
**BUSINESS INTELLIGENCE AND COMPETITIVE ADVANTAGE IN
FOODS AND BEVERAGES FIRMS IN SOUTH-WEST NIGERIA**

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ABSTRACT

This study investigated the effect of Business Intelligence (BI) on competitive advantage in food and beverage firms in South-West Nigeria, with specific focus on data warehousing and data visualization. The study was anchored on the Resource-Based View (RBV) Theory and adopted a survey research design. The population comprised 14,230 employees drawn from selected food and beverage firms, namely Nestlé Nigeria Plc, Cadbury Nigeria Plc, Guinness Nigeria Plc, Nigerian Breweries Plc, and Flour Mills of Nigeria Plc. Using the Krejcie and Morgan formula, a sample size of 370 respondents was determined and selected through simple random sampling. Data were collected using a structured questionnaire and analyzed using descriptive statistics and simple linear regression with the aid of SPSS version 25. The findings revealed that data warehousing has a significant positive influence on competitive advantage ($R^2 = 0.717$, $\beta = 0.860$, $F = 913.042$, $p < 0.05$), while data visualization also exerts a significant positive influence on competitive advantage ($R^2 = 0.770$, $\beta = 0.895$, $F = 1205.413$, $p < 0.05$). The study concluded that effective utilization of BI components enhances organizational decision-making, operational efficiency, and market responsiveness, thereby strengthening competitive advantage. The study recommended that food and beverage firms should invest in robust data warehouse systems and integrate data visualization tools into their operations to improve strategic decision-making and sustain long-term competitiveness.

KEYWORDS: Business Intelligence Data Warehouse, Data Visualization, Competitive Advantage.

INTRODUCTION

Businesses are using business intelligence (BI) more and more in today's fiercely competitive business environment in order to obtain insights, make wise decisions, and eventually create a long-lasting competitive edge. BI is the umbrella term for a number of procedures, methods, and technologies designed to convert unstructured data into insightful knowledge that can be used to inform strategic choices. Knowledge exchange, smooth and reliable data warehousing, an efficient data management system, technological prowess, data visualization, and data analytics are all essential components of successful BI initiatives (Negash & Gray 2008). Furthermore, the need of providing BI solutions that are available anywhere has increased due to the widespread use of mobile devices.

In order to produce insights that can guide strategic and operational choices, business intelligence (BI) usually entails collecting, storing, and processing data from multiple sources. This tool is used in the decision-making process in business for interpretation of data and offers insightful information to help top management executives. Experts utilize business intelligence models to identify firms' status, assess corporate efficiency, build stronger relationships with stakeholders, and create feasible market prospects because of their impact on corporate efficiency (Shamim et al., 2022). According to Wu (2021), knowledge sharing platforms and practices that are backed by leadership initiatives and incentives can help spread important information throughout the organization.

The foundation of business intelligence (BI) systems is a data warehouse, which offers a centralised location for organizing and storing both structured and unstructured data. Organisations can run sophisticated analytical queries, produce reports, and extract insightful information from both historical and current data tanks to data warehousing. Additionally, data warehousing designs like data lakes enable the large-scale storage of many data kinds, supporting machine learning and advanced analytics projects (Azzabi *et al.*, 2024).

Among other industries, the manufacturing sector in Nigeria includes the food and beverage, textile, cement, chemical, and automotive sectors. Notwithstanding obstacles like legislative restrictions, inconsistent policies, and inadequate infrastructure can hinder the operations, but the industry has shown resilient and also create room for expansion (Rao, 2021). Business

intelligence mode and its significance in gaining a competitive edge in Nigeria's food and beverage subsector cannot be overemphasized. But in the face of swift shifts in market dynamics, gaining a lasting competitive edge has grown more difficult. Nigerian manufacturing firms are realizing the value of business intelligence (BI) in providing superior services to boost client happiness, loyalty, and overall competitiveness.

Competitive advantage refers to the unique strengths and attributes that allow an organization to outperform its rivals and achieve superior market performance (Chalman, 2016). It can stem from various sources such as cost leadership, product differentiation, innovation, brand reputation, or access to exclusive resources. In today's dynamic and highly competitive business environment, sustaining a competitive advantage requires continuous improvement, strategic planning, and the effective use of technology and human capital. Organizations that successfully build and maintain competitive advantage are better positioned to attract customers, increase profitability, and achieve long-term success.

1.2 Statement of the Problem

Business intelligence (BI) is essentially a framework created to extract information for sound decision-making in the cutthroat corporate environment of today. Without a competitive edge, contemporary manufacturing companies currently face tremendous obstacles in surviving and growing. Recent studies affirm that BI systems enable firms to transform large volumes of data into actionable insights, thereby improving decision making and operational efficiency (Charkaoui & Jabraoui, 2024). Similarly, empirical study shows that organizations leveraging BI and its components are better positioned to enhance performance outcomes and sustain competitiveness (Jenkinson et al., 2024)

Many organizations, particularly those in the food and beverage industry, appear to have faced worse scenarios than anticipated, which is an indication that, they have not yet fully integrated business intelligence into their operations due to lack of potential for large expenditure required throughout its implementation. Firms often encounter major barriers such as high implementation costs, technological complexity, and lack of skilled personnel, which limit effective adoption and utilization (Tsiu et al., 2025). Other issues with BI adoption, especially for manufacturing firms, include data silos, lack of proper knowledge sharing, poor organisational structures and inadequate alignment between business strategy and information systems (Ramirez-Aristizabal et al., 2024).

Additionally, recent empirical studies highlighted that while BI adoption is increasing globally, many organizations fail to translate BI investments into sustained competitive advantage due to weak business model innovation and poor data utilization strategies (Jenkinson et al., 2024). This suggests that the mere presence of BI systems does not automatically guarantee improved performance unless they are effectively implemented and aligned with organizational goals. Although existing studies have examined the relationship between business intelligence and firm performance, there remains a significant gap in empirical research focusing specifically on how core BI components—such as data warehousing and data visualization—affect competitive advantage in food and beverage firms in South-West Nigeria. This gap indicates that many firms may not be fully exploiting the strategic potential of BI tools, thereby limiting their ability to compete effectively in an increasingly dynamic and data-driven business environment. Therefore, the persistence of these challenges necessitated an investigation into the relationship between business intelligence and competitive advantage in food and beverage firms in South-West Nigeria.

1.3 Objectives of the study

The major objective of the study was to investigate the effect of Business Intelligence on Competitive advantage in food and beverages firms in south-west, Nigeria. Specifically, the study is guided by the following objectives, to:

1. Examine the influence of data warehouse on competitive advantage in food and beverage Firms in South – West, Nigeria.
2. Evaluate the influence of data visualization on competitive advantage in food and beverage Firms in South – West Nigeria

1.4 Research Questions

The following research questions were formulated to guide the study

1. What is the level of influence of data warehouse on competitive advantage in food and beverage Firms in South -West, Nigeria
2. What is the degree of influence of data visualization on competitive advantage in food and beverage Firms in South- West, Nigeria?

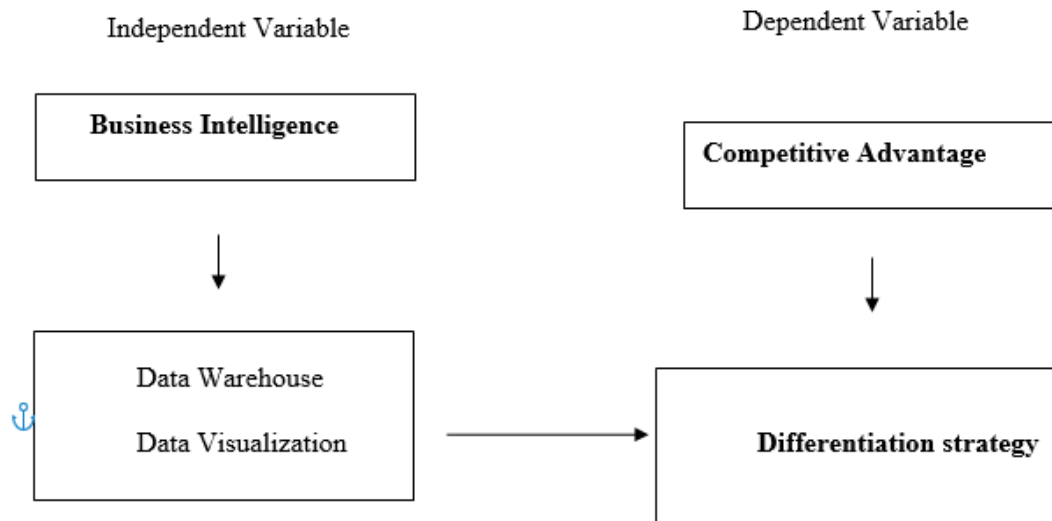
1.5 Research Hypotheses

H₀₁: There is no significant influence of data warehouse on competitive advantage in Food and beverage Firms in South – West, Nigeria.

H02: There is no significant effect of data visualization on competitive advantage in food and beverage firms in South – West, Nigeria.

REVIEW OF RELATED LITERATURE

2.1 Conceptual Framework



Source: Variables of Business Intelligence and Competitive Advantage by the Researcher (2026)

2.1.1 Business Intelligence

Business Intelligence is referred to as the techniques, technologies, systems, practices, methodologies, and applications that analyze critical business data to help an enterprise better understand its business and market and make timely business decisions ((Pourshahid *et al.*, 2021). As summarized by Chugh and Grandhi (2018), the key benefits of implementing business intelligence solutions in an enterprise includes: Equipping the company with the ability to analyze data from multiple sources and using different dimensions; Enabling managers to make informed business decisions through identifying important patterns of behaviour captured in the data; improving accuracy in predictions; helping the company to identify root causes of problems so as to improve operational efficiency. Aspects involving being able to be more efficient with the management of the full range of information, referring to a better management level supported by technological tools, is a scenario in which business intelligence and its use help to facilitate the administration of such management. Indeed, it has been noted that business intelligence is extremely positive for effective decision making (Pourshahid *et al.*, 2021).

Apart from above mentioned antecedents, Organizations culture also plays an important role in BI success. Large percentage of BI applications fails not because of technology but organizational culture and infrastructure dysfunctions. Firms that instill the right organizational culture are foreseen to be successful in deploying BI initiatives. Creating a learning organization culture has become an important strategic objective for many firms that hinges on the acquisition of information. Weir (2021) added that knowledge sharing culture is also critical in ensuring the success of BI deployments. For BI to work, the entire organization must participate in intelligence gathering and sharing. Utilization of BI tools is also being mentioned in literature as an important criterion in deploying and using BI. Chung *et al.*, (2020) defined two classes of BI tools, the first class of tool is used to manipulate massive operational data and to extract essential business information. Examples include Decision Support Systems (DSS), Executive Information Systems (EIS), data warehouse and data management systems. They are built from database management systems (DBMS) and are used for query and reporting, statistical analysis and to reveal trends and patterns that would otherwise be buried in their huge operational databases. BI tools now have additional functions of forecasting capability that uses mathematical formulas to manipulate historical data and prediction capability.

2.1.2. Data Warehouse

One significant advantage of data warehousing is its ability to provide a unified view of organizational information. By aggregating data from multiple sources such as transactional systems, customer relationship management (CRM) platforms, and operational databases, a data warehouse eliminates data silos and inconsistencies. Moreover, data warehousing enhances decision-making capabilities by enabling complex querying and analysis. Business intelligence tools integrated with data warehouses allow users to perform ad-hoc queries, drill-down analysis, and multidimensional reporting. These capabilities empower organizations to uncover hidden patterns, identify correlations, and extract meaningful insights from large datasets swiftly and efficiently. Such analytical agility is crucial in dynamic markets where timely insights can translate into competitive advantages like improved customer targeting, operational efficiency gains, and optimized resource allocation (Park, 2006).

2.1.3 Data Visualization

This process involves the graphical representation of data sets to visually communicate trends, patterns, and relationships, enabling stakeholders to interpret information quickly and make informed decisions. By enhancing data comprehension and facilitating intuitive analysis, data visualization empowers businesses to uncover opportunities, optimize strategies, and differentiate themselves in dynamic and competitive markets (Fack, 2019). For instance, interactive dashboards allow executives to monitor KPIs, track performance metrics, and identify trends in real time, supporting proactive decision-making and strategic course corrections as needed (Janakiraman & Sarukesi, 2017). Moreover, data visualization promotes data-driven decision-making by fostering a deeper understanding of trends and correlations within datasets. By visualizing historical trends and predicting future outcomes, organizations can anticipate market shifts, customer preferences, and industry trends with greater accuracy. This predictive capability empowers businesses to adapt strategies proactively, seize emerging opportunities, and mitigate risks effectively, thereby maintaining a competitive edge in rapidly evolving market landscapes.

Furthermore, data visualization enhances communication and collaboration across departments and stakeholders. Visual representations of data facilitate clear and concise communication of insights, enabling teams to align on objectives, share findings, and collaborate on strategies. Whether presenting financial performance metrics to investors, sharing marketing campaign results with stakeholders, or collaborating on product development initiatives, intuitive data visualizations foster transparency, engagement, and consensus-building within the organization (Janakiraman & Sarukesi, 2017).

2.1.4 Competitive Advantage

The concept of competitive advantage is due to profitability as a long-term concept, that is, there is continuity in achieving profits, and the performance of the organization is above average in the industry to which it belongs, and this is sufficient to be evidence of its superiority and sustainability. Organizations seek to maintain its position and multiply efforts to continue to excel and progress in sustaining its competitive advantage among organizations in the same sector (Al-Alaq, 2016). Some writers believe that the progress and failure of some organizations depends on competition, and by setting the competitive strategies of the organization that lead it to dominate the market, as it works diligently to increase its market share or control of the business market (Porter, 1985). When developing the organization's strategic plan, the organization's strengths and weaknesses are studied and the external and

internal environment is defined. During the development of the plan, a competitive advantage is established as a goal that the organization seeks to reach by implementing the strategy through the focus strategy, which is relied upon to achieve competitive advantage (Diderrich, 2019).

Competitive advantage refers to the unique attributes or capabilities that allow an organization to outperform its rivals and achieve superior performance in the marketplace (Nguyen & Kwan 2019). Foon and Nair (2010) define competitive advantage as a kind of distinction that gives the organization something of positive progress and distinction over others in the same sector and this does not mean continuity for a specific period but rather the continuation to an indefinite period of time and the goal of the organization is to continue and repeat same. There are those who believe that the competitive advantage depends on the exploitation of resources through adopting rapid movement strategies through rapid learning and dealing with the rapid and lasting changes that take place in the environment in which the organization operates (Liu & Atuahene-Gima, 2018). Achieving competitive advantage is due to several important factors, one of which is the use of technology in its various forms. It helps the organization to analyze accurately and quickly communicate, in addition to linking it with the outside world in which it influences and deals with (Vivek, 2017).

In the Nigerian food and beverage industry, maintaining consistent manufacturing output is often challenged by factors such as inadequate infrastructure, supply chain disruptions, and regulatory compliance issues. However, firms that successfully navigate these challenges by optimizing their production processes can achieve a significant competitive edge. For example, implementing advanced manufacturing technologies and practices can lead to higher efficiency, reduced production costs, and improved product quality, which directly influence a firm's market position (Uche and Eke, 2020). Such advancements not only boost output but also enhance a company's reputation as a reliable supplier.

The relationship between manufacturing output and competitive advantage is also evident in pricing strategies. Moreover, high manufacturing output facilitates innovation and responsiveness to changing consumer preferences. Firms that can produce larger quantities are often better positioned to experiment with new product formulations and flavors, thereby capturing emerging trends in the food and beverage sector (Okoro, 2025). As the industry continues to grow amidst challenges, firms that prioritize their manufacturing outputs will likely lead the market and set benchmarks for quality and consumer satisfaction. This focus on output optimization will be essential for sustaining competitive advantage in the dynamic Nigerian food and beverage landscape.

1. Differentiation

One of the numerous tactics that may have been employed for marketing objectives is differentiation strategy. The study's stance is that differentiation strategies can account for Nigerian consumers' high levels of satisfaction. It goes without saying that a product with unique value can improve the customer experience, which will encourage recurring business and greater loyalty. Vera (2016) found that customer satisfaction can be somewhat predicted by differentiating approach. In the context of Nigerian industrial companies, this warrants further examination. Geographical, psychographic, and demographic factors are reflected in the segmentation plan.

Geographical location has a major impact on a firm's success and profit margin, claims Schiele (2018). This could be caused by factors including labor and raw material availability and closeness, customer and competition proximity, infrastructure, and transportation expenses.

Differentiation strategy summarizes the various efforts and actions taken by manufacturers to create significant differences in the products and services they offer. The main focus of this strategy is to create added value that can be accepted and appreciated by consumers (Sarah et al., 2009). Through various methods such as product innovation, unique designs, special features or superior quality, manufacturers strive to provide something more than just the basics. This not only creates uniqueness in the product, but also implies a higher level of service and quality (Spitzeck & Chapman, 2012). Successful organizations are the ones with specific time-table for the use of its resources and processes required by a business to provide services (Akpaetor, and Akpan 2022)

2.1.5 Business Intelligence and Competitive Advantage

Business intelligence provides competitive advantage by transforming data into actionable insights, enabling companies to optimize operations, make better decisions, and better understand customers and market trends, ultimately driving profitability, cost efficiency and sustained success in a data-driven world. Ibrahim et al. (2021). Organisations leverage Business intelligence systems, integrating data from various sources and employing analytical tools, to gain deeper insights, identify opportunities, and adapt to dynamic market conditions, thereby staying ahead of competitors. Business intelligence helps identify and eliminate operational bottlenecks, leading to higher productivity, reduced cost, and more efficient supply chains. Organization performance has been the most important consideration for every organization, be it profit or non-profit organization (Uforo *et al.* 2022). The essence is to maximize profit by capturing consumer surplus, but the difficulty is in comprehending

customer preferences and willingness to pay (Bassey, Ekanem & Edem, 2025). Ekanem *et al.* (2022). Efficiency is performance measured in terms of inputs and outputs; hence, a higher volume produced for a given input volume indicates greater efficiency. Effectiveness is measured by how well intended goals are accomplished.

Business intelligence creates competitive advantage through enhanced customer experience. By analysing customer data, businesses can understand preferences, personalize offerings and anticipate needs, which fosters loyalty and a superior customer experience that set them apart. Business intelligence can enhance competitive advantage through strategic agility. In a dynamic market, business intelligence enables organisations to quickly adapt to changing conditions by providing comprehensive views of their internal performance and market landscape. Business intelligence creates competitive advantage by providing real time, data driven insights that reduce uncertainty, allowing firms to make faster and more accurate decisions. Business intelligence also creates competitive advantage by highlighting unmet needs and emerging opportunities, guiding products development and service innovations. Akpaetor and Madubuike, (2023). Posit that strategic response are decisions and actions that firms apply or resort to in the face of business competition or turbulent business landscape. When an organization fail to respond to competition, it unavoidably opens up itself for competitive attack from rival firms. According Ekanem *et al.* (2023) when an organization needs to adapt its work resources to attract customers as well as other organizations with similar goals, market competition is considered inevitable. Companies can succeed by going to an uncontested market space without competition. It refers to the undiscovered market area (Uttong, Ekanem, & Uwa, 2024).

2.1.6 Data Warehouse and Competitive Advantage

In an era marked by digital transformation and data-driven decision-making, organizations are increasingly leveraging advanced data infrastructure to enhance performance and maintain a competitive edge. A data warehouse is a central repository that integrates data from multiple sources, organizes it for analysis, and supports business intelligence activities. Unlike traditional databases, data warehouses are optimized for querying and reporting, enabling organizations to generate insights from historical and real-time data. The concept of data warehousing emerged in the late 1980s as a response to the growing need for strategic data analysis beyond routine transaction processing. Since then, it has evolved into a critical component of enterprise information systems, supporting functions such as market trend analysis, customer behavior tracking, financial forecasting, and performance monitoring.

Effective strategic change management involves managing the people's side of an organization (Akpaetor and Madubuike 2022).

2.1.7 Data Visualization and Competitive Advantage

In today's fast-paced and data-rich business environment, the ability to quickly interpret and act on data is essential for gaining and sustaining a competitive advantage. Data visualization, the graphical representation of information and data has emerged as a powerful tool that enables organizations to understand complex datasets, identify patterns, monitor performance, and communicate insights more effectively (Janakiraman & Sarukesi, 2017). The importance of data visualization has grown alongside advancements in data analytics and business intelligence technologies. Tools such as dashboards, charts, heat maps, and interactive visualizations allow decision-makers to process information intuitively, detect trends in real time, and respond swiftly to emerging opportunities or threats (Uwa and Akpaetor, 2018).

By making data more accessible and understandable across all levels of an organization, data visualization enhances strategic decision-making, improves operational efficiency, and fosters a culture of evidence-based management. When used effectively, it enables businesses to uncover actionable insights faster than competitors, optimize processes, improve customer experience, and drive innovation thereby establishing a distinct competitive advantage in the marketplace, data visualization supports customer-centric strategies by enabling organizations to gain deeper insights into customer behavior and preferences (Uwa and Akpaetor, 2018).

By analyzing customer data through visualizations such as customer journey maps, segmentation charts, and sentiment analysis dashboards, businesses can personalize marketing campaigns, optimize customer experiences, and enhance retention strategies. This customer-centric approach not only strengthens customer loyalty but also drives revenue growth by delivering targeted products and services that resonate with individual preferences and needs (Janakiraman & Sarukesi, 2017). Moreover, data visualization contributes to innovation and competitive differentiation by facilitating exploratory analysis and hypothesis testing. Visual analytics tools empower data scientists and analysts to explore datasets interactively, uncovering hidden patterns, correlations, and outliers that traditional data analysis methods might overlook. This capability fuels innovation by inspiring new product ideas, process improvements, and operational efficiencies, enabling organizations to pioneer industry trends and establish themselves as market leaders (Fack, 2019).

2.2 Theoretical Review

The theory upon which this study is anchored is explained in this section.

2.2.1 Resource Based View Theory (Penrose, 1959)

The resource-based view theory was used for this study. It was originally postulated by Penrose in 1959. The theory postulates that given that business controls its resources, then it will achieve superior performance. It was later advanced to fit the growing usage (Wernerfelt, 1984; Rumelt, 1984; Barney, 1986). The theory states that a company's resources such as tangible assets (like equipment and capital), intangible assets (like brand reputation and intellectual property), human resources (such as skills and knowledge), and organizational capabilities (such as innovation and operational efficiency) are key determinants of its ability to compete effectively in the market. According to the RBV theory, not all resources are equally valuable or rare. Firms can achieve sustainable competitive advantage when they possess resources that are valuable (they contribute to exploiting opportunities or mitigating threats), rare (not easily available to competitors), inimitable (difficult for competitors to replicate), and non-substitutable (no equivalent resources can provide the same benefits) (Barney, 1991). These resources and capabilities form the core competencies of a firm, enabling it to develop unique products or services, lower costs, or deliver superior customer value compared to rivals.

The RBV theory contrasts with traditional industry-based views of competitive advantage, which focus on external factors such as market structure, competitive forces, and industry attractiveness. Instead, RBV emphasizes that sustainable competitive advantage derives primarily from internal resources and capabilities that are valuable, rare, and difficult to imitate or substitute. This perspective has influenced strategic management practices by encouraging firms to identify and develop their distinctive competencies, invest in resource development and protection, and leverage these strengths to achieve long-term success in their respective markets.

These authors explain that to be able to sustain the performance of a firm, it was useful to focus on the characteristics of the resources. Resource-based view perspective emphasizes that exclusive capabilities and resource of a firm is the basic source of competitive advantage and higher performance (Barney, 1986). Every firm owns numerous intangible and tangible resources (Barney, 1986). Barney (1986) maintained that there would be no difference in firms' profitability if all firms were equally endowed. However, when a firm develops unique, distinct and implicit capability defining its strategy, it would be successful in future competitiveness (Rumelt, 1984). Resources that accord a company superior performance are

enabled through competitive advantage and must be non-substitutable, imperfectly imitable, valuable and very rare (VRIN) to provide sustainable competitive advantage that yields better or higher performance (Barney,1986). Competencies and skills allow firms to respond to customer needs with differentiated services and products by innovating technology systems for competitive advantage (Rumelt, 1984). As used in the current study, RBV theory facilitated an evaluation of business intelligence and competitive advantage of food and beverage companies. From this theoretic al lens, it is reasoned that in order to achieve competitive advantage in present-day dynamic and increasingly complex business space, food and beverage companies should utilize relevant business intelligence as an important resource in its service delivery and gain competitive edge over rival companies.

As used and related to the current study, RBV theory facilitated an evaluation of business intelligence and competitive advantage of food and beverage companies. From this theoretical lens, it is reasoned that in order to achieve competitive advantage in present-day dynamic and increasingly complex business space, food and beverage companies should utilize relevant business intelligence as an important resource in its service delivery and gain competitive edge over rival companies.

2.3 Empirical Review

Basnet et al. (2026) examined advanced data visualization strategies for communicating marketing analytics to executives. The objective of the study was to examine how sophisticated visualization techniques translate multidimensional marketing data into clear strategic narratives that support executive decision- making. The study adopted a conceptual and analytical approach, reviewing empirical and practitioner-oriented studies on visualization use in executive environments. Findings indicated that well-designed visualizations significantly enhance comprehension, reduce cognitive overload, and improve alignment between marketing teams and executive leadership. The study concluded that organizations that adopt advanced visualization strategies are more likely to achieve sustained competitive advantage through improved decision-making quality. This study is related to the present study because they both examine the effect of data visualization on competitive advantage.

Baottong et al. (2025) conducted a study on leveraging big data analytics for competitive advantage. The objective of the study was to examine the strategic integration of big data analytics for achieving competitive advantage in business analytics. The study employed a mixed-method approach, integrating a comprehensive literature review with empirical investigation. Quantitative data was collected via surveys from 200 senior executives, data

scientists, and IT managers across various industries. Qualitative data were gathered through semi-structured interviews with 30 participants, providing in-depth insights into the strategic, organizational, and cultural factors influencing the implementation of big data. Findings revealed that organizations that integrate data analytics with strategic objectives achieve higher returns on investment and improved competitiveness. The study concluded that data visualization, as part of analytics capability, significantly contributes to competitive advantage when aligned with organizational strategy. Recommendations included developing integrated strategies, investing in training programs, promoting data literacy, and ensuring high data quality and security.

Hasan et al. (2025) investigated the impact of business intelligence adoption and ambidextrous innovation in the UAE health sector. The objective of the study was to examine how business intelligence adoption influences ambidextrous innovation in health care organisations in the UAE. Quantitative cross-sectional survey was adopted for this study. The population of study was professionals in the UAE's health sector and the sample size was 510. Data were collected using structured questionnaire and analysed using structural equation modeling. Findings indicated that business intelligence adoption has a positive direct effects on ambidextrous innovation in health care organisations in the UAE. It was recommended that healthcare leaders should leverage business intelligence systems not just for data analytics, but also as tools to improve decision making, ultimately driving innovation. This study is related to the present study in terms of the method of data collection as they both used questionnaire.

Dogho and Ojoawo (2025) investigated the role of Data analytics in food safety: Improving quality control and preventing contamination in USA. The objective of the study was to examine the growing need for the application of data analytics in making food quality control easier, better, and safer. It looks into how new tools like predictive modeling, machine learning, and blockchain-based traceability systems can help prevent contamination and reduce foodborne outbreaks. The research design used was case study: A detailed review of existing literature, case studies, and relevant industry reports between 2019 and 2025 was carried out to assess the existing and potential impact of data analytics on food quality control and food safety. The research employs a qualitative approach. Results: Findings revealed a disturbing trend of repeat contamination incidents linked to dairy, poultry, and fresh produce. It also established that the rise in foodborne outbreaks was due to a number of reasons, like poor data infrastructure, low use of predictive technology, and disconnected traceable systems. The use of analytics and data analytics tools effectively helps us detect issues early,

track contamination before it happens, and maintain a strong supply chain. It was concluded that the application of data analytics is no longer a luxury; it is now a necessity that must be maximized to make food safer. As the global food industry becomes more complex and prone to contamination, using AI-driven predictive systems, blockchain traceability, and real-time analytics can significantly reduce outbreak risks. The future of food quality control relies on active data management, collaboration across sectors, and increased investment in smart farming technologies. This study is related to the present study as they both examined data management system in food and beverage Firms.

Adeniran et al. (2024). Investigated the effect of capacity utilization on productivity in Nigeria's food manufacturing sector. The objective of the study was to assess the effect of capacity utilization on productivity in Nigeria's food manufacturing sector. Quantitative research design using cross-sectional data was adopted for the study.

Data were obtained from the World Bank Enterprise Survey, covering a large number of food manufacturing firms in Nigeria. Multiple regression analysis was used to estimate the relationship between capacity utilization and productivity indicators. Findings indicated that Capacity utilization showed an insignificant relationship with total factor productivity (TFP). However, material efficiency and other operational factors significantly influenced performance. The study concluded that capacity utilization alone may not guarantee improved productivity unless supported by other operational efficiencies and firm-specific factors performance. The study concluded that capacity utilization alone may not guarantee improved productivity unless supported by other operational efficiencies and firm-specific factors. This study is related to present study because it utilizes food manufacturing firms in Nigeria.

METHODOLOGY

The survey design was used for this study. This method was used because of the nature of the study and statement of the problem. It enabled the researcher to collect data for the purpose of describing and interpreting existing condition, attitudes and on-going process. It helped the researcher to find answers to questions, collect first-hand information, elicit information from the respondents, obtain data from primary sources, collect data from the target population regarding business intelligence and competitive advantage in food and beverage Firms. The accessible population of this study consisted of 2,502 staff of Nestle Nigeria Plc, 1,216 staff of Cadbury Nigeria Plc, 1,504 staff of Guinness Nigeria Plc, 3,006 staff of Nigeria Breweries Plc, and 6,002 staff of Flour Mills of Nigeria Plc. Therefore, the total population of 14,230

accessible population was used for this study and formed the basis of this study. Also, the units of analysis comprised of managers, senior staff, and junior staff of the selected food and beverage Firms in south-west geo-political zone of Nigeria to ensure precision of results.

Table 3.2.1 NUMBER OF STAFF IN THE FIRMS.

Names of Firms	Number of Staff	Proportional Distribution
Nestle Nig. Plc.	2,502	65
Cadbury Nig. Plc.	1,216	32
Guinness Nig. Plc.	1,504	39
Nig. Breweries Plc.	3,006	78
Flour Mills Nig. Plc.	6,002	156
Total	14,230	370

Source: Human Resources Management Department of each firm, (2026).

For calculating sample sizes, this study used Krejcie and Morgan Formula, which is stated as follows:

$$S = [x^2 np (1-p)] / [d^2 (n-1) + x^2 p (1-p)] \quad \text{model 3.1}$$

Where:

S = require sample size

X²= the table value of chi-square for 1 degree of freedom at 95% confidence level (3.841)

n= the population size

P= the population proportion (assumed to be 0.50 since this would provide the maximum sample size)

d= the degree of accuracy expressed as a proportion (margin of error) (0.05)

Since N = 14,230

$$n = [3.841 (14,230) (0.5) (1-0.5)] / [0.05^2 (14,230 -1) + [3.841(0.5) (1-0.5)]$$

$$3.841 (14,230) (0.5) (0.5) / [0.0025(14229) + [3.841(0.5) (0.5)]$$

$$= 13,664.3575 / (35.5725 + 0.96025)$$

$$= 13,664.3575 / 36.53275$$

$$= 370$$

Sample size (n) = 370.

The sampling technique that was used for this study is simple Random Sampling. Since the population of the study was not collected from a particular organization, Proportional sample allocation formula was used to allocate the sample respondent to each of the organization selected for the study for the purpose of ensuring precision of results. The formula is given as

$$P = \frac{sx n}{N}$$

Where:

P = Proportional Allocation

S = Staff strength

n = sample size

N = Population of the study

Simple random sampling technique was used to select respondents from each of the selected food and beverage firms. Questionnaires were then administered to the selected respondents. Data for this study was collected from primary source through the use of questionnaire. This is because questionnaire helped to collect first-hand information and elicit responses from the respondents who will be selected to participate in the study. Nominal data was used in this study.

This study adopted questionnaire with 5-point likert scale which included, Strongly agree, SA (5), Agreed, A (4), Strong Disagreed, SD (3), Disagreed, D (2) and Neutral, UD (1). The questionnaire was divided into section A (which reviewed the demographic variables of respondents) and section B which contained some research questions relevant to the problem at hand. A total of 370 questionnaire was distributed among the staff of the selected foods and beverages firms in south-west Nigeria. In order to obtain the precise opinion, the questionnaire was designed in a way that enabled respondents to choose the most appropriate option out of the alternative questions.

In order to ascertain the combined influence of business intelligence model and competitive Advantage, the composite model is given for objective 1 and 2 as follows:

$$CA = f(DW, DV) \quad \text{Model 3.1}$$

Equations 1 -3 are rewritten in its explicit form as follows:

$$CA_{it} = \beta_0 + \beta_1 DW + \varepsilon \quad \text{Equation 3.1}$$

$$CA_{it} = \beta_0 + \beta_1 DV + \varepsilon \quad \text{Equation 3.2}$$

$$CA_{it} = \beta_0 + \beta_1 DW + \beta_2 DV + \varepsilon \quad \text{Equation 3.3}$$

Where:

DW = Data Warehouse

DV = Data Visualization

$\beta_1, \beta_2,$ = Coefficients of the independent variables
 e = Error term

The data was analyzed using descriptive and inferential statistics. Descriptive statistics such as simple percentage was used to analyze the data while inferential statistics such as Simple Linear regression analysis was used to test the null hypotheses for the study, using statistical software programme known as Statistical Package for Social Sciences (SPSS), version 25. The basic aim of the linear regression models in this study was to examine empirically the extent to which the independent variables can explain the hypothesized performance variable in these firms along the regression line. The model was estimated using the coefficient of determination (R^2). It helped to measure the goodness of fit of the model while t-value was used to measure the differences in the mean at 5% (percent) level of significance.

4 DATA PRESENTATION, ANALYSIS AND FINDINGS

4.1 Descriptive Statistics

Research Question 1:

What is the influence of data warehouse on competitive in food and beverage in South- West, Nigeria?

Table 4.1: The Result of Percentage Analysis on influence of Data Ware House on Competitive advantage in food and beverage firms in South- West, Nigeria

	Data Warehouse	SA	A	D	SD	Total
1.	I integrate data from various sources such as sales and inventory in my company	142 (39.2%)	130 (36.0%)	48 (13.3%)	42 (11.6%)	362
2.	I provide a secure and reliable storage system for historical data in my company	129 (36.6%)	143 (39.5%)	51 (14.1%)	39 (10.8%)	362
3.	I provide access to data storage in my company	151 (41.7%)	127 (35.0%)	50 (13.8%)	34 (9.4%)	362

Source: Researcher's Computation (2025)

Table 4.1 indicates that 142 respondents representing 39.2% strongly agree that they integrate data from various sources such as sales and inventory in their company while 130 respondents which account for 36.0% agree but 48 respondents representing 13.3% disagree and 42 respondents representing 11.6% strongly disagree. Also, 129 respondents representing 36.6% strongly agree that they provide a secure and reliable storage system for historical data in their company while 143 respondents representing 39.5% agree but 51 respondents

representing 14.1% disagree and 39 respondents representing 10.8% strongly disagree that they provide a secure and reliable storage system for historical data in their company. Furthermore, 151 respondents representing 41.7% strongly agree they provide access to data storage in their company while 127 respondents representing 35.0% agree but 50 respondents representing 13.8% disagree and 34 respondents representing 9.4% strongly disagree that they provide access to data storage in their company.

Research Question 2

What is the influence of data visualization on competitive in food and beverage firms in South- West, Nigeria?

Table 4.2: The Result of Percentage Analysis on influence of Data Visualization on Competitive advantage of food and beverage firms in South- West, Nigeria

	Data Visualization	SA	A	D	SD	Total
1.	I rate the clarity of data used in my company's decision-making process	141 (39.0%)	131 (36.2%)	49 (13.5%)	41 (11.3%)	362
2.	The availability of real-time data influence my company's ability to respond quickly to market shift or customer demand	130 (36.0%)	140 (38.7%)	56 (15.5%)	36 (10.0%)	362
3.	My company explores various data point for deeper insights	150 (41.4%)	126 (34.8%)	53 (14.6%)	33 (9.1)	362

Source: Researcher's Computation (2025)

Table 4.2 shows that 141 respondents representing 39.0% strongly agree that they rate the clarity of data used in their company's decision-making process while 131 respondents which account for 36.2% agree but 49 respondents representing 13.5% disagree but 41 respondent which account for 11.3% strongly disagree that that they rate the clarity of data used in their company's decision-making process. Similarly, 130 respondents representing 36.4% strongly agree that The availability of real-time data influence my company's ability to respond quickly to market shift or customer demand while 140 respondents representing 38.7% agree but 56 respondents representing 15.5% disagree and 36 respondents representing 10,0% strongly disagree.

4.2 Test of Hypotheses

Hypothesis 1

H₀₁: There is no significant Influence of data warehouse on competitive advantage in Food and Beverage Firms in South – West, Nigeria

Table 4.3: The Simple Linear Regression Analysis on the Influence of Data Warehouse on Competitive Advantage in Food and Beverage Firms in South – West, Nigeria.

Model Summary^b					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.847 ^a	.717	.716	.62372	2.457

Model Fit					
Model	Sum of Squares	Df	Mean Square	F	Sig.
1 Regression	355.202	1	355.202	913.042	.000 ^b
Residual	140.440	361	.389		
Total	495.642	362			

Coefficients^a					
Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
1 (Constant)	.275	.075		3.646	.000
Data Warehouse	.860	.028	.847	30.217	.000

Source: Researcher's Computation (2025)

Table 4.3 indicates the simple linear regression analysis on the influence of data warehouse on competitive advantage of food and beverage Firms in South – West, Nigeria, Nigeria. The results yield R^2 –value of .717, F-value of 913.042, Beta coefficients of .860, Durbin Watson coefficients of 2.457 and P-value of .000. This means data warehouse can account for 71.7% change in competitive advantage of food and beverage firms South – West, Nigeria in Nigeria. This was supported by Beta coefficients of .860 which implies that 1 unit increase of data warehouse would lead to 860 increases in competitive advantage. Therefore, to evaluate the goodness of fit of the model, an F-statistics was computed and results yield F-value of 913.042 which means that the model is fit to evaluate the influence of data warehouse on competitive advantage of food and beverage Firms in South – West, Nigeria. Also, to check the presence of autocorrelation in the model, the Durbin Watson statistics was computed and results yielded the coefficients of 2.457 which indicates that there is absent of serial correlation in the model, suggesting that the residual is not conflicting and the data warehouse operates independently to establish a significant influence on competitive advantage in food and beverage firms in South – West, Nigeria. Therefore, since an F-value of 913.042 and P-value of .000 lies below the alpha value of 0.05 level of significant in social sciences, it can be affirmed that the null hypothesis which states that there is a significant influence of data warehouse on competitive advantage of food and beverage Firms in South – West, Nigeria is rejected and the alternative accepted, suggesting that data data warehouse

has significant influence on competitive advantage of food and beverage firms in South – West, Nigeria ($P < 0.05$).

Hypothesis two

H₀₂: There is no significant Influence of data visualization on competitive advantage in Food and Beverage Firms in South – West, Nigeria

Table 4.4: The Simple Linear Regression Analysis on the Influence of Data Visualization on Competitive Advantage in Food and Beverage Firms in South – West, Nigeria.

Model Summary ^b					
Model	R	R Square	Adjusted Square	Std. Error of the Estimate	Durbin-Watson
1	.877 ^a	.770	.769	.56251	2.287

Model Fit						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	381.415	1	381.415	1205.413	.000 ^b
	Residual	114.227	361	.316		
	Total	495.642	362			

Coefficients ^a					
Model	Unstandardized Coefficients		Standardized Coefficients		Sig.
	B	Std. Error	Beta	T	
1 (Constant)	.209	.068		3.090	.002
Data Visualisation	.895	.026	.877	34.719	.000

Source: Researcher's Computation (2025)

Table 4.4 indicates the simple linear regression analysis on the influence of data visualization on competitive advantage of food and beverage Firms in South – West, Nigeria. The results yield R^2 –value of .770, F-value of 1205.413, Beta coefficients of .895,. Durbin Watson coefficients of 2.289 and P-value of .000. This implies data visualization can account for 77.0% change in competitive advantage of food and beverage Firms South – West, Nigeria. This was supported by Beta coefficients of .895 which implies that 1 unit increase of data visualization would lead to 895 increases in competitive advantage. therefore, to evaluate the goodness of fit of the model, an F-statistics was computed and results yielded F-value of 1205.413 which means that the model is fit to evaluate the influence of data visualization on competitive advantage of food and beverage Firms in South – West, Nigeria. Also, to check the presence of autocorrelation in the model, the Durbin Watson statistics was calculated and results yielded the coefficients of 2.287 which indicates that there is absent of

serial correlation in the model, suggesting that the residual is not conflicting and the variable operates independently to establish a significant influence on competitive advantage in food and beverage firms in South – West, Nigeria. Therefore, since an F-value of 1205.413 and P-value of .000 lies below the alpha value of 0.05 level of significant in social sciences, it can be affirmed that the null hypothesis which states that there is a significant influence of data visualization on competitive advantage of food and beverage Firms in South – West, Nigeria in Nigeria is rejected and the alternative accepted, suggesting that data visualization has significant influence on competitive advantage of food and beverage firms in South – West, Nigeria ($P < 0.05$)

4.3 DISCUSSION OF FINDINGS

Data Warehouse and Competitive Advantage of Food and Beverage Firms

The findings of hypothesis two indicated that data warehouse has significant influence on competitive advantage of food and beverage firms in South – West, Nigeria. Data warehouses, as centralized repositories for structured and unstructured data, play a crucial role in enhancing competitive advantage by enabling organizations to efficiently store, manage, and analyze vast amounts of business intelligence. By consolidating data from disparate sources, a data warehouse allows businesses to gain insights into customer behavior, market trends, and operational performance, ultimately supporting more informed decision-making. The finding is supported by the work of Gartner (2020) who emphasized that organizations investing in robust data warehousing solutions can better analyze historical data to predict future trends, which aids in strategic planning and operational efficiency. The ability to derive actionable insights from large datasets provides companies with a strategic edge in terms of market forecasting and responsiveness. The finding is in line with previous studies of Singh *et al.* (2021) who also support this view, showing that businesses with integrated data warehouses exhibit enhanced decision-making capabilities, leading to improved performance and a stronger competitive position.

The findings of hypothesis two indicated that data warehouse has significant influence on competitive advantage of food and beverage firms in South – West, Nigeria. Data visualization has emerged as a powerful tool for businesses looking to enhance their competitive advantage by turning raw data into actionable insights. It allows organizations to distill complex data into clear, visual formats that facilitate quick decision-making and identify trends and patterns that might otherwise go unnoticed. The finding is supported by the work of Zhang (2024) who emphasized that data visualization enhances the decision-

making process by making large datasets more accessible, thereby improving efficiency and strategic responses to market dynamics. This ability to interpret data visually leads to better decision-making speed and accuracy, critical factors in gaining a competitive edge. Similar studies, like those by Wang et al. (2022), support this, showing that companies using data visualization tools are able to interpret market

trends, consumer preferences, and operational performance more effectively, leading to improved business outcomes and sustained competitive advantage. The finding is in agreement with the works of Moore et al. (2017) who discussed how the use of data visualization tools has been integral in enabling firms to better understand consumer behavior, demand fluctuations, and operational efficiency, ultimately improving their market position. In a highly competitive industry like food and beverage, firms must constantly adapt to changes in consumer trends and supply chain disruptions, and the ability to visualize data facilitates more agile responses.

5. CONCLUSION

In conclusion, the significant influence of data warehouses and data visualization, on the competitive advantage in food and beverage firms in the South – West, Nigeria underscores the critical role of information technology in modern business strategy. Data warehouses fosters collaboration and innovation, allowing firms to improve decision-making processes and enhance operational efficiency. data visualization further strengthen this competitive edge by enabling firms to store, organize, and analyze vast amounts of data, providing insights that drive strategic decisions and optimize business operations. These tools allow companies to respond quickly to market dynamics, streamline their supply chains, and improve overall productivity.

6 Recommendations

1. Food and beverage firms should invest in data warehouses that centralize data from various sources. That will support long-term strategic planning and enhance good decision making that will help firms identify opportunities for growth and areas that require improvement.
2. Organisation should integrate data visualization tools into their operations by visually representing complex data which aids in making faster and more accurate business decisions -making.

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