Shaping Consumer Goods Supply Chain Decisions with Business Intelligence Analytics: A Qualitative Case Study

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Abstract: *Power BI, a robust business intelligence tool, and widely utilised in big data analytics, has garnered attention for its potential to revolutionise decision-making processes. However, its role in shaping supply chain analytics decisions within the fast-moving consumer goods (FMCG) industry in developing nations remains less investigated. This qualitative case study explored the experiences of supply chain managers in the Nigerian FMCG sector, investigating the adoption, significance, and challenges associated with Power BI utilisation. Semi-structured personal interviews were conducted, transcribed verbatim, and analysed thematically. Findings showed that the integration of Power BI in supply chain management offers myriad benefits, including intuitive usability, visually engaging data presentation, user-friendly dashboards, strong data governance with security features, alongside the ability to visualize vast datasets. Furthermore, the study reveals how Power BI influences decision-making processes by enhancing business visibility, facilitating demand forecasting through reliable data insights, understanding customer behaviour, and fostering higher-quality decision-making across supply chain functions. Nonetheless, challenges such as data integration complexities, data quality issues, organizational silos, high infrastructure costs, and suboptimal data visualization practices hinder effective BI utilization in supply chain operations. This research offers valuable insights for FMCG supply chains in developing nations, industry practitioners, and policymakers alike.*
Keywords: business intelligence system, power B1, consumer goods supply chain, data visualisation, supply chain analytics.

INTRODUCTION

In the contemporary era characterized by data-driven operations, complex supply chain dynamics, and relentless market fluctuations, the importance of harnessing cutting-edge tools

like business intelligence (BI) and data visualization cannot be overstated. These tools empower enterprises to sift through vast amounts of data, uncover invaluable insights, and implement informed decisions, that lead to sustained competitive advantage. Power BI is a well-liked technology that is well-known for its versatility, ease of use, and smooth integration with other Microsoft products. Power BI is a cloud-based tool developed by Microsoft that offers analytics and data visualization capabilities to enterprises [1].

A wide variety of visualization choices, including bar charts, pie charts, line graphs, and scatter plots, are available to users of Power BI, facilitating the analysis and meaningful presentation of data. Organizations can use this application to make decisions based on real-time data analysis by easily creating interactive dashboards and reports using data from several sources [2]. In the current dynamic business landscape, enterprises must possess the agility to promptly adapt to shifts in the marketplace. In order to do this, real-time data analysis is very crucial

Many factors restrict the general application of Power BI, even though its significance for managerial business decisions is widely acknowledged. This is especially true in the consumer goods supply chain. According to [5], supply chain organizations must use a variety of tools to present their data in a variety of ways to make it easier for people to understand because not everyone is able to interpret, analyze, and interpret business intelligence (BI) language and computational methods. As a result, it is claimed that organizations are having difficulty using BI successfully [6]–[7].

The main obstacles to the effective adoption of business intelligence (BI) in businesses are specifically highlighted in [6], which also includes low levels of technology infrastructure availability, profitability and business expectation factors, and insufficient management sponsorship and support [8] believed that in order for BI projects to be implemented successfully, top management sponsorship and assistance are necessary [9]. Moreover, [8] argued that a poor acceptance rate of Power BI exists in developing country enterprises since many fast-moving consumer goods industries, particularly in these countries, lack the necessary skills and knowledge to adopt or apply Power BI [8]–[9].

Furthermore, [2] described the low degree of sponsorship and assistance from senior management needed for BI projects to be implemented successfully in many Nigerian consumer goods supply chain organizations. Thus, it would seem that the research topic is still in its infancy when it comes to using Power BI as an analytical tool for decision-making, necessitating more attention.

Furthermore, there is an enormous body of research on the use of Power BI for general business choices, especially in the areas of retail marketing, banking, healthcare, insurance, and logistics [10]–[11]. Its use in the supply chain for fast-moving consumer goods (FMCG), especially in developing countries like Nigeria, doesn't seem to have gotten much empirical attention, though. Managers in the FMCG supply chains of emerging nations may so be deprived of accuracy in making decision without utilizing Power BI.

Furthermore, it seems that there is a lack of discussion in the literature regarding the difficulties managers face when attempting to use Power BI tools for management decision-making or the

skills needed to successfully use Big Data Analytics tools. These voids gave rise to the following two inquiries:

1. Why are supply chain organizations using Power BI to inform their decisions?
2. What aspects of Nigeria's FMCG affect the adoption of Power BI?

As a result, we undertake this investigation with the following particular goals in mind:

i. Examine the significance of using Power BI in supply chain decision-making by reviewing the body of current research.
ii. Ascertain the rationale behind the use of Power BI analytics in supply chain decision-making.
iii. Determine what obstacles stand in the way of the efficient use of power.

METHODOLOGY AND DATA COLLECTION

The research employed a qualitative methodology, grounded in interpretive perspectives, and utilized personal interviews as the primary method for data collection. Our rationale for choosing this approach stemmed from the belief that a qualitative case study offered the best avenue to understand the personal experiences of BI users within the consumer goods supply chain trajectory.

The study took place in XYZ Company- (*Not real name*). The case organisation is a subsidiary of a foremost global consumer goods supply chain company in Nigeria. It was established in 1923 and initially operated as a soap manufacturing company. Over the years, XYZ Nigeria expanded its product line to include a wide range of household and personal care products such as detergents, toothpaste, skincare products, and food items. The firm has been a dominant player in the Nigerian consumer goods market, with brands like Omo, Close Up, Lux, Knorr, and Blue Band being household names across the country [12 & 13]. It has heavily invested in local manufacturing, with several production and IT infrastructure spread across the country. This has helped in creating employment opportunities and boosting the local economy.

Two kinds of data were collected from the focal case study; both primary and secondary data sources were used. Primary data, using the personal interview method, was collected from the Heads of Departments that deal directly with consumer goods supplies decision-making, and that require the in-depth application of Power BI. This includes the Production Department, Marketing, Distribution, and Supply, Finance, Account and Administration, Information Communication, and Corporate Affairs.

To facilitate the collection of primary data, an in-depth personal interview was conducted either on a face-to-face basis or by telephone with departmental heads and their deputies. Based on their availability, 6 in-person interviews and 4 online interviews were conducted using Zoom meeting technology. On the other hand, secondary data was collected through a literature review of relevant published articles and text to achieve the first specific objective of this study, i.e. analysing the importance of adopting Power BI in business decision-making.

Interview data was processed, and transcribed verbatim, and various themes that emanated from the responses were analysed and discussed in line with the research questions and the overall objective of the study. Before the collection of primary data, ethical standards were adhered to; from the design of the personal interview guide (available appendix section) to the actual interviewing of respondents. For instance, respondents were assured of anonymity and confidentiality. The purpose of the study was explained to participants at the onset before data collection, and each participant's consent was sought and obtained before data collection. Each interview session lasted between 25-30 minutes.

FINDINGS AND DISCUSSION

Demographic Profile Of Interview Respondents
Overall, the study conducted 10 in-depth personal interviews with the selected respondents. Table 1 summarises the demographic characteristics of interview respondents. Amongst them were seven (7) male and three (3) female participants. In terms of their current job position, four (4) participants were departmental/unit heads, while six (6) were deputy heads of their departments. The highest age range of the respondent includes those between ages 35-40years (65%). This is followed by ddepartment heads and their deputies who participated in a thorough in-person interview or over the phone in order to assist the collection of primary data. Zoom meeting technology was used to conduct 6 in-person interviews and 4 online interviews with participants based on their availability. In contrast, secondary data was gathered by means of a review of pertinent published papers and text in order to fulfil the study's primary goal, which was to analyze how crucial it is to use Power BI in business decision-making.

We also collect primary data through the semi-structured interview process. The interview material was verbatim transcribed and analyzed. Based on the research objectives and the study's general goal, several themes that emerged from the respondents were examined and debated. Prior to gathering primary data, ethical guidelines were followed. We ensured that participants consents were sought and obtained, and their permission were received to allow the recording of conversion. However, they were assured of anonymity and confidentiality as they provide data for the study.

The study interviewed the chosen respondents in-depth on ten separate occasions. The demographic details of interviewees are presented in Table 1. There were three (3) female and seven (7) male contestants in all. Four (4) participants held departmental or unit heads positions in their current jobs, while six (6) participants held deputy heads of department's positions. The respondents' greatest age range was from 30 to 52 years old. Regarding work tenure, which serves as a gauge of an individual's level of experience, four (4) respondents had been employed by the company for approximately five years, five (5) respondents had been there for five to ten years, and the last participant had worked there for more than ten years. With the exception of three (3), every respondent held a master's degree in their educational pursuit.

Thematic Findings and Discussion

The objective of this study was to conduct a qualitative exploration of how Power BI enhances effective supply chain decisions in the fast-moving consumer goods industry. We present and discuss the findings on four overarching issues, namely:

a) the use of technologies in general for supply chain management decision-making;

b) the specific use of Power BI tools, their significance, and reasons for considering BI tools for consumer goods supply chain analytics;

c) the factors that influence the effective adoption of Power BI technology; and

d) the challenges encountered in adopting Power BI in consumer goods supply chain decision-making.

Overview of Decision-Making Technologies Used in the Organisation

This specific topic was intended to provide some of the answers to the first overall research question, even though it also served as a starting point for a lively conversation during the interview. Based on the results, the participants furnished a synopsis of the types of data analytics technology employed within their establishment. In addition to Power BI, other tools including Microsoft Excel, Cloud Computing, Apple Keynote, SAP, Python, Sage, Tableau, and AI were also discussed. According to the respondents, these tools are employed for a variety of functions, including as decision support systems, offering knowledge and experience to assist with product development efforts, streamlining corporate procedures, and boosting general productivity, profitability, and competitiveness.

The results also support the argument made by [13], who said that artificial intelligence systems and power BI technology are presently transforming the way business managers in the manufacturing industry make judgments about which products and services to offer. The present analysis confirms the findings of [14], which listed Microsoft Power BI, Tableau, ClicData, and Sisense as the top four Big Data analytical tools for decision assistance. Furthermore, research findings suggest that companies are using BI technology as a stand-alone system or integrated with other systems that support the organization's ability to make logical business decisions. It is feasible to conclude from this study that utilizing BI technology is consistent with the claim made by [15].

Usage of Power BI, Significance and Reasons for Usage

The results showed that the organization uses BI at a higher level than elementary school. For example, the majority of respondents stated that they were using BI tools in their department and that they are acquainted with them. Accordingly, contrary to what other studies like [16]–[17] suggested, people who are familiar with and use BI tools in that setting are not just those in technological or information technology fields. Therefore, the study's findings disprove the idea that people with computers or systems expertise are the only ones who would be interested in adopting BI as a decision-making tool. According to the results, the firm uses Power BI because of its perks, which translate into considerable advantages for BI users [18]. which found that the deployment of BI by organizations leads to improvement in long-term business decisions in manufacturing and service-oriented organisations. In addition, the results of this study, particularly in

the use of BI for business decisions, are consistent with the works of [19], and a similar study by [20]. In particular, [19] argued that effective power BI deployment integrates business processes toward the achievement of organizational goals. Similarly, [21] reported that with a composite of business process, technolology, the incorporation of separate entities to achieve coordinated operations, is made possible by the use of power BI. This empowers the employee to be more responsible in applicable decision-making situations.

Despite the current findings, this study differs in some regards from that which was earlier reported [9]. In their study of the features that provide the driving force to firms' adoption of analytics technology, [9] reported user-friendly dashboard features as the least reason for the choice of BI in the Bangladesh event marketing industry; a clear aberration from the findings in this study. The following explanation can be offered for this inconsistency. First differences in business or industry context could be a major consideration. The current study location is different from that of [9] which took place in Bangladesh and differences in user culture which according to [22] could influence the outcome of an empirical study. Secondly, the research approach and data collection methods adopted between the two studies differ. While [9] study was quantitative, collecting primary data through the questionnaire survey, and involving more than one organization, the current study was qualitative and adopted a single case study data collection method. Thus, in such methodological variations, differences in research outcomes are bound to occur. Nonetheless, the findings here generally showed that usage of BI in the firm is influenced by reasons that include user-friendliness of the dashboard amongst others.

Challenges of Adopting Power BI
Adopting Power BI in most socio-economic systems includes achieving and maintaining credibility and stakeholder trust paramount. Maintaining trust and credibility are major challenges to adopting power BI as a decision making tool. Consistent positive reputation is needed to build a good patient-client relationship, enhance positive perception, and ensure business continuity [12, 18, 19]. In healthcare, effective communication has been argued as the foundation for building and enhancing health system reputation [16; 17 & 19].

Power BI as a managerial decision-making support tool. The challenges range from complexity in integrating multiple data source systems; issues related to siloes breaking; low data quality which became difficult to analyse; requirement for continuous learning and training; expensive infrastructure installation requirements; to ineffective data visualization and dashboard practices that were mentioned by respondents. Communication is said to be effective when messages or information of whatever form are conveyed clearly in order to elicit the needed feedback or positive response. This means that health information has to be communicated clearly without ambiguity and emphatically to be able to generate positive perception of the health system. This is because, according to [11] the effective communication of organizational initiatives, plans, and operational outcomes can lead to a favorable corporate reputation [11; 17 & 18]. In addition to supporting transparent patient engagement, effective communication also enhances clinical and operational performance [19; 12 & 14].

In essence, there is a profound impact of communication of Power BI in the sector; improving health outcomes stakeholder trust, and the overall success of healthcare sector as information are shared openly [20; 21 & 22]. Given the benefits of effective communication in organisations, the aim of this article is to examine the strategies that healthcare systems can

adopt to leverage communication in order to build a strong, credible, and positive reputation [23; 24 & 25].

CONCLUSION AND FUTURE RESEARCH

This study has demonstrated the need for user training in order to properly comprehend the BI system's operation and learn how to incorporate the necessary data sets into the toolbox of BI functions. To solve issues with data quality, an appropriate data management policy and strategy must also be developed. To improve decision-making, data that is generated internally or gathered from outside sources needs to go through dependability and validation processes. Additionally, this study suggests data modeling and data architecture. The work of [1], which maintains that data modeling is essential to providing high-quality information for BI usage and efficient decision-making in organizations, lends credence to this idea as well.

Future studies could consider the inclusion of other types of analytical tools such as visual AI, Python, R, amongst others to understand how their usage can also shape supply chain decision. We also expect future study to conduct empirical studies involving multi-case studies instead of single qualitative case study as it is the case in the current study.

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