. This has reduced the queue experienced in the filling stations hitherto the introduction of the technology.

In accordance with the result of the survey, the research submits as follows;

A. The human and material resources which are the engines of the Aquila technology should be optimized by training and retraining of all personnel to keep the system running and facilitate the attainment of the mandates of the Board.

B. For sustainability of the Aquila technology, there is the need for all inclusive synergy among stakeholders so all markets can key in and support in the e-loading and payment system.

C. The system should work towards achieving settlement of marketers' claims in 48 hours. This is achievable when the system is enabled to track all trucks when loading and discharging, play a visibility role and the system is fully technology enabled. The paper also recommends translation of project Aquila manuals and pamphlets from English language to the three (3) major languages in Nigerian; Hausa, Yoruba and Igbo. Another option is uploading the manuals online and producing audio CDs of the same for stakeholders who cannot read. This may facilitate penetration understanding and benefits of Aquila technology on petroleum supply chain.

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