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AN ANALYSIS OF THE FACTORS AFFECTING SUCCESSFUL ADOPTION OF BUSINESS INTELLIGENCE IN THE BEVERAGE MANUFACTURING INDUSTRY IN ZIMBABWE- CASE OF DELTA BEVERAGES.

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DEDICATION

To my beloved husband Chengetai and my two lovely sons Tawananyasha and Kutenda.

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ABSTRACT

Business Intelligence (BI) and the many analytics systems that support demand management, predictive analytics, revenue modelling and role-based intelligence within organizations are critical for any organization to survive in today's incredibly turbulent marketplace. The research analyses the factors affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe using a case study of Delta Beverages Corporation. The objectives of the study were fourfold; to ascertain the effect of organizational factors on adoption of Business Intelligence at Delta Beverages; to assess the impact of environmental factors on adoption of Business Intelligence adoption at Delta Beverages; to investigate the impact of technological factors on Business Intelligence adoption at Delta Beverages; and to propose better ways that Business Intelligence can be adopted and implemented at Delta Beverages. This research adopted a positivism philosophy. The study adopted a deductive research approach. A quantitative explanatory research design was adopted for this study. The population constituted of the managers (top, middle and low level) and workers of Delta Beverages in Harare. A systematic random sampling technique was used. A sample size of 313 was taken, with a response rate of 85.94%. Primary data was used. SPSS was used for data analysis. Microsoft Office was used for presentation in form of tables and graphs. The study concluded that Delta Beverages has pronouncedly adopted business intelligence in its operations. The study also concluded that organisational factors like employee competences and skills, management style, organisational structure, organisational culture and business size affect the extent to which Delta beverages can adopt business intelligence. Organisational factors' conduciveness has a strong positive and statistically significant impact on business intelligence adoption. Currently, all these factors are generally not conducive for significant adoption of business intelligence. Various environmental factors like political environment, national economic environment, legal environment and competitive pressures have an impact on the extent to which Delta Beverages adopts business intelligence. The study concluded that the conduciveness of these environmental factors has a moderate positive impact on the extent of adoption of business intelligence by Delta Beverages. However, currently the business environment for Delta Beverages is not conducive for business intelligence adoption. The study recommended Delta Beverages Top management to support business intelligence adoption. The government was recommended to support business intelligence adoption through provision of enough foreign currencies and reduction of taxes.

Future researchers were recommended to do surveys in other industries and to include interview guides to enhance data triangulation.

Key words. *Business Intelligence, Adoption, Information Technology, Beverage Manufacturing Industry, Organisational Factors, Environmental Factors, Technological Factors*

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ACRONYMS

Chief information officer	CIO
Information Technology	IT
Business Intelligence	BI
Confederation of Zimbabwe Industries	CZI
Statistical Package for Social Sciences	SPSS
Resource-based view	RBV
Technology-Organization-Environment	TOE
Diffusion of Innovation	DOI
Product Lifecycle Management	PLM
Supply Chain Management	SCM
Internet of Things	IOT
Cyber Physical Systems	CPS
Mean Time Between Failures	MTBF
Total Quality Management	TQM
Hewlett-Packard	HP

CHAPTER ONE

GENERAL INTRODUCTION

1.0 INTRODUCTION

The chapter provided the background to the study, the research objectives, research questions, research hypothesis, problem statement, justification of the study, brief literature review, methodology and the implementation plan.

1.1 BACKGROUND TO STUDY

Business Intelligence (BI) and the many analytics systems that support demand management, predictive analytics, revenue modelling and role-based intelligence within organizations are critical for any organization to survive in today's incredibly turbulent marketplace. Research and claims by various industrialists have pointed out that business intelligence is one of the ways companies are now using it to spruce up their performance. However, literature is scarce on the driving forces behind the adoption of business intelligence, especially by manufacturing companies. This study focuses on the factors that affect the successful adoption of business intelligence in Zimbabwe's manufacturing industries, focusing on the beverages industry.

Business intelligence (BI) is an umbrella term for the technologies, applications, and processes associated with collecting, storing, using, disclosing and analysing data to facilitate decision making (Rahman, 2017). Dayal (2009) defines BI as the technologies, tools, and practices for collecting, integrating, analysing, and presenting large volumes of information to enable better decision making. In economically turbulent times, Business Intelligence (BI) is increasingly being used to mitigate risk and increase certainty (Salmasi, Talebpour and Homayounvala, 2016). The concentration is on how BI can streamline manufacturing, quality assurance, marketing and customer service are evaluated, as are the potential payoffs of increasing the level of insight an organization has. The use of Business Intelligence refers to certain skills, technologies, practices, and processes that are employed as part of supporting decision- making in an organization (Rezaie, Mirabedini and Abtahi, 2017). The applications of Business Intelligence technology have historical, contemporary and even predictive viewpoints of the business undertakings of an organization. This technology contains certain unique functions that are intrinsic to the particular systems. The adoption of BI systems therefore is aimed at the support of better quality decision- making within an organization.

Chief information officers (CIOs) rank BI first when asked to prioritize technology investments, which indicates BI's strategic importance. In today's highly competitive world, BI quality and accuracy are critical factors in the generation of profits and losses (Puklavec, Oliveira and Popovič, 2018). Several researchers have emphasized the benefits of using BI. Organizations can improve their business practices and thus their performance, by making decisions based on business analytics (Puklavec, Oliveira and Popovic, 2014). The aim of BI is building shareholder value. However, the success of BI varies across industries and organizations. BI implementations are complex, and this high complexity carries a cost. The cost of BI technologies is high because implementation requires software, infrastructure, licenses, training and wages (Pham, Mai, Misra, Crawford and Soto, 2016). Moreover, a significant number of organizations fail to realize the expected benefits of BI.

Business intelligence has resulted in significant transformations in the way the manufacturing companies operate across the globe (Owusu, Agbemabiasie, Abdurrahaman and Soladoye, 2017). Furthermore, the increase in specialised hardware being equipped with continuously increasing processing power has enabled more robust BI systems (Petter, DeLone and McLean, 2013). This specialised hardware and processing power has also greatly improved infrastructure in which data can be mined and fed for enhanced and advanced capabilities in the manufacturing industries (Bughin, and Hazan, 2017). Bughin, and Hazan (2017) note however, that the majority manufacturing companies in the world seems to be realising the benefits of BI and are just starting to adopt it.

Numerous questions may arise as to how exactly these companies can integrate BI with the customers' need for human interaction when needed (Acheampong and Moyaid, 2016). Nevertheless, there are dramatic changes that have been taking place in this sector across the globe, especially advancing and advanced economies in the world. Manufacturing companies are now more able to personalise customer services and minimise fraudulent risks as well as monitor system and human performance (Manning, 2018). One of the business intelligence tools is the artificial intelligence, which is the development of computer systems that have the potential to perform tasks that would require human intelligence; examples of these tasks include visual perception, speech recognition, decision making and translation between languages (Nasab, Jaryani, Selamat and Masrom, 2017). The real life examples of artificial intelligence examples include self-driving cars, boson dynamics, navigation systems, chatbots, human vs. computer games, use of social media data to predict customer needs, use of electronic systems that allow customers to transact throughout the day using USSD messages with computers, use of computers to generate data for decision making and playing advisory services and simulation and prototyping, inter alia (Lautenbach, Johnston and Adeniran-Ogundipe, 2017).

To keep abreast with the rapid changes in business environment as the rate at which data and information is accumulating, organizations are thriving to leverage the benefits from information through embracing the emerging inception of information management (Lee and Xia, 2010). For companies and institutions to survive in the economy and in the business world, decisions must be accurate and made on time (Karim 2011; Olszak 2016). Business Intelligence (BI) is moderately gaining acceptance both in the business world and the academic arena. According to the Gartner report for 2012 (Gartner, 2012), BI remains the most favoured on the list of the technological tools of the Chief Information Officer's (CIO's). Business intelligence (BI) solutions are being adopted within organizations to achieve a more grounded decision-making process that improves organizational performance.

Beverage manufacturing companies across the globe have adopted business intelligence to differing extents, in different ways. Globally, food and beverage companies like PepsiCo and Coca Cola Co. in the US and UK, Boparan Holdings in the UK and Heineken in the US have adopted business intelligence in their operations (Mesaros, Carnicky, Mandicak, Habinakova, Mackova and Spisakova, 2016). The US and UK markets are characterised by stable economic environments, with high effective demand for beverage products. Pepsi Co. has managed to adopt business intelligence systems by collecting customer data through strong R&Ds and collection of social media customer data. Through the processing of these data with intelligent computer systems such as the chatbots, the company has managed to remain one of the biggest beverage companies in the US as it is able to predict customer needs and to detect changes in customer preferences then react as early as necessary (Hatta, Miskon and Abdullah, 2017). A research by Tanja (2018) revealed that Pepsi has managed to adopt business intelligence more successfully because of factors like better employee skills, stability of business environment, supportive business culture and flatter organisational structure, financial stability and availability of customer data sources like Google and YouTube.

Regionally, beverage companies in countries like Kenya and South Africa have also adopted business intelligence to some extent. A study by Kappelman, McLean, Johnson and Torres (2016) concluded that the manufacturing industries in the developing countries have adopted business intelligence to a lesser extent than the developed countries. In South Africa, mostly the multinational companies like Coca Cola, Pepsi and Heineken companies have adopted business intelligence. However, poor access to customer data has resulted in challenges in the adoption of business intelligence. According to Ndou (2014), companies like Peninsula

Beverages in South Africa have failed to adopt business intelligence to a considerable extent owing to reasons like financial challenges, high resistance to change, unsupportive top management and lack of the requisite skills. Similar reasons were unveiled by Villamarín and Diaz Pinzon (2017) in their study on Sun Set Agro in Kenya.

In Zimbabwe, the external business environment has been characterised by high instability for almost two decades (Chokuda, 2018). Economically, the country experiences high unemployment rates, high inflation rates, high interest rates, low investment, foreign currency shortages, high rate of company closures, high import levels and low export levels and low GDP. Politically, the country has experienced high political instability for over two decades. According Ndou (2014) the political and economic environments of Zimbabwe hinder business activity, including adoption of business intelligence systems. Socially, the country has varied cultures. Social media has also been adopted, to the level of social media banking. However, according to Kaseke (2019), most of the companies in Zimbabwe have failed to collect customer data on digital platforms for business intelligence purposes but have only managed to use these platforms as customer touch-points for communication purposes. All in all, the business environment in Zimbabwe is being characterised by shortage of working capital support, a decline in domestic market, exorbitant utility charges, higher compared to regional tax structures, high wages, credit and liquidity stress, and several supply-side restrictions that includes fuel, power and imported inputs. Demand for local products has declined because of a possible shift in consumption patterns in favour of cheaper imported goods.

Looking at the beverage industry in Zimbabwe, the industry is dominated by Delta Beverages, which is currently the largest listed company in Zimbabwe by market capitalisation (Zimbabwe Stock Exchange, 2020). The other players in the industry include African Distillers Ltd, Pepsi, Schweppes and Simba. According to the Confederation of Zimbabwe Industries (2020) reported that there has been a general decline in the capacity utilisation in the manufacturing industry in Zimbabwe. Capacity utilisation is the extent to which an enterprise or a nation uses its installed productive capacity. It is the relationship between output that is produced with the installed equipment, and the potential output which could be produced with it, if capacity was fully used. The CZI considers the current capacity utilisation as too low for a vibrant industry. The confederation cites a plethora of factors to the decline in capacity utilisation in the industry, both internal and external. The figure that follows presents the capacity utilisation performance of the manufacturing sector in Zimbabwe for the past 6 years.

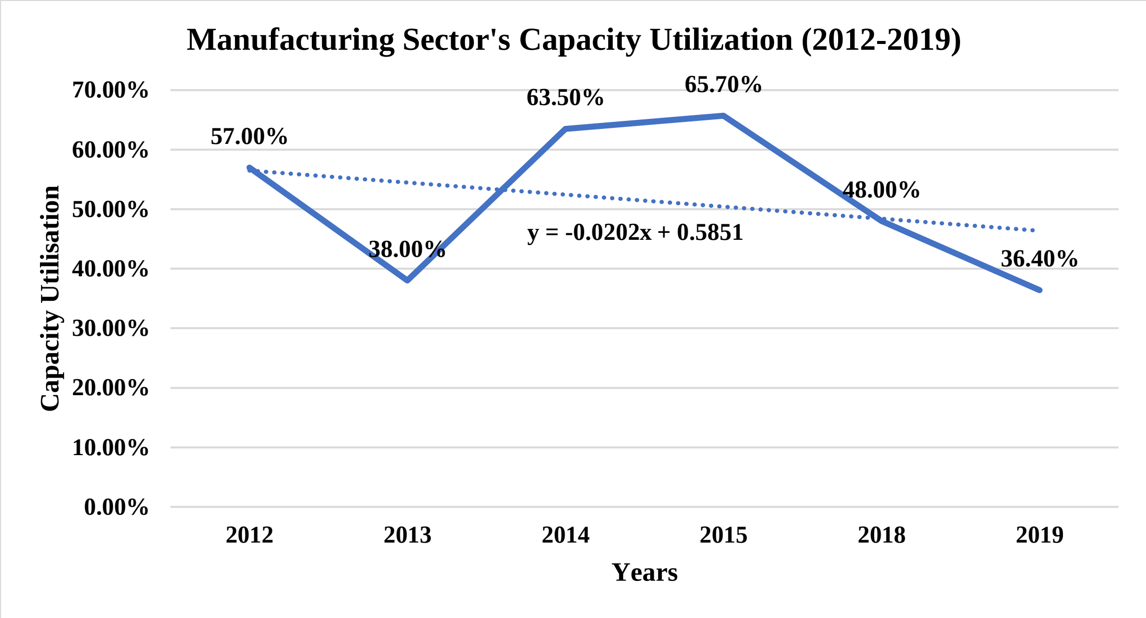

Figure 1.1: Manufacturing Sector's Capacity Utilization for the period 2012-2019
Source: CZI Manufacturing Sector Surveys, 2012-2019.

The figures from the Confederation of Zimbabwe Industries (2020) reported that there has been a general decline in the capacity utilisation in the manufacturing industry in Zimbabwe. Capacity utilisation fell to 36.4% in 2019 from 48% in 2018, representing a percentage change of -24.17%. Delta Beverages has managed to adopt different strategies in its bid to remain the country's major suppliers of beverage products in Zimbabwe. Delta Beverages Company is the largest beverages manufacturer and distributor in Zimbabwe. It has four product categories which it manufactures and distributes in Zimbabwe, namely Lager Beer, Sparkling Beverages, Sorghum Beer and Alternative Beverages (www.delta.co.zw, accessed 24/11/2020). At Lager Beer strategic business unit, the company has several lager brands in its portfolio including Castle Lager, Lion Lager, Peroni, Sarita and Redds amongst others. In the Sparkling Beverages category, the company bottles carbonated soft drinks under the Coca-Cola and Schweppes brands (Mushure, 2018). Delta Corporation Ltd. has an outright market dominance of beverage products in Zimbabwe, with approximately 96% market share in lager beer, 97% market share in sparkling beverages, and 90% market share in traditional sorghum beer (Mushure, 2018). The company is listed on the Zimbabwe Stock Exchange and is the largest privately-owned company by market capitalization in Zimbabwe; with a market capitalization of ZWL 28 billion in December 2020 (Zimbabwe Stock Exchange, 2020). The company uses flow production in its operations, characterised by heavy equipment. The company has a divisionalised and tall structure, facing challenges to access foreign currencies, is capital intensive and is highly able to higher qualified human skills. However, the company has not been spared by both internal and external business challenges.

In its desire to grow, improve decision making and reduce costs, Delta Beverages has tried to adopt business intelligence in its operations. For example, the company has lost large sums of money in unfruitful investments and due to fraudulent activities (Chokuda, 2018). For example, Delta Beverages was swindled of more than $47,000 and the accused appeared in court facing fraud charges. The Herald of 17 July 2012 showed that the prosecutor revealed that during the period from July 24, 2011 to March 24, 2012 the accused on 14 occasions made a misrepresentation into the company's system by posting fictitious figures to idle codes of beer packs. Due to this misrepresentation, the company lost $47 000. To reduce some of these problems, the company has tried to adopt business intelligence for advisory purposes, supervisory purposes and for employee and customer data capturing and processing. Also, because the company is large and deals with large volumes of sale arrangements with its clients, the company has sought business intelligence and more advanced computer systems for data capturing, monitoring and processing and the generation of reports. However, despite its ability to improve its systems through the adoption of business intelligence, the company has continued to make retarded profits, poor decisions and has cases of fraudulent activities have continued. This study seeks to explore the critical success factors that are needed for successful adoption of business intelligence at Delta Beverages.

1.2 RESEARCH PROBLEM

Studies show that though Business Intelligence has influenced business processes greatly in developed countries. For companies like Pepsi, Coca Cola and Heineken in the US, UK and India have managed to adopt business intelligence and have their performances improved. The economic and political environments of these countries are more stable than in Zimbabwe. However, the case for Delta Beverages seems to be different. The company has adopted business intelligence in its processes, including automation of systems and adoption of relevant computer hardware and software, but its capacity utilisation and general performance has generally been on the decline over the past five years. No research was found to have analysed the current role that business intelligence is playing towards the company's current performance level.

Also, no extant literature has been found to have looked at the extent to which the critical success factors for business intelligence adoption in the beverage in industry are applicable at

Delta Beverages. Thus, there is very little, or no research has been carried out to analyse Business Intelligence adoption in Delta Beverages' business processes particularly in Zimbabwe. The Institutional theory that attempts to explain the underlying factors to business success is not comprehensive enough. It leaves out an open end. It does not state the strength of the factors in their influence towards business success, and the fact that they are contextual to the beverages manufacturing industry and Zimbabwe at large, there is need for this research as it delves into the strength of the different factors on adoption of Business intelligence.

1.3 RESEARCH OBJECTIVES

1.3.1 MAIN OBJECTIVE

The study was aimed at analysing the factors affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe.

1.3.2 SPECIFIC OBJECTIVES

The objectives of the study were;

1. To ascertain the effect of organizational factors on adoption of Business Intelligence in the beverage manufacturing industry.
2. To assess the impact of environmental factors on adoption of Business Intelligence adoption in the beverage manufacturing industry.
3. To investigate the impact of technological factors on Business Intelligence adoption in the beverage manufacturing industry.
4. To propose better ways that Business Intelligence can be adopted and implemented in the beverage manufacturing industry.

1.4 RESEARCH QUESTIONS

The main question to be answered by the research was; what are the factors that are affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe.

1.4.1 SPECIFIC QUESTIONS

The study aimed to provide solutions to the following research questions:

1. What is the effect of organizational factors on adoption of Business Intelligence in the beverage manufacturing industry?

2. What is the impact of environmental factors on adoption of Business Intelligence adoption in the beverage manufacturing industry?
3. What is the impact of technological factors on Business Intelligence adoption in the beverage manufacturing industry?
4. How can beverage manufacturing industry successfully adopt and implement Business Intelligence in the beverage manufacturing industry?

1.5 HYPOTHESIS

1.5.1 MAIN HYPOTHESIS

Organisational factors, environmental factors and technological factors have an effect in successful adoption of Business Intelligence in the Beverage Manufacturing Industry in Zimbabwe.

1.5.2 SPECIFIC HYPOTHESIS

H_1: There is no significant relationship between organisational factors and the adoption of business intelligence in the beverage manufacturing industry.
H_2: There is no significant relationship between environmental factors and the adoption of business intelligence in the beverage manufacturing industry.
H_3: There is no significant relationship between technological factors and the adoption of business intelligence in the beverage manufacturing industry.

1.6 RATIONALE OF THE STUDY

The researchers aim was to analyse the factors that affect successful adoption of Business Intelligence in the beverage manufacturing industry in decision making. Very little study has been carried in Zimbabwe in the context of this subject. Below are the expected benefits of the research.

1.6.1 THEORETICAL CONTRIBUTION

Theoretically, the study contributes to the body of knowledge which benefit researchers and scholars and carry out further research in the field Business Intelligence Adoption readiness in the beverage manufacturing industry. From the preliminary literature review, it has come out clear that the theories that underlie adoption of Business intelligence such as the Institutional Theory that states that generally, organizations work in environments which are dependent on the economic, socio-political, and technological influences were not conclusive enough to rate the strength of these different factors on success of a business undertaking. The theories were too generic, and in this research the researcher contextualizes it to business intelligence. To this theory, the research measured the strength of the effect of different factors that affect an institution's operations according to the Institutional Theory using principal component factor analysis. It also contextualized the theory to business intelligence, to the beverages manufacturing sector, and to Zimbabwean business environment.

1.6.2 METHODOLOGICAL CONTRIBUTION

Methodologically, the researcher used a quantitative survey method. This can create an area of further study for other scholars who can use a qualitative study in future to broaden the amount of data collection and accuracy of responses. Methods like case studies, focus groups, can also be used to gather research data.

1.6.3 PRACTICAL CONTRIBUTION

In practice, the study was aimed at helping in understanding the success factors of Business Intelligence Adoption. The findings of this study can be used to develop models to measure the success of Business Intelligence Adoption in future. Suggestions based on findings were made to Delta Beverages so that it can focus on critical success factors for business intelligence adoption. In as much as the study is mainly centred on Delta, the practical contribution of the research can be valuable to different companies in and outside the manufacturing sector. They can use the findings to develop business intelligence models that are useful for the success of business.

1.7 SCOPE OF THE STUDY

The study was limited to Delta Beverages. Both primary data and secondary data was used in this study. The study utilized data over the period from 2015 to 2020. The sample was drawn from managers (top, middle and low level) and workers of Delta Beverages. Since The questionnaire was converted to a google form which was shared online to allow data collection to be done across the country. With respect to the factors that the researcher focussed on, the research's main worry was on the three main categories of factors that affect an institution's operations according to the Institutional Theory; technological factors, organizational factors and environmental factors.

1.8 ASSUMPTIONS

In carrying out the study, the following assumptions were made;

1. The respondents would be truthful to the best of their knowledge and experiences when responding to the questions on the questionnaire.
2. The covid-19 lockdown restrictions would not negatively affect the data collection process since an online questionnaire was employed.

1.9 STRUCTURE OF THE DISSERTATION

Chapter one brought out the study background, statement of the problem, objectives of the research and research questions, importance of the study, scope of the research and relevance of the study. Chapter two was centred on the relevant literature on the subject under study and the theories and concepts relating to the research topic and questions. Chapter three presented the methodology that was used in conducting this research. It outlined the research design, secondary data sources, techniques employed in the collection of data, sampling techniques and the instruments used for the research. Presentation and analytical tools were used and explained the population that was targeted. Chapter four has a detailed report on the results and findings of the study. It also discussed and analysed the responses to the areas that were investigated by the researcher. Chapter five presented the conclusions that were derived from the findings and recommendations that were made to improve on Business Intelligence adoption with the intention to improve the overall company performance and decision making in the Zimbabwe beverage industry.

1.10 CHAPTER SUMMARY

Chapter one introduced the research background on the analysis of factors affecting Business Intelligence adoption in beverage manufacturing organizations in Zimbabwe. The chapter discussed the research problem which motivated the researcher to undertake the study. The chapter then outlined the research hypothesis and research objectives, rationale of the study, the scope of the study, and the research outline. The following chapter focused on the review of literature relevant to the study.

CHAPTER TWO

LITERATURE REVIEW

2.1 INTRODUCTION

Chapter Two looked at literature review linked to business intelligence and its successful adoption in manufacturing organisations. It looks at both theoretical literature, which are values, claims, beliefs, theories and models held or propounded by authorities or scholars in the adoption of business intelligence. Empirical literature are the findings of previous researchers in their related studies. The review of literature was done by the researcher to avoid reinventing the wheel, to develop a conceptual framework for this study and to determine the best methodology to use borrowing from researches of past researchers (Saunders, 2016).

2.2 EXPLANATION OF RESEARCH STRATEGY FOR THE LITERATURE

The researcher's literature search strategy was multi-pronged, and it involved accessing various journal articles from Emerald, Ebsco host, Elsevier and google scholar as well as Business Intelligence books. The key words used in this search were Business Intelligence Adoption, Business Intelligence Critical Success Factors and the impact of Business Intelligence Adoption in the manufacturing industry. The search was limited to a period not more than ten years to ensure that they are current and relevant.

2.3 DEFINITION OF BUSINESS INTELLIGENCE

The term "Business Intelligence" is frequently used to describe the technologies, applications, and processes for gathering, storing, accessing and analysing data to help users to make better decisions (Sherman, 2020). These systems refer to decision making, information analysis and knowledge management. According to Marr (2019) BI is all about the capture, access, understanding and the analysis of raw data into information/knowledge in order to improve business. Sahay (2018) recognises BI as the capability of an organisation to explain, plan, predict and solve problems, think more abstractly,

The term business intelligence (BI) is used to describe technologies, applications and processes required for gathering, storing, accessing and analysing data to help users to make better decisions. These systems refer to decision making, information analysis and knowledge management. According to Marr (2019) BI is all about the capture, access, understanding and the analysis of raw data into information/knowledge to improve business. Loshin (2018) recognises BI as the capability of an organisation to explain, plan, predict and solve problems, think more abstractly, understand, invent, and learn so that organizational knowledge can increase, provide information for the decision-making process, enable effective actions, and support establishing and achieving business goals. Fundamentally, BI means to have access to right information at the right time, in order to make the right decision. Understanding the data that is generated through the day today business of a company plays a major role of the business strategy for creating competitive manufacturing firms. Business intelligence systems are dynamic, and their roles in an organisation have been changing over time. Initially, BI systems were simple, static and analytical programs that were used to handle specific functions in an organisation (Sherman, 2020). Today, they have evolved into solutions that can be utilised for strategic planning, operations management, tracking the profitability of organisational brands as well as the management of customer relationships. According to Howson (2020) BI systems are not only a category of technologies but are determinants of a different organisational management technique that spans new techniques of data collection, storage, processing to analysis and utilisation of the resultant information. A typical BI system has online analytical processing which refers to the way end users navigate through data along various dimensions. It also has advance analytics for analysing data using statistical and other quantitative techniques to predict and show patterns. In addition, it has data warehouse which handles integration of numerous organisation records for aggregation and query tasks. As well, it has real time (BI) functions for real time analysis and distribution of information.

The construct of BI implies aggregating aspects of various components of decision support framework and generating information which is critical for decision making (Sherman, 2020). Thus, many definitions of BI systems focus on the capability of an organisation to bolster business efficiency and to attain strategic organisational goals.

2.4 UNDERPINNING THEORIES TO THE ADOPTION OF BUSINESS INTELLIGENCE

2.4.1 RESOURCE-BASED THEORY

The resource-based view (RBV) provides a theoretical lens for linking BI adoption and value (Ramon-Jeronimo, Florez-Lopez and Araujo-Pinzon, 2019). This theory has to analyze IT capabilities and to elucidate how IT value resides more in the firm's ability to leverage IT than in the technology itself. That is, IT business value is contingent on the breadth and depth to which IT is used in the key activities in the firm's value chain. The greater the use, the more likely the firm is to develop distinctive capabilities from its core IT infrastructure (computers, networks, databases, and communication platforms). The way IT infrastructure components are integrated with the business processes and are aligned with the firm's corporate strategy is key to organizational effectiveness. In fact, more consideration is given to the processes underlying the bonds proposed by RBV since the firm's context affects the nature of its processes (Ramon-Jeronimo, Florez-Lopez and Araujo-Pinzon, 2019). From the fundamentals of the RBV theory, technology is viewed as a key resource that could directly influence adoption of BI and ultimately firm performance. Following this line of thought, firms that embed BI more broadly and deeply into their value chain activities can create superior business value from adopting BI. Even though BI could be considered a commodity, the particular ways in which a firm assimilates this technology in its business processes is unique.

2.4.2 TECHNOLOGY-ORGANIZATION-ENVIRONMENT

Technology-Organization-Environment (TOE) Framework developed by Ansong and Boateng, (2018) posits that the process by which firms adopt and implement technological innovations is influenced by three elements. These are the technological context, the organizational context, and the environmental context. These three elements can provide both opportunities and constraints for technological innovation adoption. The technological context consists of the internal and external technologies which are essential to the firm and technologies may include both processes and equipment. The organizational context refers to the firm's characteristics and resources, and may include the firm's size, degree of formalization, degree of centralization, managerial structure, and amount of slack resources, human resources, and linkages among employees and so on (Ansong and Boateng, 2018). The environmental context comprises of the size and structure of the industry, the macroeconomic context, the firm's competitors, as well as the regulatory environment. This framework has been used to explore the adoption of technological innovation in many areas and therefore the researcher found it useful as well in analyzing the critical success factors to the adoption of BI in manufacturing sector.

2.4.3 DIFFUSION OF INNOVATION THEORY

According to Vagnani (2017) the theory of Diffusion of Innovation (DOI) posits that the rate of adoption of innovations is influenced by five factors: compatibility, observability, relative advantage, complexity, and trialability. Rogers explained further that complexity is mostly negatively related with the rate of adoption, but trialability, relative advantage, observability, and compatibility are usually positively related with the rate of adoption. Consistently however, researchers have found out that technical compatibility, relative advantage, and technical complexity are the main antecedents to innovations adoption (Vagnani, 2017). Many studies have used Rogers's theory to predict innovation adoption behavior at both organizational and individual levels.

2.5 BUSINESS INTELLIGENCE AND THE MANUFACTURING SECTOR

BI can enhance productivity and competitiveness, boost innovation and growth as well as generate new manners of competition and value capture across organizations. BI contributes to an organization's agility by providing timely and accurate information. In addition, the prevalent use of data ensures transparency, aids the discovery of market needs, uncovers process or service variability, improves performance and assists in the adoption of more sustainable practices. In the manufacturing sector, McKinsey & Company Report (2019) highlighted the main areas in which BI proves to be a differentiating factor for industry leaders at the expense of late adopters.

2.5.1 RESEARCH & DEVELOPMENT AND PRODUCT DESIGN

The current paradigm of manufacturing involves global supply chains where an intricate chain of suppliers dispenses material resources to the original equipment manufacturer to bring a product to the market (Ansong and Boateng, 2018). Communications among the numerous players involved are cumbersome for established value chains and even more so during the developmental stages of new products. Hence, the first do-main in which BI can aid manufacturing is research and development and product design. In this regard, technologies that facilitate interoperability along the value chain play a central role. For example, cross-enterprise Product Lifecycle Management (PLM) systems provide a platform for co-creation of products using designs and inputs from numerous players along the supply chain. This collaboration and experimentation moves the burden of innovation across the original equipment manufacturer organizational boundaries and in this process aids decision making as well as the selection of appropriate suppliers while reducing costs and time to prototyping. Consumer input is crucial for successful design-to-value. Open innovation, where customers take a leading role in the design of new offerings, expands the information pool regarding needs, applications and solution technologies that would be most valued by a potential consumer and, in turn, are most important to secure success in the market (Chen, Chiang, and Storey, 2018). Traditional point-of-sale data and customer feedback are complemented with customer-firm social media interaction changing the relationship between market actors and strengthening brand engagement.

(a) TIME-TO-MARKET

The time that it takes from the conception of a new product until it is available for sale is known as “time-to-market”. In general, it is used as a metric to determine competitiveness in terms of product development. In light of continuous product life-cycle shortening and increased international competition, the manufacturing industry strives to reduce the time to market of new product offerings for multiple reasons. In first place, reduced time to market extends sales life and therefore improves profitability. In addition, getting to the market ahead of the competition results in the application of premium fees to products which in-creases revenues, a bigger market share, as well as giving the manufacturer the opportunity to establish industry standards and develop a technological edge. Furthermore, a shorter time to market is associated with increased flexibility to respond to changing customer trends leading to improved levels of customer satisfaction and customer loyalty which, in turn, may increase sales (Sahay, 2018). Moreover, reduced time to market has been associated with lower product development costs, faster break-even and improved operational and business performance.

(b) SHORTENING PRODUCT DEVELOPMENT THROUGH OPEN INNOVATION

Since 80% to 90% of the time to market is absorbed during the design phase, involving suppliers and customers in the development of new product offerings have an enormous impact on time to market. To this end, a new paradigm for R&D was proposed by Sahay (2018) known as open innovation. It assumes that companies should make use of both internal and external ideas as well as, internal and externals paths to market to advance their technology. Two possible sources of external ideas are customers and suppliers.

Customer involvement, also known as customer co-creation, gives manufacturers access to a pool of knowledge about needs and preferences that aid the decision-making process (Chen, Chiang, and Storey, 2018). After all, managers agree that BI should be applied to gain customer insights and adjust, customize and/or develop new service offerings. Through customer co-creation, customers voluntarily and freely provide feed-back and inform about products shortcomings. This information can be used by manufacturers to make changes early on during the new product development process. The involvement of suppliers reduces development costs, aids the standardization of components, ensures consistency between the design and the suppliers capabilities and limits the number of engineering changes. Involving suppliers gives the original equipment manufacturer access to knowledge and technical skills outside the firm which improves quality and reduces the number of defects, helps identifying technical problems early on and increases the number of proposed solutions. However, it must be noted that companies embracing open innovation are expected to go through a learning phase, especially when it comes to structuring development agreements with external organizations, before truly benefiting from faster development cycles (Yang, Kumara, Bukkapatnam and Tsung, 2019).

2.5.2 SUPPLY CHAIN MANAGEMENT

Supply Chain Management (SCM) is another domain in which BI can derive insights to boost performance. As with other manufacturing domains, promoting efficiency and minimizing operating costs are frequently cited as areas for the application of BI. In the words of an interviewed executive, BI helps build a stronger relationship with suppliers as a means of shortening lead times, and improving delivery reliability and certainty (Chen, Chiang, and Storey, 2018). In fact, one of the most critical issues in SCM relies on the volatility of demand coupled with insufficient flexibility and responsiveness from suppliers to continuously shifting consumer demands (Chen, Chiang, and Storey, 2018). A common consequence is known as the bullwhip effect, where orders to suppliers tend to have larger variance than sales, and this distortion amplifies as it propagates upstream. A related effect, called the ripple effect, occurs when a disruption cannot be localized and cascades downstream affecting SC performance and altering its structure. BI has the potential to reduce these effects given the “volume”, “variety”, “velocity”, “value” and “veracity” levers of big data. Thus, the holy grail of BI for SCM is transparent information flow to aid accurate market trend predictions and guarantee data-driven decision-making. In this regard, a competitive advantage is to be gained from aggregating high-quality data from production, inventories and retailers. This once farfetched idea is now possible through block chain technology where distributed, immutable information contained in a ledger is visible to all stakeholders helping them overcome mistrust and boosting efficiency and visibility along the chain (Yang, Kumara, Bukkapatnam and Tsung, 2019). However, it must be noted that these technologies and applications require companies involved in the supply chain to collaborate and willingly share all relevant data.

(a) SUPPLY/DEMAND MATCH

Perfect matching of supply and demand requires accurate knowledge of customer preferences regarding the products and features that are perceived as most valuable, as well as the quantities that consumers would be willing to purchase. In addition, products must be priced reconciling manufacturing costs and the rates that customers are willing to pay (Sahay, 2018). This hints at a few different tasks: using customer input in order to produce successful products, forecast demand to manufacture the appropriate quantities, and suitable pricing.

Demand forecasting: Demand forecasting refers to accurately estimating the number of units that will be sold and is of great importance to produce items in adequate quantities to maximize service levels while keeping capital investments on inventory low. Demand forecasting is used to support strategic decisions such as capacity expansion and transformation, technology migration, tool procurement and outsourcing (Yang, Kumara, Bukkapatnam and Tsung, 2019). Deficient forecasting increases the likelihood of obsolescence, urgent orders, inefficient resource utilization and the spread of the bullwhip effect along the supply chain (Chen, Chiang, and Storey, 2018). BI has the potential to harness unexploited predictive value out of product and customer information, retailer sales and manufacturing orders. This, in combination with vertical supply chain integration and fast responsiveness, guarantees that market leaders turn a profit while securing the shortest market lead-times.

Dynamic pricing*:* Pricing is a complex task in which variables such as a company's operating costs4, the availability of supply, brand equity and future demand forecasts have to be considered to maximize sales and profitability. A common practice, originally introduced in industries where the short-term capacity (supply) is difficult to change, such as airlines, hotels and sporting events, is the use of dynamic pricing where the price of an item varies in real-time to account for fluctuations in market conditions such as demand, inventory levels, competitor offerings and customer history. The adoption of dynamic pricing strategies has proliferated due to an increased availability of demand data, the emergence of new technologies that facilitate changing prices, and the availability of software for analyzing demand data and for dynamic pricing (Yang, Kumara, Bukkapatnam and Tsung, 2019). These new technologies allow retailers and manufacturers to combine information about sales with demographic data and customer preferences, and to use it to optimize pricing and markdowns as well as to evaluate the effect of pro-motions. Early adopters of dynamic pricing strategies have reported improved financial performance, fast return on investments, and no negative impact on price image (Chen, Chiang, and Storey, 2018). However, transparency of pricing practices is of outmost importance: while most customers accept dynamic pricing in response to shifting market conditions, backlash has resulted from pricing based on price elasticity of demand for individual customers.

2.5.3 PRODUCTION

Production can also benefit from BI. The integration of ubiquitous sensors, the Internet of Things (IoT), and the fusion of the physical and the virtual world by means of cyber-physical systems (CPS) give rise to real "smart factories". In these smart factories, real-time monitoring of operations generates the necessary data to maximize yield, reduce waste, cut operational and maintenance costs, optimize schedules and support lean manufacturing projects. Historical data can be used to create a "digital factory" to determine the most efficient production systems, a space efficient layout for the construction of new plants, adequate step sequencing for a specific product, as well as enable cost reductions in terms of tool design, construction and assembly time, and improvements in delivery reliability (Sahay, 2018). There are a number of successful applications of BI in the domain of production. Some examples include resources (such as energy and water) and processes, tooling optimization, asset utilization, quality, inventories and labor among others.

(A) RESOURCES

The manufacturing industry transforms raw materials into finished goods while making use of other input resources such as energy and water. Hence, it is only natural for the manufacturing sector to be invested in the optimization of input resources to identify opportunities to reduce raw materials, water and energy consumption, eliminate waste, and therefore improve efficiency, yield and adherence to sustainable practices. In the remainder of this section, the use of BI to optimize energy consumption is explored as a motivating example. Parallels can be drawn between this application and the optimization of other resources. BI can optimize energy consumption (Yang, Kumara, Bukkapatnam and Tsung, 2019). In the past, energy consumption was estimated from calculations regarding the specific physical process energy requirements. With the adoption of BI, energy consumed by each machine tool can be easily tracked. The knowledge extracted from this data is potentially useful not only to reduce energy consumption as a whole by means of identifying opportunities for optimization, but also can be fed into models dealing with other production aspects. Historical power usage profiles may be of importance to develop accurate models capable of predicting machine tool failure, since uptakes in energy consumption could be symptomatic of mechanical malfunctioning. Furthermore, accurate accounting of energy usage on a per part basis could be used to derive the cost of energy embedded in consumer products (Sherman, 2020). Lastly, as regulations promoting sustainable and environmentally friendly practices are drafted, careful attention to manufacturing carbon footprint is paid. Accurate energy consumption logs can potentially aid decision makers not only in terms of achieving operational excellence but also on bettering environmental performance of manufacturing equipment.

(B) ASSET UTILIZATION

Many industries within the manufacturing sector hold high capital investments on machinery and equipment and, for this reason, are generally referred to as asset-heavy. For these industries, maximizing the Return on Assets, i.e. the profits made for each dollar held on assets, is of outmost importance to guarantee profitability. In order to succeed, careful job scheduling, timely maintenance and short changeover times must be meticulously planned, in addition to ensuring maximum machine life (Sherman, 2020). The exciting prospect of harnessing BI to deliver predictive maintenance is discussed hereunder.

BI for predictive maintenance: Traditionally, maintenance has been regarded as a reactive measure and managed with the "run-to-failure" method: after failure has occurred, steps are taken in order to remedy it (Sherman, 2020). This is the most expensive method of maintenance management, translating into major expenses from spare parts inventory, overtime labor, long machine downtime and low production availability. Since asset-heavy industries rely on optimizing equipment utilization to reduce losses in terms of capital expenditures and revenue, many organizations adopt a "preventive" maintenance management style where repairs are scheduled periodically based on the equipment's Mean Time Between Failures (MTBF). However, this frequently leads to un-necessary repairs (and their associated unnecessary materials and labor costs) or catastrophic failures (and the already discussed run-to-failure maintenance drawbacks). Thus, to improve upon preventive maintenance, a more proactive approach known as "predictive" maintenance has gained traction. Predictive maintenance entails the "regular monitoring of the actual mechanical condition, operating efficiency, and other indicators of the operating condition of machine-trains and process systems provide the data required to ensure the maximum interval between repairs and minimize the number and cost of unscheduled outages created by machine-train failures".

Vast work has been done in terms of predictive maintenance, generally involving the use of sensors to record physical parameters such as temperature, vibration, noise or acoustic emissions, lubrication or oil physical properties as well as corrosion and wear. In some cases, the input data is constituted of not only machine sensor data but also human (mood monitoring and sentiment analysis) and material data (Sherman, 2020). The output produced is a longevity estimate, a probability of failure or a financial estimate on maintenance of a component. In most modern implementations, the system provides a list of appropriate countermeasures based on historic data from former interventions or, when unseen situations are encountered, dynamically generated countermeasures.

(C) QUALITY

Quality is by far the most exploited aspect of production that BI has to offer to the manufacturing industry (Yang, Kumara, Bukkapatnam and Tsung, 2019). Adoption of BI can be used to locate defect-producing steps within the production line, predict whether a manufactured item will pass the quality check. This is probably the result of a long-standing tradition in detailed statistical analysis associated with quality initiatives such as Statistical Quality Control (SQC), Total Quality Management (TQM), Kaizen, ISO 9000 quality standards, 6σ, lean six sigma, among others. Thus, improving quality requires focus on enhancing manufactured products and the processes they go through aiming at reducing wasteful use of materials, equipment and labor as well as improving customer experience. Majority of sectors within the manufacturing industry show an increasing trend in the use of BI to improve quality, especially industries concerned with metal, computer and electronic products were the front-runners, while plastic, paper, glass, food processing and chemical manufacturing lag behind.

(D) INVENTORIES

Inventories represent a huge capital commitment and loss of liquidity for the manufacturing industry (Marr, 2019). In addition, keeping safety stocks requires physical space and thus its cost is increased as the result of storage, additional personnel requirements and administration. Inventoried items also suffer the risk of obsolescence, and essentially conceal production problems and prevent their elimination. To counteract these costly disadvantages, the industry constantly searches for an equilibrium that allows it to minimize safety stocks but, at the same time, ensure delivery reliability and customer satisfaction. To this aim, inventory tracking has been widely automated using barcodes or more sophisticated Radio-Frequency Identification (RFID) technology in the form of tags attached to individual products. The data produced can be used for inventory analytics to identify potential stock shortages and to avoid incidents in customer delivery (Marr, 2019). In addition, it can be useful to diagnose supply shortfalls, backlog accumulation and inadequate inventory levels at strategic stocking points. Inventory analytics can also be used for ABC inventory classification as well as review and update the classification in real time for optimal item distribution. Furthermore, the use of BI on inventory data aids the identification of obsolete goods as well as those at risk of obsolescence and helps avoiding excess stock while securing sufficient inventory to handle demand fluctuations.

(E) LABOR

The use of BI to handle all the aspects of the workforce life cycle, from hiring to training and development, including retention, assignment, compensation and benefits is known as workforce analytics. Workforce analytics refers to the processes involved with understanding, quantifying, managing, and improving the role of talent in the execution of strategy and the creation of value (Marr, 2019). An optimized workforce management does not only lead to labor cost reductions and thus, to increased organizational profitability, but also results in improved overall operational performance. It allows for reallocation of labor resources when and where necessary in a flexible fashion to meet deadlines and to ensure customer satisfaction. Problem areas can be readily identified, resulting in appropriate action being swiftly taken without compromising neither the quality of the service provided nor its profitability. In addition, workforce analytics provides real-time labor data that can be potentially aggregated with payroll data for accurate job costing analysis that result in more precise pricing. Finally, labor scheduling is optimized by minimizing non-productive time, over-scheduling and preventable overtime.

2.5.4 MARKETING, SALES AND AFTER-SALES SUPPORT

The fourth domain in which BI adoption in manufacturing sector can have a transformative impact within the manufacturing industry are the areas of marketing, sales and after-sales support. Analytics conducted on data about interaction with customers are not limited to co-creation and open innovation initiatives, but also exploited to improve marketing and sales (Hidayanti, Herman and Farida, 2018). For example, social network chatter analytics can help identify pools of new potential clients, as well as enhance product development. Statistical analysis, forecasting, predictive modeling and optimization are used for customer segmentation to improve the effective-ness of marketing and sales forces, as well as the type, number and quality of service offerings. In other words, BI can be used to improve customer experience. In addition, sensors on products allow for real-time monitoring of usage patterns and customization of after-sales services to successfully target different customer segments. Data from firm-customer-interaction is revolutionizing traditional commercial relationships: the manufacturing industry is transforming from a product to a service-oriented industry through the monetization of insights derived from data by means of innovative business models (Hidayanti, Herman and Farida, 2018).

(A) AFTER-SALES SERVICES

The notion of "servitization" was firstly introduced in the late 1980s as a way to gain an edge on competitors, engage customers and increase the level of differentiation in markets of homogeneous performance, price and quality (Marr, 2019). A more current definition describes servitization as "the innovation of an organizations capabilities and processes to better create mutual value through a shift from selling products to selling product-service systems". In addition, servitization has economic advantages for manufacturers and consumers: it increases sales revenues and makes maintenance and support costs more predictable. As a consequence of this process, the manufacturing sector is steadily evolving from producing assets to delivering value to customers through servicing those products (Marr, 2019). After-sales services are seen as a high margin business with low associated risks that generate revenue throughout the life span of the asset, which account for a large percentage of corporate returns. Furthermore, when effectively delivered, they improve firm-customer relationship increasing customer loyalty and intent of repurchase. Moreover, after-sales services help gain valuable knowledge about customers' technologies, processes and plans that can, in turn, be used as feedback to customize new offerings.

Most organizations do not perceive the profitability of after-sales services and they fail at delivering value to customers by managing the offerings as a mere afterthought (Hidayanti, Herman and Farida, 2018). These inefficient after-sales services do not generate profits. In fact, studies show that while servitized firms are generally larger in terms of sales revenues, they are also collectively less profitable than pure manufacturing firms. This is because servitized firms have higher costs per employee, as well as higher working capital and net asset base. Successful management of after-sales services is cumbersome and requires the timely allocation of parts, people and equipment to the appropriate locations while minimizing costs and optimizing fill-rates. Simultaneously, successful after-sales services must satisfy customer needs in terms of acceptable delivery times and price. Adoption of BI can be the differentiating factor to optimize after-sales services management. Data from product failure rates, customers, business strategies and product technologies can be harnessed to train analytic models capable of forecasting after-sales services demand probability distributions and therefore facilitate resource allocation (Hidayanti, Herman and Farida, 2018). In addition, customer segmentation can be applied to design a portfolio of attractive service offerings considering parameters such as waiting time and cost of service leading to premium, gold and silver service plans to satisfy different customer segments.

2.5.5 END-OF-LIFE OR REVERSE LOGISTICS

End-of-life or reverse logistics can potentially profit from the use of BI. This domain is the process of planning, implementing, and controlling backwards flows of raw materials, in process inventory, packaging and finished goods, from a manufacturing, distribution or use point, to a point of recovery or point of proper disposal (Ansong and Boateng, 2018). Reverse logistics involves recycling and remanufacturing as well as product returns, reuse of materials, waste disposal, refurbishing and repairing and it developed as a response to product-oriented policies that oblige manufacturers to guarantee and finance product take-back and recycling given growing environmental concerns. In this regard, sensors on products could accurately predict the end-of-life of a good based on analytics of usage patterns, and wireless connection could be used to inform the appropriate stakeholders in order to coordinate efficient reverse logistics (Ansong and Boateng, 2018). Forecasting the rate of return of products and their demand will help design and construct reliable and profitable reverse supply chains. In fact, integrating data from all the players within the reverse supply chain can guarantee higher profitability. Furthermore, companies could use this information to target marketing campaigns to improve re-sales and customer experience.

2.6 CRITICAL SUCCESS FACTORS FOR ADOPTION OF BUSINESS INTELLIGENCE IN MANUFACTURING ORGANISATIONS

Critical Success Factors (CSFs) embody a set of factors where the accomplishment of positive results will guarantee a viable position for the individual, sector or organisation. According to Sherman (2020) critical success factors are the few key areas where things must go right for the business to flourish. As a result, the critical success factors are areas of activity that should receive constant and careful attention from management. Regarding the adoption of BI, these factors can be categorized as either organisational, process or technological. The implementation of a BI system is not a standard application-based IT project. According to Yeoh, & Popovič, Aleš. (2016) the successful adoption of BI in manufacturing organisations is premised on three categories of factors which are organisational factors, process factors and technology. According to Yeoh & Popovič, Aleš. (2016) BI initiative must be designed to uncover numerous issues that are universal in the entire organisation and must therefore be positioned under the authority of senior managers. About the process, management requires change management strategies that are centered on the users. The authors suggest that this can be achieved through formal participation of the users in order to achieve user driven iterative approach to changing requirements (Yeoh & Popovič, Aleš., 2016). Technology wise, the successful adoption of BI systems requires a flexible technical framework in order to allow for system expansion whenever there is need for expansion. Moreover, data quality and integrity issues must be sustainable in order to make it possible to conduct cross-functional and cross-departmental use of data (Yeoh, & Popovič, Aleš, 2016).

2.7 EMPIRICAL LITERATURE REVIEW

A study conducted by Haley (2014) sought to outline critical success factors that were uniform in among organisations. Their approach involved conduction a survey of 111 organisations that were known to make use of data warehouse and related BI technologies. In their findings, they established that success factors included management support, adequate resources, change management and data management techniques. In addition, they opined that quick implementation, the ability to adjust business requirements, useful information and ease of navigating were necessary in the implementation of a good data warehouse strategy. In another related study, a survey of 42 BI system users conducted and observed that the satisfaction demonstrated by system users played an important role in the overall success of a data warehouse (Haley, 2014).

Strand and Syberfeldt (2020) used a case study approach to come up with important factors which were known to guarantee success of a data warehouse. In their findings, they established that these factors were the following: adopting a business-driven approach, board support, adequate human and financial resources, high data quality, an adjustable enterprise model and data stewardship as well as the availability of any automatic data extraction technology. In a survey, conducted on 11 organisations, Suhendra, Ernestivita, Khasanah and Filandari, (2020) established that quality in organisational data and its system were the most critical success factors for any BI system. They further observed that the quality of a system was constrained by management support, available resources and participation of the end users and the level of skills demonstrated by the project team. The variables used in a study by Suhendra, et al., (2020) are system throughput, ease of use, ability to locate data, access authorisation, and data quality. The variables were further subdivided into currency, level of detail, accuracy and consistency. The data was gathered from a single large US enterprise, based on a single project, therefore even the author agrees that his study can be treated as a case study Suhendra, et al., (2020), finding that 70% of end user satisfaction could be explained by the independent variables that were measured.

The study conducted in Current Practices in Data Warehousing (Watson, Annino, Wixom, Avery, & Rutherford, 2017) concentrated on some of the factors influencing data warehousing projects success. Survey respondents were asked to provide answers to questions about who sponsored the data warehouse, which organisation unit was the driving force behind the initiative, about solution architecture and end users, about implementation costs, operational costs, solution approval process, after implementation assessment and the realisation of expected benefits as well as the expectations. To describe success, two questions were used, one about ROI and the other about the perceived successfulness of implementation. The authors decided to concentrate on the three dimensions presented by Yeoh, & Popovič, Aleš. (2016) each being assigned a set of questions that, to the authors' opinion, best describe the attitudes of business users towards the implementation and use of BI systems.

2.7.1 ADOPTION OF BI AT NIKE INC.

Koch (2014) studied Nike Corporation and Nike is one of the biggest sportswear companies worldwide. It is an American multinational founded in 1964 by the brand name "Blue Ribbon Sports," its head offices in Oregon. In 1997, its profits reached 9.19 billion dollars, while in 2012, they soared high to 25.3 billion dollars, employing 44,000 people. In 1998, in view of the millennium, the company proceeded to a change in its systems, and the implementation of an ERP system. According to the Forbes list, after spending 400 million dollars on software, it ended up losing 100 million dollars in sales; its share dropped by 20% and faced many lawsuits. It also experienced a big rift in its personal relations as it could not manage the orders of the best advertised sports shoes Air Jordan. This failure was due to a technical problem in the so-called i2 system to do with the process of order management. The specific system was part of a general BI but, according to analysts, its selection was wrong as its structure could not tally with the entrepreneurial operation of the company. According to a senior executive, the system operated on prediction algorithms that could not respond to such voluminous sales. The company had an entrepreneurial plan understandable to all its employees, so it continued to operate as usual, while the problems that arose from the system failure did not impact its general course (Koch, 2014). According to Nike, the problems that arose from the system had been restored by autumn 2000, and its cycle of operations was not affected from then on. Three years later, the company announced that it had the biggest profits since its foundation. In 2001, it reduced the i2 system operation to a great extent and adopted SAP.

2.7.2 ADOPTION OF BI FOXMEYER DRUGS

The company FoxMeyer Drugs was founded in 1977, and situated in Texas, USA. It employed over 4,000 workers, with 5 billion dollars in sales (1995), and was the fourth biggest distributor of pharmaceutical products in the world, second in the US. In 1993, with the aim of using technology to increase its efficiency, the company proceeded to adopt BI. This projected was called Delta III and started off in the same year. The company purchased the SAP R/3 system, along with a system of warehouse automation by Pinnacle (an international provider of the English information systems Sage), while it appointed Andersen Consulting as a contractor for the implementation of both systems, as well as their unification. The project would last for 18 months, cost 65 million dollars, and was estimated to reduce costs by 40 million dollars a year (Scott, 2015).

Many employees, however, were opposed to the implementation of the systems as warehouse automation threatened their posts (Scott, 2015). They took action and massively abandoned the warehouses that would close down with a view to being re- placed with a big centre. SAP at the time did not have a great share in warehouse systems, and FoxMeyers, after the commencement of the project, branched out, making new agreements, and increasing its transactions. Furthermore, FoxMeyers did not have any trained staff to execute the project, so it relied on a con-tractor, and used the whole work as an opportunity to train its executives. Finally, there was already some leeway for profit as the company's prices were competitive and this margin for profit narrowed considerably due to the great cost of the project. As a result, the project lasted 6 months longer than expected, cost 100 million dollars, and suffered damage to products in the warehouses worth 34 million dollars. For some, its failure led to bankruptcy in 1996. Two years earlier, the system could process only 10,000 orders a day, in contrast to 420,000 orders its previous system could handle. In 1998, it was announced that the company would sue SAP and Andersen Consulting, today's Accenture, claiming half a billion dollars from each (Scott, 2015). Finally, the companies reached a compromise without having recourse to justice.

2.7.3 ADOPTION OF BI AT HEWLETT PACKARD (HP)

It is one of the best-known companies in the field of informatics. The company started off in 1938 as a company of electronic products and tools, and its development was particularly boosted by service provision to the USA administration during the Second World War. In 2004, its turnover reached 80 billion dollars and its profits 4.2 billion dollars. Hewlett-Packard (HP) worked closely with SAP as of 1989 as over 50% of the latter's clients used HP infrastructure and counsellors for the implementation of ERP systems (Chaturvedi and Gupta, 2015). During the third quarter of 2004, the company's sales had decreased by 5%, and it announced that this decrease was partially due to the failed attempt at adopting BI. The overall damage the company suffered is estimated at 160 million dollars, 5 times the cost of the system implementation. This fact puzzled the market as HP was the main counsellor for the implementation of BI systems. The company revealed that the problem lay in the execution of the project and technical difficulties. In the past, HP had decided to redesign its strategy with the aim of producing a big volume of cheap electronic products. To this end, in 1993, it decided to replace its numerous systems it used with SAP R/3. This replacement was completed in 1998. With the passage of time, the company constantly upgraded its systems with a view to meeting with new needs, such as electronic orders, and ended up using 35 ERP systems on a global level. The company's administration wanted to reduce these systems down to 4, and finally in 2004 its order-taking systems were pared down to 7.

Still, the administration wanted to further increase the company's efficiency through the SAP FOM platform. The first results were visible after fully implementing the system in June 2004. 20% of the orders could not pass through the old systems due to programming problems, the company lagged behind with the execution of orders, lost its credibility, and increased its costs. Many times, during that period, they ended up dispatching merchandise by air, in an attempt to keep the deadlines. Besides, the company did not al-low the employees to actively participate in the chance, which had as a result that the workers had no access to useful information, and were not sufficiently trained (Chaturvedi and Gupta, 2015). According to Gilles Bouchard, the then CIO of the company, the problem was that a lot of small technical problems occurred together, which deteriorated the system, in terms of operationalise. As he once stated, "We had a series of small problems that were not difficult to tackle individually. All of them together, though, brought a perfect storm." In 2005, HP proceeded to the adoption of Genesis system, which failed, too (Chaturvedi and Gupta, 2015).

2.8 CONCEPTUAL FRAMEWORK

According to Shikalepo (2020), a conceptual framework plays a significant role in aiding a researcher to derive meaning from his or her subsequent findings. A conceptual framework is a structure which the researcher believes can best explain the natural progression of the phenomenon to be studied. It is a central part of the plan for negotiation to be examined, tested, studied and transformed as a result of investigation and it explains the possible connections between the variables (Shikalepo, 2020). In a statistical perspective, the conceptual framework describes the relationship between the main concepts of a study. It is arranged in a logical structure to aid provide a picture or visual display of how ideas in a study relate to one another (Grant and Osanloo, 2014). In additional, it shows the series of action the researcher intends carrying out in a research study. This figure that follows is a pictorial presentation of the conceptual framework that links the critical success factors of BI and success adoption of BI in manufacturing sector. The conceptual framework presented here was adopted form Yeoh, & Popovič, Aleš. (2016)'s critical success factors in adoption of BI in manufacturing businesses.

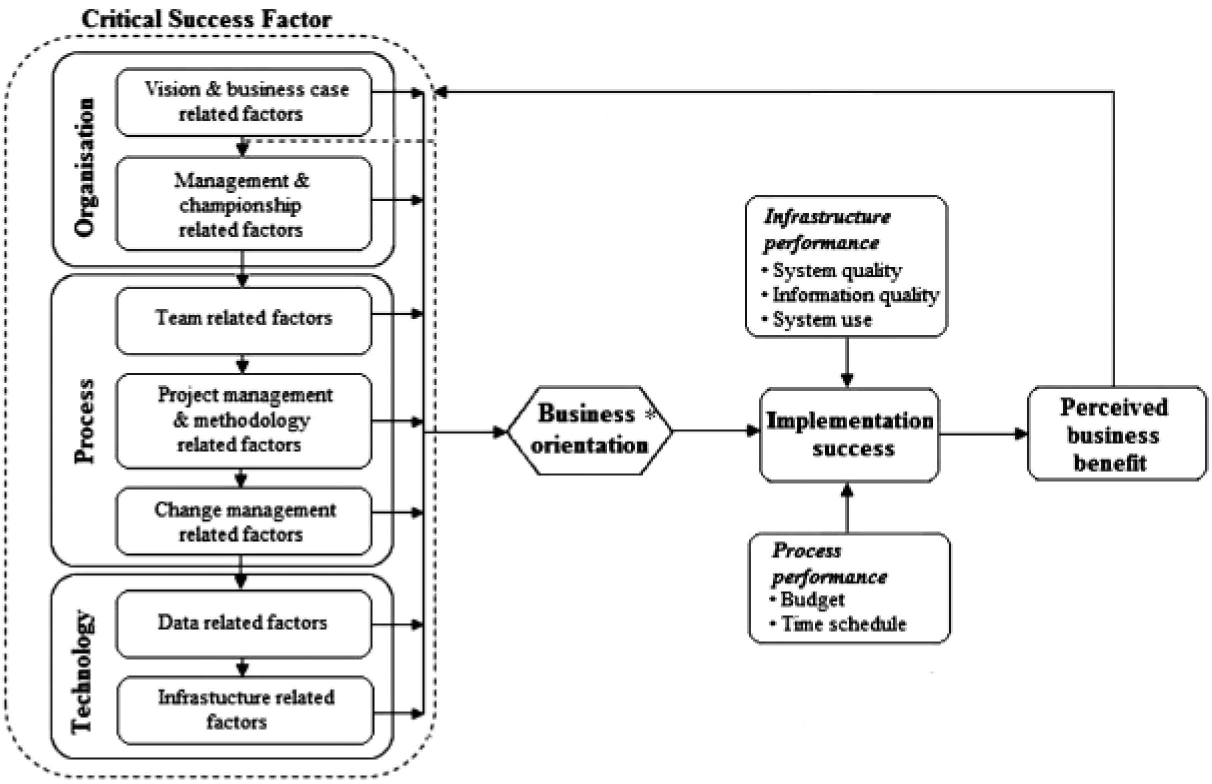

Figure 2.1: Conceptualizing critical success factors and successful implementation of business intelligence: *Adopted from Yeoh, & Popovič, Aleš. (2016)*

The conceptual framework presented above stipulates that for successful adoption and implementation of BI in manufacturing sector, there are certain factors that are critically required. The first category of required factors relates to the organisational factors. These factors stipulate that for successful adoption of BI in manufacturing sector, there is need for a great sense of commitment both by the management of an organisation and sponsors of a project. In addition, there should be a clear articulated vision.

The process factors require change management strategies that are centered on the users and this can be achieved through formal participation of the users to achieve user driven iterative approach to changing requirements (Yeoh & Popovič, Aleš, 2016). The last category relates to the technological factors. For successful adoption of BI systems, there should be a flexible technical framework to allow for system expansion whenever there is need for expansion. Moreover, data quality and integrity issues must be sustainable in order to make it possible to conduct cross-functional and cross-departmental use of data (Yeoh, & Popovič, Aleš, 2016).

For the purposes of this research, the researcher bases their argument that the successful adoption of BI in manufacturing business is guided by the framework by Yeoh, & Popovič, Aleš, (2016). The researcher therefore used the conceptual framework presented above to relate successful adoption of BI to the different factors as presented in Figure 2.1 above.

2.9 CHAPTER SUMMARY

The chapter presented what was reviewed by the researcher. The literature reviewed by the researcher covered mostly the critical success factors for BI adoption in the manufacturing sector. The empirical literature mostly presented related studies where researchers established critical success factors necessary for adoption BI. The researcher also looked at various ways BI can be of value in the manufacturing sector. The chapter also presented a few case studies of companies that adopted BI and the resultant impact on their performance. All this helped the researcher to have a clear picture of BI, critical success factors necessary for its adoption in manufacturing sector in Zimbabwe. It also helped the researcher to justify why BI is necessary in the manufacturing sector. The next chapter presented the methodology that the researcher adopted in conducting the research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

Chapter three focused on the methodology used to carry out the research. It looked at the research philosophy adopted, the research approach, the research design, the population of the study, sampling methods, sample size taken, research instruments used, data collection methods, data validity and reliability enhancements, research ethics observed, among other aspects. The methodology basically was a way of ensuring that data related to the study was collected for analysis, from the relevant subjects for answering the research questions and fulfilling the research objectives outlined in the first chapter.

3.2.1 RESEARCH OBJECTIVES

The study was aimed at analysing the factors affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe.

The objectives of the study are;

1. To ascertain the effect of organizational factors on adoption of Business Intelligence in the beverage manufacturing industry.
2. To assess the impact of environmental factors on adoption of Business Intelligence adoption in the beverage manufacturing industry.
3. To investigate the impact of technological factors on Business Intelligence adoption in the beverage manufacturing industry.
4. To propose better ways that Business Intelligence can be adopted and implemented in the beverage manufacturing industry.

3.2.2 RESEARCH QUESTIONS

The main question to be answered by the research was; what are the factors that are affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe.

The study aimed to provide solutions to the following research questions:

1. What is the effect of organizational factors on adoption of Business Intelligence in the beverage manufacturing industry?
2. What is the impact of environmental factors on adoption of Business Intelligence adoption in the beverage manufacturing industry?

3. What is the impact of technological factors on Business Intelligence adoption in the beverage manufacturing industry?
4. How can beverage manufacturing industry successfully adopt and implement Business Intelligence in the beverage manufacturing industry?

3.2.3 HYPOTHESIS

H_1: There is no significant relationship between organisational factors and the adoption of business intelligence in the beverage manufacturing industry.

H_2: There is no significant relationship between environmental factors and the adoption of business intelligence in the beverage manufacturing industry.

H_3: There is no significant relationship between technological factors and the adoption of business intelligence in the beverage manufacturing industry.

3.3 RESEARCH DESIGN

Rajasekat, Philominathan and Chinathi (2013) describe research design as a presentation of the different types of approaches used and a systematic outline of how the scientific research has been carried out in solving the identified research problem.

Several possible research designs exist; including experimental design, exploratory designs, explanatory design, descriptive design and mixed methods design. Explanatory research design is more suitable when establishing cause and effects relationships between variables (Creswell, 2013). Exploratory research design is more suitable when the researcher is looking for new insights, studying what is currently taking place, when asking questions and when assessing phenomena in a new light (Robson, 2014). Descriptive research design is more appropriate when testing hypotheses (theories), when carrying out statistical analysis using quantitative data analysis techniques and when describing accurate profiles of people, events or situations of particular interest (Bartunek, Li and Easterby-Smith, 2009). Experimental designs are more appropriate when an experiment is carried out such as in a laboratory to result in observations which lead to conclusions (Bryan, 2014). Mixed methods design is used when one or more pure research designs are combined (Saunders, Lewis and Thornhill, 2016). The researcher took environmental, organizational and technological factors and extent of business intelligence adoption as variables which therefore have a relationship that can be established quantitatively. Since this research was about establishing the cause and effect relationships, a quantitative explanatory research design was adopted for this study.

3.3.1 RESEARCH PHILOSOPHY

Saunders, Lewis and Thornhill (2016) define research philosophy as a set of assumptions underpinning a research strategy employed by the researcher. The main research philosophies are the positivism, interpretivism and pragmatism (Adams and Schvaneveldt, 2015). According to Kothari (2014), positivism research philosophy is more appropriate when the research uses purely quantitative methods in collecting and analysing data, whereby interpretivism philosophy is more appropriate when purely qualitative methods are being used to collect and analyse data and pragmatism philosophy is whereby the research employs mixed methods, that is, both qualitative and quantitative methods of data analysis.

This research adopted a positivism approach however with quantitative methods being more dominant than qualitative methods. Positivism philosophy was considered more appropriate due to the nature of the research objectives, whereby the objectives sought to establish the nature of the impact of environmental factors, organisational factors and technological factors on the extent of the adoption of business intelligence, as supported by Guba and Lincoln (2014) who highlighted that positivism philosophy is basically associated with quantitative studies. In carrying out the study, the researcher held the following beliefs;

1. **Ontological beliefs**: the research was carried out from an ontological belief that it is reasonable to generalise findings from Delta Beverages to all other corporates in Zimbabwe. The researcher believes there is one truth on the effect of environmental factors, organisational factors and technological factors (internal and external) on the extent of business intelligence adoption which is universally applicable to the population. Summary measures and statistical analysis from the views of the surveyed sample beverage manufacturing company were used to generalise results to all beverage manufacturing organizations in Zimbabwe.
2. **Epistemological belief**: the research was anchored on facts gathered through a disciplined scientific research approach by using established methods to gather data to establish "one truth". Research instrument used contained structured questions that did not require any opinion or perception of the researcher.
3. **Axiological belief**: Research values which guided how the research was carried out were critical for the outcome of the research. The researcher sent links to the respondents for the questionnaire and had low interaction with the respondents since the study required the actual views of the respondents and facts not the researcher's.

3.3.2 RESEARCH APPROACH

According to Saunders, Lewis and Thornhill (2012) a research approach is the extent to which the researcher understands the theory at the start of his/her research. There is more than one research approach, which include inductive, deductive and abductive approaches (Saunders, Lewis and Thornhill, 2012). Inductive approach is when the researcher collects data and develops a theory from the analysis of the data (Babin, Carr, Griffin and Zikmund, 2013). According to Bendoly and Swink (2014), a deductive research approach is when the researcher collects data to test an existing theory laid on a specified population. Babin, Carr, Griffin and Zikmund (2013) postulate that an abductive research approach is when both inductive and abductive approaches are mixed, agreeing with Bryan (2014) who highlighted that impure approaches can be used and are termed abductive approaches. According to Bryan (2014), deductive approaches are more appropriate when doing quantitative researches and inductive approaches are more appropriate when carrying out qualitative approaches. The researcher needed to statistically determine test hypothesis and determine the nature and significance of the relationship between environmental, technological and organizational factors against business intelligence variables, hence the study adopted a deductive research approach.

3.4 TARGET POPULATION

Babin, Carr, Griffin and Zikmund (2018) define research population as the total number of elements that the research conclusions are to be attributed to. Cohen and Manion (2016) also stated that all elements that are under consideration or that are of interest to researcher, from which a sample can be drawn, is the research population. In this research, the population constituted of the managers (top, middle and low level) and workers of Delta Beverages in Zimbabwe

Table 3.1 below presents the breakdown of the population.

Table 3.1: Research population

Category	Category size
Management	**65**
Non-managerial employees	**1 645**
TOTAL	**1 710**

Source: Research data, 2019

Table 3.1 above shows that the population of the study was 1710, being made up 65 managerial employees and 1645 non-managerial employees.

3.5 SAMPLING METHODS

There are two sampling techniques, probabilistic and non-probabilistic sampling methods. Probabilistic sampling methods are those methods which give the population elements equal chances of being selected into the sample for sampling (Creswell, 2013). Examples include cluster sampling, stratified random sampling, random sampling and systematic random sampling (Blumberg, Cooper and Schindler, 2014). Non-probabilistic sampling methods are methods that give population elements unequal chances of being selected into the sample (Crawshaw and Chambers, 2001). Examples of non-probabilistic sampling methods include quota sampling, convenience sampling, judgemental sampling and snowballing sampling (Blumberg, Cooper and Schindler, 2014). Saunders, Lewis and Thornhill (2012) however highlighted that most of the probabilistic sampling methods require a sampling frame in order to be usable.

When selecting the actual respondents systematic random sampling technique was used, since the population was too large to employ simple random sampling. The researcher obtained the sampling frame from the HR of Delta Beverages. The researcher arranged the names in Alphabetical order, then assigned codes to each population element then used the hat system, without replacement, to choose the sample elements. After calculation of the required sample size, the researcher divided the population by the sample size, then came up with groups of the population amounting to the sample size. From the first group, simple random sampling was used using the hat system, without replacement, to randomly choose one population element. The remaining sample elements were chosen one from the remaining population groups, basing on the first randomly chosen element. This method was used in order to ensure that bias was eliminated, whereby every population element had an equal chance of being chosen to be a sample element. Also, Crawshaw and Chambers (2004) highlighted that statistical analysis require randomly chosen samples.

3.6 SAMPLE SIZE

Collis and Hussey (2019) defined a sample as a part of the population drawn from the population and studied, whose results are then generalised for the whole population. Hakim (2013) highlighted that a sample is taken when the population is too large to be studied wholly, element by element; when the researcher has limited time to carry study the whole population and when the researcher has limited resources. The sample size was based on the formula by Krejcie and Morgan (1970), in order to reduce the sampling error. Table 3.2 below shows the appropriate sample sizes for given population sizes by Krejcie and Morgan (1970).

Table 3. 1: Sample sizes by Krejcie and Morgan (1970)

Table 3.1

Table for Determining Sample Size of a Known Population

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	346
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	354
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	191	1200	291	6000	361
45	40	170	118	400	196	1300	297	7000	364
50	44	180	123	420	201	1400	302	8000	367
55	48	190	127	440	205	1500	306	9000	368
60	52	200	132	460	210	1600	310	10000	370
65	56	210	136	480	214	1700	313	15000	375
70	59	220	140	500	217	1800	317	20000	377
75	63	230	144	550	226	1900	320	30000	379
80	66	240	148	600	234	2000	322	40000	380
85	70	250	152	650	242	2200	327	50000	381
90	73	260	155	700	248	2400	331	75000	382
95	76	270	159	750	254	2600	335	1000000	384

Note: N is Population Size; S is Sample Size *Source: Krejcie & Morgan, 1970*

Source: Krejcie and Morgan (1970)

Given that the population size for this study was 1710, the sample size taken was 313. The breakdown of this sample is presented in Table 3.3 below, with the instrument used indicated.

Table 3. 2: Sample size

Category	Population	Sample size	Instrument
Delta Beverages management and staff	1 710	313	Questionnaire

Table 3.2 above shows that the sample size was 313, constituted of both management and non-managerial staff, of which the same questionnaire was used for everyone.

3.7 DATA SOURCES

There are two types of data which are primary data and secondary data, and, in this research, primary data was used.

Primary data is defined as data that is collected for the first time, to solve the current research problem (Cohen and Manion, 2015). Creswell, Vicki and Clark (2010) stated that primary sources of data consist of original sources of data that is collected straight from the field work. Primary data collection is accomplished through various methods which includes giving out questionnaires and carrying out interviews in marketing and business research, or experiments and direct observations in the physical sciences (Creswell, Vicki and Clark, 2010). In this research primary data were sourced from Delta Beverages employees.

Primary data related to the facts given, views held, experiences and expectations of the respondents concerning the variables of the study, through responding to questions crafted in form of a questionnaire. Primary data was used because the information that was gathered was up to date and also the data was gathered for the problem at hand. Another reason was that it gave a reliable picture since it was original and direct from the parties involved (Delta Beverages employees), who aired their views regarding the level of business intelligence adoption and how the environmental factors, technological factors and organisational factors are affecting the adoption of BI.

3.8 RESEARCH INSTRUMENTS

Denscombe, (2012*)* stated that research instruments are measurement tools that are used for gathering data, for example questionnaires designed to obtain data on a topic of interest from research subjects. The research adopted only the questionnaire as the research instrument.

3.8.1 QUESTIONNAIRE

Easterby-Smith, Thorpe, Jackson and Lowe (2008) define a questionnaire as a list of predetermined questions, to which the respondents are subjected. The term questionnaire stems out from collection of questions and statements designed to provide answers to the area of study under review (Easterby-Smith, Thorpe, Jackson and Lowe, 2008).

3.8.1.1 ADVANTAGES OF USING QUESTIONNAIRES

In line with the claims by Kothari (2014) that questionnaires can be used to gather data and information from a large sample, the questionnaire used in this study enabled the researcher to collect data from a large sample of 313 employees, which sample size was very large, relative to the fact that the researcher singlehandedly conducted the research and had time and resource constraints. Just as confirmed by Eden and Huxham (2015) the same questions were given to respondents arranged in the same order so there was no bias of information that was collected from all the members of the sample. Questionnaires also had an advantage that the information was collected from a large sample, yet confidentiality was still guaranteed. Another advantage was that the answers that were given to the questions could easily be quantified and data could be analysed efficiently and quickly with the use of computer software packages, Microsoft Office packages and IBM’s SPSS packages. In line with the advantage of questionnaires highlighted by Eden and Huxham (2015), questionnaires had an advantage that both quantitative and qualitative data was collected using one instrument by just differing the type of questions in the instrument.

3.8.1.2 DISADVANTAGES OF QUESTIONNAIRES

Some respondents could not successfully complete the questionnaires due to reasons including reluctance, being busy or undisclosed reasons. To overcome some of these challenges the researcher explained first to the respondents the importance of her completing the research. Explanations were given both by word of mouth and through an introductory letter on the questionnaire. Another disadvantage was that some respondents who were randomly chosen would not easily understand all questions in the questionnaire due to various reasons, therefore they had challenges in responding to the questions. However, by properly designing the questionnaire, by using simple terms and other qualities as recommended by Kothari (2014), the researcher managed to reduce the effects of misunderstanding of questions

3.8.2 QUESTIONNAIRE DESIGN

The questionnaire was basically in three sections. The first section of the questionnaire was administrative, which introduced the respondent to the study and the purpose of the study. It also contained the instructions and other administrative aspects like explanation of the subject under study. The second section solicited for the demographics and background information of the respondents, which was meant to determine their suitability for the study. Such information included age group and education levels of respondents and their working experience with Delta Beverages. The third and major section contained questions relating to the research objectives. These questions sought for data relating to the research objectives. The questionnaire contained mainly closed ended questions, whereby respondents were asked to choose from the given choices, and very few open ended where respondents were asked to specify any other responses that they could have if the given choices were never exhaustive of all the possible responses or choices. Closed ended questions were mostly used as they would produce the quantitative data which was mainly required in this study, in line with what Gray (2017) highlighted.

3.8.3 LIKERT SCALE

The Likert scale is the mostly common used approach to scaling down responses in a survey (Merriam, 2012). It is named after its developer, Rensis Likert. The end-points of a Likert scale are typically “strongly disagree” and “strongly agree.” The respondents are required to indicate their degree of agreement by having a comparison between any one of the five response categories which are agree, strongly agree, disagree, strongly disagree and undecided (Robson, 2014).

The use of the Likert scale had several advantages which included that it could be easily constructed and administered by the researcher and the respondents could understand and comprehend it more easily. The responses were assigned codes, which then helped generate the categorical and quantitative data used for the research. A much simpler language was used, therefore with the use of a Likert scale, it did not take long for the respondents to answer such questions.

3.9 DATA COLLECTION PROCEDURES

The researcher put together a list of questions in conformity with the reviewed literature and crafted a questionnaire which was uploaded on google forms. The researcher then collected a letter of permission and approval from the University department to gain audience from Delta Beverages. The researcher then applied for permission from the Human Resources Director of Delta Beverages using the letter of permission collected from the University of Zimbabwe. The researcher then put together a sample from the employees. The researcher proceeded to circulate the link of the questionnaire to the selected respondents after seeking consent from them first. Each respondent was given a maximum of thirty minutes, with an average of 15 minutes, to complete the questionnaire, then each respondent would upload the completed questionnaires to the researcher. Thirty minutes were regarded adequate for the respondents to study and complete the questionnaire. Due to Covid-19 and its related restrictions, an online questionnaire was helpful to restrict contact with people. After results were submitted the researcher then examined for wholeness, consistency and reliability of data, then went ahead to summarize, present and analyze the data.

3.10 PILOT STUDY

To boost the validity of the research instrument, a pilot study was conducted before the actual study was done, and a pilot study is also recommended by Shirley and Sushanta (2018). The questionnaire was administered to sixteen respondents to establish if the questionnaire was properly designed. The pilot study sought to ascertain if the questions were east to understand to the respondents, and if the responses given would be applicable to the research objectives and questions. Consequently, the researcher refined the questionnaire accordingly.

The researcher worked closely with the research project supervisor to be guided in all areas, as well as the research instrument. This helped in data validation. Minimization of errors assisted the researcher in data sorting, presentation and analysis.

3.11VALIDITY OF DATA

The extent to which a research instrument measures what it is intended to measure is regarded by Silverman (2014) as the validity of data. Silverman (2014) goes on to say that the validity of the research instrument or data is broken down into content validity and face validity. Content validity has to do with the relevance of actual data collected by the research instrument compared to the research problem and objectives (Silverman, 2014). Face validity refers to the consistence, structure and related aspects of the instruments (Silverman, 2014).

3.12 RELIABILITY OF DATA

Reliability refers to the internal consistency of the research instrument (Johnston, 2018). To improve the reliability of the data, pilot testing of the questionnaire was administered to sixteen respondents, whose responses were used to refine the final questionnaire. The researcher noted that the respondents, depending on their backgrounds, used different languages and jargons to answer the questionnaires. To avoid this, the process of pretesting was done to other respondents who did not then necessarily take part in the actual study. The goal for pretesting was to do an initial reliability assessment of the instrument.

The researcher also carried out a test-retest reliability assessment, whereby a respondent would be given a questionnaire to complete, then the researcher would use the responses to refine the questionnaire. After that the researcher would give back the refined questionnaire to the same respondent and determine if the responses given this time were consistent with the responses given the first time. If there was no consistence, the researcher would continue to refine the questionnaire until there was consistence.

This consistence was also tested using statistical package, SPSS version 22, by determining the Cronbach's Alpha, which tests the internal consistency of the questionnaires basing on the responses given. This is a reliability coefficient which shows how items in a set are positively correlated. It measures the inter-correlations among test items, with a measure of 1 being highest in terms of internal consistency and reliability and 0.7 to 0.9 being high and acceptable (Johnston, 2018).

The following mathematical formula for Cronbach's alpha was used to measure the reliability as well as internal consistency.

$$\propto = \frac{K\acute{c}}{(\tilde{v} + (K-1)\acute{c})}$$

Where:

K is the number of test items

$\tilde{v}$ is the average variance

$\acute{c}$ is the average of all covariance between the components across the current sample.

3.13 ETHICAL CONSIDERATIONS

According to Tharenou, Donohue and Cooper (2013), ethics are the standards or the norms of behaviour that help to guide the researcher's moral choices concerning the behaviour and the relationships towards others. Saunders et al (2016), regard research ethics as the extent to which one's behaviour is appropriate regarding the rights of the persons that become the subjects of the research work. Thus, ethics guide how the researcher formulates the research topic, designs the research instruments, collects data and analyse the findings (Yin, 2012).

The researcher acknowledged the authors of content that the researcher borrowed throughout the dissertation, by use of properly citation using the Harvard style, thereby circumvent plagiarism. The researcher also designed her research instrument in a manner that the identity of the respondents was not captured, and that private information of the respondents was kept confidential and was used only for the purposes of research, such as the highest levels of education of the respondents. Any quotations made were after the permission of the respective respondents was sought.

The researcher acquired a letter from the University to use for obtaining permission from the respondents to carry out the research. The researcher additionally granted the respondents an introductory letter so that the researcher could gain both access and the consent of the respondents. The respondents were not forced to participate. Each respondent was free to pull out at any time. The researcher also ensured that each respondent was independent from any control from either the researcher or from other respondents. The researcher guaranteed the respondents that there were no right or wrong answers, so that each respondent could feel free to convey their suggestions, feelings and thoughts. The researcher furthermore did not pay the respondents for taking part in the research, nonetheless the researcher applauded respondents by word of mouth to those who would have acknowledged that they have responded to the questionnaire.

3.14 DATA ANALYSIS AND PRESENTATION

Using the Likert scale by assigning of codes to the nominal, ordinal or interval data, for closed-ended questions in the questionnaires, the data was fed into IBM's SPPS v. 16 package. Depending on the number of options given on each closed ended question, the codes ranged from 1 up to a number corresponding to the number of options available. These codes were defined and fed into SPSS, then the responses from the questionnaires were then fed into the package using the codes. After feeding all the questionnaires the researcher now used the available options on the SPSS package to analyse or summarise the fed data. Analysis could be in form of frequencies, percentages, measures of central tendency, measures of dispersion and correlation analysis.

The very few open-ended questions responses were not fed into SPSS or any package, they were just summarised in writing, then interpreted.

For presentation purposes, the researcher used the SPSS package to get summarized data, such as frequencies, and then she could also use the same application package to represent data in form of tables. However, the researcher felt that the package was not an expert in presenting data, but just in analyzing data. As a result, for data presentation, the researcher would import summaries of data from the SPSS package to Microsoft Office application package version 2013 and would then use Excel to present data in form of tables. The process of importing from Excel to Word proved to be quite simple and convenient because the two applications communicate very well, therefore where editions needed to be made, the process proved to be quite easy.

3.15 CHAPTER SUMMARY

Chapter three outlined the methodology used in the study. It encompassed many critical areas, with justifications for each choice made, starting with the research philosophy. The philosophy adopted was a positivism research philosophy. The chapter then looked at the research approach, of which a deductive research approach was adopted. The research design was also outlined, of which a quantitative explanatory design was adopted due to the cause and effect relationship of the variables in the topic. After that the chapter looked at the research population, whereby the population amounted to 1710 Delta Beverages employees. The chapter then looked at the sampling methods adopted, of which the systematic random sampling technique was employed to come up with sampling elements. The sample size taken was 313. Structured online questionnaires were used to collect data. To ensure validity of data, pretesting of the questionnaire was done, and the project supervisor also helped design the questionnaire. Reliability would be tested using the Cronbach's Alpha. Data analysis was done using SPSS package, and presentation by Microsoft Office Word and Excel in form tables. Research ethics were observed throughout the study, which included anonymity of participants. Chapter four focused on data presentation, analysis, interpretation and discussion of findings in relation to the reviewed literature in the preceding chapter.

CHAPTER 4

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 INTRODUCTION

The chapter focused on the analysis of the collected data, the presentation of the analyzed data, the interpretation of the presented data, and the discussion of the findings. The chapter gave the response rate of the study, succeeded by the reliability statistics, succeeded by the demographics and background information of the respondents, succeeded by the presentation of results on the individual objectives.

4.2 RESPONSE RATE

The study adopted the response rate formula by Saunders et al. (2016) which expresses successful instruments as a percentage of the total distributed instruments.

In this study the researcher administered 313 questionnaires to the target population using the target sample size and successful questionnaires were 269 for analysis. The response rate was calculated using the following formula.

$$\therefore \text{Response Rate} = \frac{269}{313} = 85.94\%$$

Table 4.1 presents the response rate.

Table 4. 1: Response rate

Questionnaires distributed	Successful	Response rate
313	269	85.94%

The results in Table 4.1 show that the response rate for the study was 85.94%. According to Shirley and Sushanta (2014), a response rate of at least seventy percent is highly representative of the sample. As a result, the response rate of 85.94% for this study was highly representative of the sample and the population since the sample size was chosen using the authentic Krejcie and Morgan (1970) formula. Response rate was high because the researcher works for the organization in which the study was carried out.

4.3 RELIABILITY TESTS

Reliability is regarded by Johnston (2019) as the internal consistence of the instrument, which measures the extent to which the instrument can be reused with another sample drawn from the sample population with similar conclusion being drawn about the population. Johnston (2019) regards a Cronbach's Alpha of at least 0.70 to indicate high reliability of the instrument. SPSS was used to test the reliability of the questionnaire for the study with 22 items. Table 4.2 presents the results.

Table 4. 2: Reliability of the questionnaire

Cronbach's Alpha	N of Items
.927	22

Source: Primary data (2021)

The Cronbach's Alpha for this study was 0.927, which implies that the questionnaire was highly reliable or internally consistent in collecting data. It could be reused with another sample drawn from the same population at Delta Beverages, with similar conclusions being drawn.

4.3 DEMOGRAPHICS AND BACKGROUND OF RESPONDENTS

The demographics and background information of respondents is presented in this section. This include age, education and experience. This information was considered important as it showed the extent to which the respondents were suitable for the study.

4.3.1 AGE OF PARTICIPANTS

The age of the participants is presented in Figure 4.1. According to Robson (2018) age is a variable which gives a general idea about the possibility that a certain generation is knowledgeable, might have experienced something or their general expectations. In this study, the researcher regarded business intelligence technologies as a recent technological phenomenon which can best be understood by younger ages.

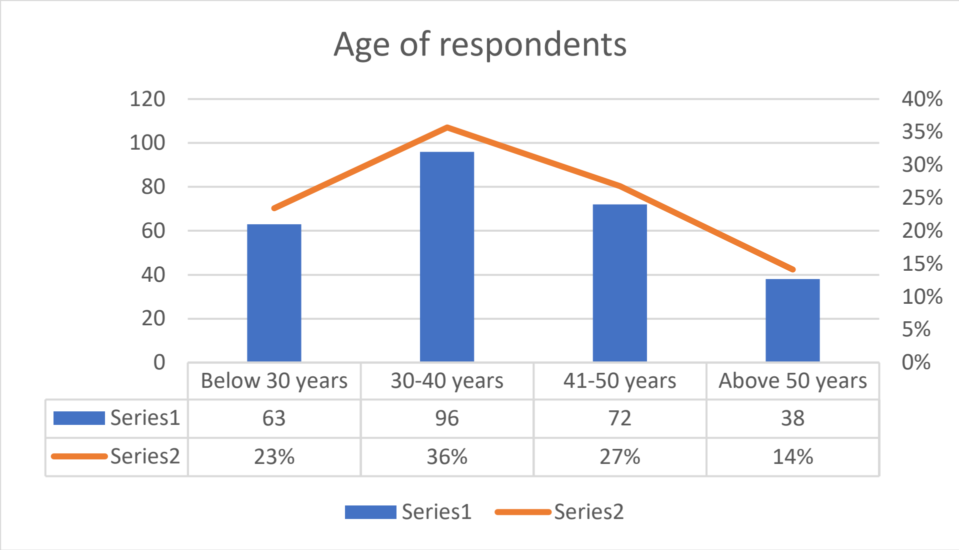

Figure 4.1: Age of respondents

Source: Primary data (2021)

The results in Figure 4.1 indicate that the modal age group was the 30-40 years group with 36% of the respondents, followed by the 41-50 years group with 27% of the respondents, succeeded by the 'below 30 years' group with 23% of the respondents, and the least group was the 'above 50 years' group with 14% of the respondents. The results indicate that the age distribution was almost normal, with some positivity in skewness, implying that younger ages were more dominant or frequent than older ages. The study indicates that 86% of the respondents were less than 50 years, which the researcher regards as good enough for the respondents to understand various technologies, including business intelligence technologies. Further, all the age groups were represented, hence the views, opinions and suggestions by people of different age groups were collected.

4.3.2 EDUCATION LEVEL

Green (2014) highlighted that education level generally indicates literacy, understanding of the phenomena under study, and the quality of the suggestions. Figure 4.2 represents the highest education levels of the participants.

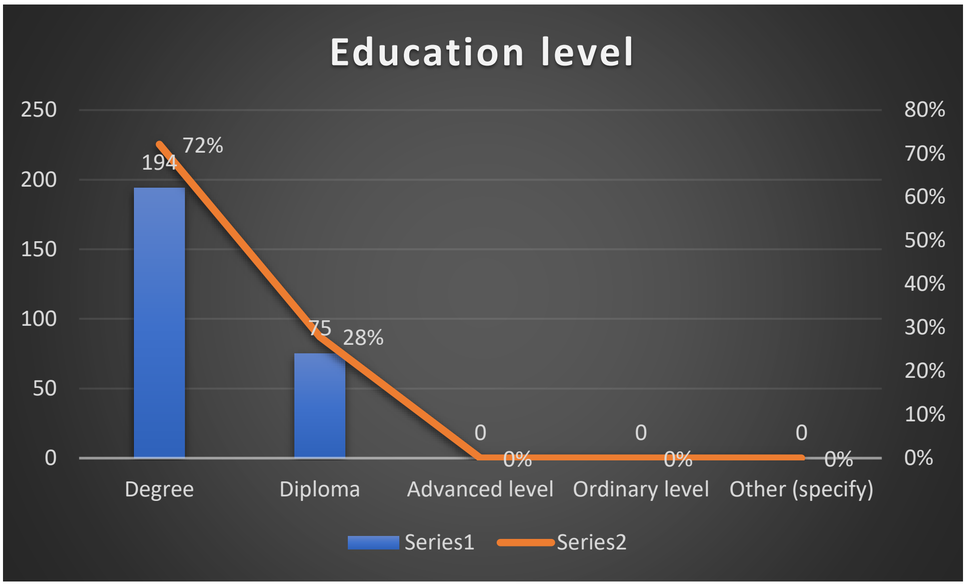

Figure 4.2: Highest education levels of the participants

Source: Primary data (2021)

The results presented in figure 4.2 show that the modal level of education was the ‘degree’ with 72% of the participants, and the remaining 28% held diplomas. This implies that all the participants had tertiary education, which reflect that they were supposedly highly literate to understand questions on the questionnaires, and to give valuable theoretical opinions or suggestions where needed.

4.3.3 EXPERIENCE LEVEL AT DELTA

According to Bryan (2018), experience level reflects the possibility that the respondents give responses basing on experience with the organization, not merely on theory and expectations. The results on the level of experience of the respondents with Delta Beverages are presented in Figure 4.3.

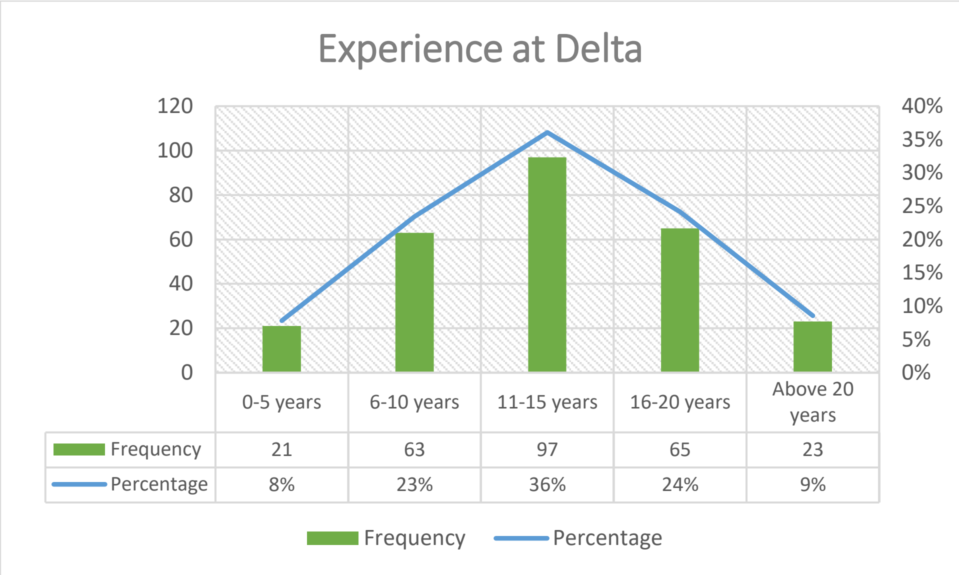

Figure 4.3: Experience of Delta Beverages

Source: Primary data (2021)

The results show that the level of experience of the participants at Delta Beverages is almost normally distributed, with infinitesimal negative skewness. The modal age group is the 11-15 years with 36% of the respondents. The results indicate that 92% of the respondents have more than 5 years level of experience with Delta Beverages. This implied that the participants were generally highly experienced with Delta Beverages such that most of the information they would give would be based more on their experiences with Delta Beverages rather than theory and expectations. The study sought to understand the extent of business intelligence at Delta Beverages as it is, hence information based more on experience would be best for the study.

4.4 EXTENT OF BUSINESS INTELLIGENCE ADOPTION AT DELTA BEVERAGES

The results in Table 4.3 presents the results on the current extent of business intelligence adoption at Delta Beverages, which was taken as the dependent variable of the study. The study used the mean value to determine the general position taken by the respondent on a notion.

Table 4. 3: Extent of business intelligence adoption at Delta Beverages

	SD	D	N	A	SA	Mean	s.d.
Statement	**1**	**2**	**3**	**4**	**5**		
Delta Beverages has adopted technologies that are assisting in marketing, e.g. to electronically collect social media customer data, for processing and predicting future customer needs	64 (24%)	97 (36%)	73 (27%)	35 (13%)	0 (0%)	2.29	0.97
Delta Beverages has adopted technologies that are assisting in research and development and product design	13 (5%)	28 (10%)	66 (25%)	92 (34%)	70 (26%)	3.66	1.12
Delta Beverages has adopted technologies that are assisting in management, e.g. to assist decision making at different levels	11 (4%)	27 (10%)	54 (20%)	106 (39%)	71 (26%)	3.74	1.08
Delta Beverages has adopted any technologies that are assisting in supply chain management practices e.g. demand forecasting, reduction of lead times	38 (14%)	69 (26%)	74 (28%)	51 (19%)	37 (14%)	2.93	1.25
Delta Beverages has adopted technologies that are	41 (15%)	49 (18%)	84 (31%)	52 (19%)	43 (16%)	3.03	1.28

assisting in production e.g. real time monitoring of production lines							
Overall	**167 (12%)**	**270 (20%)**	**351 (26%)**	**336 (25%)**	**221 (16%)**	**3.13**	**1.26**

Source: Primary data (2021)

A mean of 2.29 was obtained on the notion that 'Delta Beverages has adopted technologies that are assisting in marketing, e.g. to electronically collect social media customer data, for processing and predicting future customer needs'. This shows that in general, the respondents generally disagreed with the assertion. The standard deviation of 0.97 shows that responses generally were highly consistent with the mean. The study established here that Delta Beverages has not adopted technologies that are assisting in marketing, e.g. to electronically collect social media customer data, for processing and predicting future customer needs.

Furthermore, the results in Table 4.3 indicate that a mean of 3.66 was obtained on the notion that 'Delta Beverages has adopted technologies that are assisting in research and development and product design', with a standard deviation of 1.12. This indicated that the respondents were generally in agreement with the notion, and the responses were moderately variable. The results indicate that Delta Beverages has adopted technologies that are assisting in research and development and product design.

Moreover, a mean of 3.74 was obtained on the conception that 'Delta Beverages has adopted technologies that are assisting in management, e.g. to assist decision making at different levels', with a standard deviation of 1.08. The results thus indicate that the respondents were generally in agreement with notion, and the responses were moderately consistent. The study established here that Delta Beverages has adopted technologies that are assisting in management, e.g. to assist decision making at different levels.

Apart from that, the results in Table 4.3 allude that a mean response with a weight of 2.93 was achieved on the opinion that "Delta Beverages has adopted any technologies that are assisting in supply chain management practices e.g. demand forecasting, reduction of lead times", with a standard deviation of 1.25. This implies that the respondents were generally neutral, and the actual responses were moderately consistent with the mean. The study found here that it is not clear if Delta Beverages has adopted any technologies that are assisting in supply chain management practices e.g. demand forecasting, reduction of lead times.

In addition, the results indicate a mean of 3.03 on the impression that 'Delta Beverages has adopted technologies that are assisting in production e.g. real time monitoring of production lines', with a standard deviation of 1.28. This implies that the respondents were generally neutral about the assertion and the mean is moderately reliable. The study established here that it is not clear if Delta Beverages has adopted technologies that are assisting in production e.g. real time monitoring of its production lines.

Overall, the results in Table 4.3 indicate that a mean of 3.13 resulted from the responses on the assertions on the extent to which Delta Beverages has adopted business intelligence in its operations. The standard deviation of 1.26 indicate that the respondents were moderately consistent in their responses on business intelligence adoption at Delta Beverages. This implies that Delta beverages has not clearly or satisfactorily adopted business intelligence in its operations.

4.5 ORGANIZATIONAL FACTORS AND BUSINESS INTELLIGENCE ADOPTION

The first objective of the study sought to determine the impact of organizational factors on the extent of adoption of business intelligence at Delta Beverages. The results are presented in Table 4.4.

Table 4. 4: Organisational factors at Delta Beverages

	SD	D	N	A	SA	Mean	s.d.
Statement	**1**	**2**	**3**	**4**	**5**		
Delta Beverages' employee skills and competences affect the extent of its adoption of Business Intelligence in any way	0 (0%)	2 (1%)	75 (28%)	112 (42%)	80 (30%)	4.00	0.78
Delta Beverages' management styles currently affect the extent of its adoption of Business Intelligence in any way	0 (0%)	0 (0%)	63 (23%)	124 (46%)	82 (30%)	4.07	0.73
Delta Beverages' organisational structure currently affects the extent of its adoption of Business Intelligence in any way	0 (0%)	14 (5%)	54 (20%)	138 (51%)	63 (23%)	3.93	0.80
Delta Beverages' current organisational culture affects the extent of its adoption of Business Intelligence in any way	13 (5%)	34 (13%)	74 (28%)	91 (34%)	57 (21%)	3.54	1.10
Business size affects Delta's Business Intelligence adoption	6 (2%)	18 (7%)	34 (13%)	88 (33%)	123 (46%)	4.13	1.02
Generally, the organizational factors at Delta Beverages are conducive for business intelligence adoption	39 (14%)	51 (19%)	88 (33%)	52 (19%)	39 (14%)	3.00	1.24

Source: Primary data (2021)

The results in Table 4.4 show that the responses to the assertion that 'Delta Beverages' employee skills and competences affect the extent of its adoption of Business Intelligence in any way' was 4.00, with a standard deviation of 0.78. The results show that the respondents were generally in agreement with the notion, and the mean was highly reliable measure of the overall respondent position. The results indicate that Delta Beverages' employee skills and competences affect the extent of its adoption of Business Intelligence. This concurs with the findings of Yeoh and Koronios (2010) who found that employee competences and skills are key factors for business intelligence adoption.

Further, the results in Table 4.4 indicate that on the notion that 'Delta Beverages' management styles currently affect the extent of its adoption of Business Intelligence in any way', a mean response of 4.07 was obtained, with a standard deviation of 0.73. This indicates that the respondents were generally in agreement with the notion. The study establishes that management style as an organisational factor affect business intelligence adoption at Delta Beverages. This concurs with the claims by Negash and Gray, (2008) that management style is a key factor for business intelligence adoption.

Furthermore, the results show that a mean of 3.93 was obtained on the notion that 'Delta Beverages' organisational structure currently affects the extent of its adoption of Business Intelligence in any way', with a standard deviation of 0.80. The results indicate that the respondents were generally in agreement with the notion, and the mean was highly reliable as a measure of respondents' general position. The study established that Delta Beverages' organisational structure currently affects the extent of its adoption of Business Intelligence. This is in line with the claims by Chen, Chiang, and Storey (2018) on the importance of organisational structure on adoption of business intelligence.

In addition, the results indicate that a mean of 3.54 was achieved on the impression that "Delta Beverages' current organisational culture affects the extent of its adoption of Business Intelligence in any way", with a standard deviation of 1.08 showing moderate consistency of the actual responses. The results show that the respondents generally agreed with the assertion. It was found here that organisational culture affects business intelligence adoption at Delta Beverages, which confirms the findings of Chen, Chiang, and Storey, (2018).

It was further established that a mean of 4.13 was obtained on the notion that 'Business size affects Delta's Business Intelligence adoption' with a standard deviation of 1.02. The standard deviation showed satisfactory consistency of the actual responses. The mean value indicated that the respondents were generally in agreement with assertion. The study found here that business size affects Delta Beverages' Business Intelligence adoption, which is in line with the claims of Chesbrough (2003).

The results alluded that a mean of 3.00 was obtained on the notion that 'Generally, the organisational factors at Delta Beverages are conducive for business intelligence adoption', with a standard deviation of 1.24. The standard deviation showed moderate mean reliability. The results showed that generally, the organisational factors at Delta Beverages are not conducive for business intelligence adoption. The results under this notion were used against the result obtained as presented in Table 4.3, and correlation analysis was performed, of which the results are presented in Table 4.5.

Table 4. 5: Correlation between organisational factors and business intelligence adoption

		Organisational factors	BI adoption
Organisational factors	Pearson Correlation	1	.788*
	Sig. (2-tailed)		.011
	N	269	269
BI adoption	Pearson Correlation	.788*	1
	Sig. (2-tailed)	.011	
	N	269	269

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Primary data (2021)

The results in Table 4.5 show that there is a strong positive correlation between the conduciveness of the organisational factors and the extent of business intelligence adoption at Delta Beverages ($r = 0.788$). This implies that increasing the conduciveness of the organisational factors results in corresponding improvement in the adoption of business intelligence. Correlation is significant at the 0.05 level ($p = 0.011$). This implies that we have sufficient statistical evidence, proof or confidence that such a relationship exists at Delta Beverages.

The first hypothesis of the study was: H_1: There is no significant relationship between organisational factors and the adoption of business intelligence at Delta Beverages.

With the results obtained in Table 4.5, we reject H_0 and infer that organisational factors have a significant impact on the extent of business intelligence adoption at Delta Beverages. This result confirms the findings of Chaturvedi and Gupta (2005) on their study.

4.6 ENVIRONMENTAL FACTORS AND BUSINESS INTELLIGENCE ADOPTION

The second objective of the study sought to assess the impact of environmental factors on adoption of Business Intelligence adoption at Delta Beverages. Table 4.6 presents results on environmental factors as they are applicable to Delta Beverages.

Table 4. 6: Environmental factors as applicable to Delta Beverages

	SD	D	N	A	SA	Av	s.d.
Statement	**1**	**2**	**3**	**4**	**5**		
The national political environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	0 (0%)	6 (2%)	41 (15%)	89 (33%)	133 (49%)	4.30	0.81
The national economic environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	0 (0%)	0 (0%)	5 (2%)	45 (17%)	219 (81%)	4.80	0.45
The national legal environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	3 (1%)	28 (10%)	79 (29%)	100 (37%)	59 (22%)	3.68	0.97
The competitive pressures in the beverage industry currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	0 (0%)	15 (6%)	48 (18%)	68 (25%)	138 (51%)	4.22	0.93
Generally, the external environmental factors applicable to Delta Beverages are conducive for business intelligence adoption	55 (20%)	80 (30%)	91 (34%)	33 (12%)	10 (4%)	2.49	1.06

Source: Primary data (2021)

The results in Table 4.6 indicate that a mean of 4.30 was obtained on the notion that 'The national political environment currently has an effect on Delta Beverages' level of adoption of

Business Intelligence in any way' with a standard deviation of 0.81. This implies that the respondents were generally in agreement with the notion and that the mean was highly reliable as a measure of central tendency. The study found that the national political environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence. The results agree with the findings of Luhn, (2012) who found political environment to be a key factor in business intelligence adoption extent.

Furthermore, the results in Table 4.6 indicate that on the assertion that 'The national economic environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way', a mean of 4.80 was obtained, with a standard deviation of 0.45. This implies that the responses were highly consistent. The results indicate that the respondents were generally in strong agreement with the notion. The study established here that the national economic environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence, which concurs with the findings of Luhn, (2012).

In addition, a mean of 3.68 was obtained on the notion that 'The national legal environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way', with a standard deviation of 0.97. The results show that the mean was highly reliable. The respondents were generally in agreement with the notion. The study found here that the national legal environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence, confirming the findings of Hidayanti, Herman and Farida, (2018).

Furthermore, the results in Table 4.6 show that a mean of 4.22 was obtained ion the impression that 'The competitive pressures in the beverage industry currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way', which shows that the respondents were generally in agreement with the impression. The standard deviation of the mean was 0.93, showing high response consistency. The results indicate that the competitive pressures in the beverage industry currently has an effect on Delta Beverages' level of adoption of Business Intelligence, which is in tandem with the findings of Hidayanti, Herman and Farida, (2018).

In addition, a mean of 2.49 was obtained on the conception that 'Generally, the external environmental factors applicable to Delta Beverages are conducive for business intelligence adoption', with a standard deviation of 1.06. This shows that the respondents were generally in disagreement with the notion, and their respondents were moderately consistent. The study established here that generally, the external environmental factors applicable to Delta Beverages are not conducive for business intelligence adoption. To test the effect of these factors on business intelligence adoption, correlational analysis was performed between the results on this assertion and the results summarised in Table 4.3.

Table 4. 7: Correlation between environmental factors and business intelligence adoption

		Environmental factors	BI adoption
Environmental factors	Pearson Correlation	1	.356*
	Sig. (2-tailed)		.045
	N	269	269
BI adoption	Pearson Correlation	.356*	1
	Sig. (2-tailed)	.045	
	N	269	269

*. Correlation is significant at the 0.05 level (2-tailed).

Source: Primary data (2021)

The results in Table 4.7 show that there is a moderate positive correlation between the conduciveness of the environmental factors and the extent of business intelligence adoption at Delta Beverages ($r = 0.356$). This implies that increasing the conduciveness of the environmental factors results in somewhat improved adoption of business intelligence. Correlation is significant at the 0.05 level ($p = 0.045$). This implies that we have sufficient statistical evidence, proof or confidence that such a relationship exists at Delta Beverages.

The second hypothesis of the study was: H_2: There is no significant relationship between environmental factors and the adoption of business intelligence at Delta Beverages.

With the results obtained in Table 4.7, we reject H_2 and infer that environmental factors have a significant impact on the extent of business intelligence adoption at Delta Beverages. This is in tandem with the findings of Shin (2003) and Yang, Kumara, Bukkapatnam and Tsung, (2019) in their separate studies.

4.7 TECHNOLOGICAL FACTORS AND BUSINESS INTELLIGENCE

The third objective of the study sought to investigate the impact of technological factors on Business Intelligence adoption at Delta Beverages. Results on technological factors as applicable to Delta Beverages are presented in Table 4.8.

Table 4. 8: Technological factors as applicable to Delta Beverages

	SD	D	N	A	SA	Av	s.d.
Statement	**1**	**2**	**3**	**4**	**5**		
The quantity of available data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	12 (4%)	32 (12%)	54 (20%)	84 (31%)	87 (32%)	3.75	1.16
The quality of available data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	0 (0%)	5 (2%)	72 (27%)	91 (34%)	101 (38%)	4.07	0.85
The cost of accessing data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	21 (8%)	37 (14%)	51 (19%)	81 (30%)	79 (29%)	3.59	1.26
The current level of technological infrastructure adoption by Delta Beverages e.g. computer software, has an effect on Delta Beverages' level of adoption of Business Intelligence	0 (0%)	0 (0%)	24 (9%)	43 (16%)	202 (75%)	4.66	0.64

The current technical skills possessed by Delta Beverage staff currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way	0 (0%)	24 (9%)	69 (26%)	83 (31%)	93 (35%)	3.91	0.98
Generally, the technological factors applicable to Delta Beverages are conducive for business intelligence adoption	37 (14%)	53 (20%)	81 (30%)	48 (18%)	50 (19%)	3.08	1.29

Source: Primary data (2021)

The results in Table 4.8 show that a mean of 3.75 and a standard deviation of 1.16 were obtained on the conception that 'The quantity of available data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way'. This implies that the respondents were generally in agreement with the notion. The study found that the quantity of available data e.g. customer and market data have an effect on Delta Beverages' level of adoption of Business Intelligence, concurring with the findings of Yang, Kumara, Bukkapatnam and Tsung (2019).

Further, the results in Table 4.8 show that a mean of 4.07 and a standard deviation of 0.85 was obtained on the notion that 'The quality of available data e.g. customer and market data influence Delta Beverages' level of adoption of Business Intelligence in any way'. This implies that the respondents generally agreed with the assertion. The study established here that the quality of available data e.g. customer and market data influence Delta Beverages' level of adoption of Business Intelligence. This in line with the findings of Yang, Kumara, Bukkapatnam and Tsung, (2019) who established that quality of data is key to adoption of business intelligence systems.

Also, the results in Table 4.8 show that a mean of 3.59 was obtained on the notion that 'The cost of accessing data e.g. customer and market data influences Delta Beverages' level of adoption of Business Intelligence', with a standard deviation of 1.26. The respondents thus were generally in agreement with the notion.

The results indicate that the cost of accessing data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence.

Furthermore, the results in Table 4.8 indicate that a mean response of 4.66 and a standard deviation of 0.64 was obtained on the notion that 'the current level of technological infrastructure adoption by Delta Beverages e.g. computer software, has an effect on Delta Beverages' level of adoption of Business Intelligence'. This implies that the respondents generally agreed with the notion. The study thus established that the current level of technological infrastructure adoption by Delta Beverages e.g. computer software, has an effect on Delta Beverages' level of adoption of Business Intelligence. This concurs with the results reported by McKinsey & Company Report (2019).

Apart from that, the results in Table 4.8 indicate a mean of 3.91 on the notion that 'The current technical skills possessed by Delta Beverage staff currently has an effect on Delta Beverages' level of adoption of Business Intelligence', with a standard deviation of 0.98. The respondents thus were generally in agreement here. The study thus established that the current technical skills possessed by Delta Beverage staff currently has an effect on Delta Beverages' level of adoption of Business Intelligence, which agrees with the findings of Koronios (2010)

Furthermore, a mean of 3.08 was obtained on the notion that 'Generally, the technological factors applicable to Delta Beverages are conducive for business intelligence adoption', with a standard deviation of 1.26. This implies that the general respondent was neutral in that regard. The study found that generally, the technological factors applicable to Delta Beverages are not clearly conducive for business intelligence adoption. The results obtained on this notion were correlated with the summarised results in Table 4.3 in line with both the third objective and the third hypothesis of the study.

Table 4. 9: Correlation between technological factors and business intelligence adoption

		Technological factors	BI adoption
Technological factors	Pearson Correlation	1	.738*
	Sig. (2-tailed)		.015
	N	269	269
BI adoption	Pearson Correlation	.738*	1
	Sig. (2-tailed)	.015	
	N	269	269

*. Correlation is significant at the 0.05 level (2-tailed).

The results in Table 4.9 show that there is a strong positive correlation between the conduciveness of the technological factors and the extent of business intelligence adoption at Delta Beverages ($r = 0.738$). This implies that increasing the conduciveness of the technological factors results in corresponding improvement in the adoption of business intelligence. Correlation is significant at the 0.05 level ($p = 0.015$). This implies that we have sufficient statistical evidence, proof or confidence that such a relationship exists at Delta Beverages.

The third hypothesis of the study was: H_3: There is no significant relationship between technological factors and the adoption of business intelligence at Delta Beverages.

With the results obtained in Table 4.9, we reject H_3 and infer that technological factors have a significant impact on the extent of business intelligence adoption at Delta Beverages. This confirms the findings of Davenport et al., (2010) and Wixom and Watson (2007).

4.8 CHAPTER SUMMARY

Chapter four focused on the presentation, analysis, interpretation and discussion of findings. The response rate of the study was 85.94%. The questionnaire was reliable. The demographics and background information of respondents implied that the respondents were appropriate for the study. Delta Beverages has adopted business intelligence to a limited extent. Conduciveness of organisational factors, environmental factors, and technological factors, have significant positive impact on the extent of business intelligence adoption at Delta Beverages. The next chapter focused on the summary, conclusions and recommendations of the study.

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 INTRODUCTION

Based on the findings and discussions presented in chapter 4, this chapter looked at the summary of the major findings of the study. It sought to investigate how the research objectives and research questions of the study were answered, the conclusions to the study objectives and the recommendations of the study to the study stakeholders. The chapter gave a recap of the study objectives and the study hypothesis. After that the summary of the major findings were presented. The chapter then went on to the conclusions of the study objectives, then the recommendations of the study mainly to Delta Beverages, the government and future researchers.

5.2 RESEARCH OBJECTIVES

The study was aimed at analysing the factors affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe.

The objectives of the study are;

1. To ascertain the effect of organizational factors on adoption of Business Intelligence in the beverage manufacturing industry.
2. To assess the impact of environmental factors on adoption of Business Intelligence adoption in the beverage manufacturing industry.
3. To investigate the impact of technological factors on Business Intelligence adoption in the beverage manufacturing industry.
4. To propose better ways that Business Intelligence can be adopted and implemented in the beverage manufacturing industry.

5.3 HYPOTHESIS

H_1: There is no significant relationship between organisational factors and the adoption of business intelligence in the beverage manufacturing industry.

H_2: There is no significant relationship between environmental factors and the adoption of business intelligence in the beverage manufacturing industry.

H_3: There is no significant relationship between technological factors and the adoption of business intelligence in the beverage manufacturing industry.

5.4 SUMMARY OF MAJOR FINDINGS

The following were the major findings under each objective.

5.4.1 IMPACT OF ORGANISATIONAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION

The results indicated that Delta Beverages' employee skills and competences affect the extent of its adoption of Business Intelligence (mean = 4.00). The study also established that management style as an organisational factor affect business intelligence adoption at Delta Beverages (mean = 4.07). The study further established that Delta Beverages' organisational structure currently affects the extent of its adoption of Business Intelligence (mean = 3.93). It was further found here that organisational culture affects business intelligence adoption at Delta Beverages (mean = 3.54). The study also established that business size affects Delta Beverages' Business Intelligence adoption (mean = 4.13). The results also showed that generally, the organisational factors at Delta Beverages are not conducive for business intelligence adoption (mean = 3.00). The results also established that there is a strong positive correlation between the conduciveness of the organisational factors and the extent of business intelligence adoption at Delta Beverages ($r = 0.788$). Correlation is significant at the 0.05 level ($p = 0.011$). The first hypothesis of the study was H_1: There is no significant relationship between organisational factors and the adoption of business intelligence at Delta Beverages. With the results obtained, we reject H_1.

5.4.2 IMPACT OF ENVIRONMENTAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION

The study found that the national political environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 4.30). The study further established that the national economic environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 4.80). The study further found that the national legal environment currently has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 3.68). Furthermore, the results indicated that the competitive pressures in the beverage industry currently has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 4.22). Further, the study established that generally, the external environmental factors applicable to Delta Beverages are not conducive for business intelligence adoption (mean = 2.49). The study established a moderate positive correlation between the conduciveness of the environmental factors and the extent of business intelligence adoption at Delta Beverages ($r = 0.356$). The correlation is significant at the 0.05 level ($p = 0.045$). The second hypothesis of the study was H_2: There is no significant relationship between environmental factors and the adoption of business intelligence at Delta Beverages. With the results obtained, we reject H_2.

5.4.3 IMPACT OF TECHNOLOGICAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION

The study found that the quantity of available data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 3.75). The study further established that the quality of available data e.g. customer and market data have an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 4.07). Moreover, the results indicated that the cost of accessing data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 3.59). Furthermore, the study established that the current level of technological infrastructure adoption by Delta Beverages e.g. computer software, has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 4.66). Also, the study established that the current technical skills possessed by Delta Beverage staff currently has an effect on Delta Beverages' level of adoption of Business Intelligence (mean = 3.91). In addition, the results alluded that generally, the technological factors applicable to Delta Beverages are not clearly conducive for business intelligence adoption (mean = 3.08). The study established a strong positive correlation between the conduciveness of the technological factors and the extent of business intelligence adoption at Delta Beverages (r = 0.738). The correlation is significant at the 0.05 level (p = 0.015). The hypothesis of the study was H_3: There is no significant relationship between technological factors and the adoption of business intelligence at Delta Beverages. With the results obtained, we reject H_3.

5.5 CONCLUSIONS

The following were the conclusions drawn on each objective.

5.5.1 IMPACT OF ORGANISATIONAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION

The first objective of the study sought to establish the impact of organisational factors on business intelligence adoption at Delta Beverages. Delta Beverages has not meaningfully adopted business intelligence. The study concluded that organisational factors like employee competences and skills, management style, organisational structure, organisational culture and business size affect the extent to which Delta beverages can adopt business intelligence. Currently, all these factors are generally not conducive for significant adoption of business intelligence. Nevertheless, organisational factors' conduciveness has a strong positive and statistically significant impact on business intelligence adoption. Improving the conduciveness of the above organisational factors results in corresponding improvement in the extent of business intelligence adoption, and there is enough statistical proof for such a relationship.

5.5.2 IMPACT OF ENVIRONMENTAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION

The second objective of the study sought to assess the impact of environmental factors on adoption of Business Intelligence adoption at Delta Beverages. Delta Beverages has pronouncedly adopted business intelligence in its operations. Various environmental factors like political environment, national economic environment, legal environment and competitive pressures have an impact on the extent to which Delta Beverages adopts business intelligence. The study concluded that the conduciveness of these environmental factors has a moderate positive impact on the extent of adoption of business intelligence by Delta Beverages. Improving environmental conduciveness results in moderate improvement in the extent of adoption of business intelligence by Delta Beverages, and there is sufficient statistical proof for such a relationship. However, currently the business environment for Delta Beverages is not conducive for business intelligence adoption.

5.5.3 IMPACT OF TECHNOLOGICAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION

The third objective of the study sought to investigate the impact of technological factors on Business Intelligence adoption at Delta Beverages. The technological factors like quantity of data, quality of data, cost of accessing data, current level of technological infrastructure adoption by Delta Beverages, and the technical skills possessed by Delta Beverage employees have an impact on the company’s ability to adopt business intelligence in its operations. The conduciveness of technological factors has a strong positive impact on the extent of adoption of artificial intelligence by Delta Beverages. Improving the conduciveness of the technological factors results in strong improvement in the extent of technological adoption, and there is sufficient statistical proof for such a relationship. However, the current technological environment as applicable to Delta Beverages is not conducive for a sound adoption of business intelligence.

5.6 RECOMMENDATIONS

In line with the fourth objective, basing on the findings of the study and the reviewed literature, the following recommendations were made to the indicated stakeholders.

5.6.1 MANAGERIAL RECOMMENDATIONS

Recommendations to management from this study are to promote Training of employees to be able to use the available technologies, this can be done on the job or off the job. Mandel training centre can be an example of training centres where employees can be sent for further training in their related fields. Universities can also be of important help when it comes to improving the technical skills of the employees. Top management is recommended to support the acquisition of the necessary technologies related to business intelligence like machinery for real time monitoring, robots, Chatbots and related computer software. This can be done through allocating funds meant for technological improvements during annual budgets. Benchmarking of business intelligence technologies with other companies in and outside Zimbabwe, in the beverages industry or outside the beverage industry can be a strategy Delta beverage can employ to adopt business intelligence. The study also recommends Delta Beverages to implement BI applications with flexible and agile architecture to meet changing requirements that include supporting embedded analytics. Use of social media platforms like Facebook by the company improves interaction and collection of social media data, which may then be used for decision making.

5.6.2 POLICY RECOMMENDATIONS

The government is recommended to support acquisition of technology by companies like Delta Beverages, through providing the much-needed foreign currency to purchase related equipment. Further, the government is recommended to find sustainable solutions to the current unconducive political, legal and economic environment which have a direct effect on business intelligence adoption by companies like Delta. This may further increase Foreign Direct Investment whereby foreign investors may inject capital in companies like Delta Beverages, which capital is then used to purchase capital equipment like modern machinery. ZIMRA is also recommended to reduce its taxes on acquisition of technologies by companies like Delta to promote acquisition of business intelligence infrastructure. Government can also assist companies by encouraging collaboration in accumulating market and economic data and enabling access of the same by industry players. Government can also assist by building national infrastructure to allow accessibility of data and services reliably and countrywide.

Government is also recommended to improve country policies that support international partnerships and trading.

5.7 RECOMMENDATIONS FOR FURTHER RESEARCH

The study was an analysis of the factors affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe: Case of Delta Beverages Ltd. the other researchers can focus either on the same industry but with a survey of the beverage manufacturing organisations like Pepsi Zimbabwe. Alternatively, surveys can be conducted in other industries like the manufacturing (excluding beverage industry), banking industry and telecoms industry. Inclusion of an interview guide would also enhance data triangulation.

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APPENDICES

APPENDIX 1-LETTER OF ENTRY

UNIVERSITY OF ZIMBABWE BUSINESS SCHOOL

UNIVERSITY OF ZIMBABWE

TREP Building
Mt Pleasant
Harare, Zimbabwe

Email: info.uzgsm@gmail.com
Tel: 263-0242- 333521/2

13th April 2021

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: <u>ACADEMIC REFERENCE LETTER FOR MRS TINASHE ZVOBGO (R174056A)</u>

This letter serves to confirm that Mrs Zvobgo is a bona fide Master of Business Administration (MBA) student at the University of Zimbabwe Business School (UZBS). She is carrying out a research in partial fulfillment of the requirements of the MBA degree programme.

We kindly request you to provide her with the information she needs to complete her research. Please note that only aggregated data will be used in the final analysis. Please also note that the UZ Business School upholds high levels of confidentiality and ethical standards in conducting research, and therefore, the information that you provide will be used for academic purposes only and will not be disclosed to third parties.

Yours faithfully,

Nkaseke

GRADUATE SCHOOL
OF MANAGEMENT
UNIVERSITY OF ZIMBABWE

DR N. KASEKE
DIRECTOR, UZ BUSINESS SCHOOL
/fg

APPENDIX 2

UNIVERSITY OF ZIMBABWE

Research Questionnaire for Business Intelligence Successful Adoption Factors in The Beverage Manufacturing Industry in Zimbabwe

Dear respondent

My name is Tinashe Zvobgo R174056A, a student studying towards a master's Degree in Business Administration at the University of Zimbabwe. I am currently undertaking a research entitled: **"An analysis of the factors affecting successful adoption of Business Intelligence in the beverages manufacturing industry in Zimbabwe: case of Delta Beverages".**

The term "Business Intelligence" is frequently used to describe the technologies, applications, and processes for gathering, storing, accessing and analysing data to help users to make better decisions (Davenport et al., 2010; Wixom and Watson, 2007). The use of Business Intelligence refers to certain skills, technologies, practices, and processes that are employed as part of supporting decision making in an organization (Rezaie, Mirabedini and Abtahi, 2017)

Please assist by completing this questionnaire. The information provided will be used purely for academic purposes and responses will be treated with confidentiality.

For more information regarding the research please do not hesitate to contact me on my cell number + 263 77 391 3066.

Instructions

1. Do not write your name or phone number on any part of the paper
2. Please answer the questions below by writing and or ticking in the appropriate boxes.
3. Kindly attempt all questions in each section

Date_____/_____/______

SECTION A: DEMOGRAPHICS AND BACKGROUND INFORMATION

A1. What is your age group?

Below 30 years	
30-40 years	
41-50 years	
Above 50 years	

A2. What is your highest level of education?

Degree	
Diploma	
Advanced level	
Ordinary level	
Other (specify)	…………………….

A3. What is your level of experience at Delta Beverages?

0-5 years	
6-10 years	
11-15 years	
16-20 years	
Above 20 years	

SECTION B: EXTENT OF BUSINESS INTELLIGENCE ADOPTION AT DELTA

B1. To what extent has Delta Beverages adopted Business Intelligence? Show the extent of adoption using the scale given below.

1 = Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N) 4=Agree (A) and 5=Strongly Agree.

	Statement	**SD**	**D**	**N**	**A**	**SA**
		1	**2**	**3**	**4**	**5**
B1	Delta Beverages has adopted technologies that are assisting in marketing, e.g. to electronically collect social media customer data, for processing and predicting future customer needs					
B2	Delta Beverages has adopted technologies that are assisting in research and development and product design					
B3	Delta Beverages has adopted technologies that are assisting in management, e.g. to assist decision making at different levels					
B4	Delta Beverages has adopted technologies that are assisting in supply chain management practices e.g. demand forecasting, reduction of lead times					
B5	Delta Beverages has adopted technologies that are assisting in production e.g. real time monitoring of production lines					

SECTION C: ORGANIZATIONAL FACTORS ON ADOPTION OF BUSINESS INTELLIGENCE AT DELTA BEVERAGES

C1. Show the extent of your agreement or disagreement with each of the following statements in the table. *Tick the number in the box corresponding to the most appropriate answer*. *Use the given key*. 1 = Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N) 4=Agree (A) and 5=Strongly Agree.

Statements		SD	D	N	A	SA
		1	2	3	4	5
C1	Delta Beverages' employee skills and competences affect the extent of its adoption of Business Intelligence in any way					
C2	Delta Beverages' management styles currently affect the extent of its adoption of Business Intelligence in any way					
C3	Delta Beverages' organisational structure currently affects the extent of its adoption of Business Intelligence in any way					
C4	Delta Beverages' current organisational culture affects the extent of its adoption of Business Intelligence in any way					
C5	Business size affects Delta's Business Intelligence adoption					
C6	Generally, the organisational factors at Delta Beverages are conducive for business intelligence adoption					

SECTION D: THE IMPACT OF ENVIRONMENTAL FACTORS ON ADOPTION OF BUSINESS INTELLIGENCE ADOPTION AT DELTA BEVERAGES

D1. Show the extent of your agreement or disagreement with each of the following statements in the table? *Tick the number in the box corresponding to the most appropriate answer. Use the given key*. **Key**: 1 = Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N) 4=Agree (A) and 5=Strongly Agree.

Statements		SD	D	N	A	SA
		1	2	3	4	5
D1	The national political environment currently influences Delta Beverages' level of adoption of Business Intelligence in any way					
D2	The national economic environment currently influences Delta Beverages' level of adoption of Business Intelligence in any way					
D3	The national legal environment currently influences Delta Beverages' level of adoption of Business Intelligence in any way					
D4	The competitive pressures in the beverage industry currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way					
D5	Generally, the external environmental factors applicable to Delta Beverages are conducive for business intelligence adoption					

SECTION E: IMPACT OF TECHNOLOGICAL FACTORS ON BUSINESS INTELLIGENCE ADOPTION AT DELTA BEVERAGES

E1. Show the extent of your agreement or disagreement with each of the following statements in the table? *Tick the number in the box corresponding to the most appropriate answer. Use the given key*. **Key**: 1 = Strongly Disagree (SD), 2=Disagree (D), 3=Neutral (N) 4=Agree (A) and 5=Strongly Agree.

Statements		SD	D	N	A	SA
		1	**2**	**3**	**4**	**5**
E1	The quantity of available data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way					
E2	The quality of available data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way					
E3	The cost of accessing data e.g. customer and market data has an effect on Delta Beverages' level of adoption of Business Intelligence in any way					
E4	The current level of technological infrastructure adoption by Delta Beverages e.g. computer software, has an effect on Delta Beverages' level of adoption of Business Intelligence					
E5	The current technical skills possessed by Delta Beverage staff currently has an effect on Delta Beverages' level of adoption of Business Intelligence in any way					
E6	Generally, the technological factors applicable to Delta Beverages are conducive for business intelligence adoption					

SECTION F: SUGGESTIONS

F1. How do you suggest Delta Beverages improves its level of adoption of Business Intelligence? Use the space below.

…………………………………………………………………………………………………

…………………………………………………………………………………………………

……………………………………………………………………………………………….

F2. How do you suggest any other stakeholder, such as the government, can help improve Business Intelligence adoption by Delta Beverages? Use the space below.

………………………………………………………………………………………………………
………………………………………………………………………………………………………
………………………………………………………………………………………………………

END OF QUESTIONNAIRE