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Understanding the Business Value Creation Process for Business Intelligence Tools in the UAE

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Abstract

Background: *In today's dynamically changing business environment, organizations are constantly striving to improve their organizational performance, and the use of business intelligence (BI) aids in this process. This is a key reason why BI has captured the attention of many academicians and practitioners. Most of the research on BI highlights its importance and the ways in which it facilitates decision-making; however, there is limited research on how the use of BI tools and applications benefits the organization by enabling it to convert the millions of dollars spent on BI investment into business value. This study validates the "business value of BI" framework by evaluating the business value creation process for BI tools in the UAE.*

Method: *The data for this empirical study were collected via interviews with 15 middle managers from various industries in the UAE, with a focus on BI tools and the use of BI in their organizations.*

Results: *The results show that a business value creation process for BI exists and that it is divided into three subprocesses: the BI conversion process, BI use process, and BI competitive process.*

Conclusions: *The use of BI has become necessary for organizations to compete effectually. The results of this study identify the various BI tools that organizations in the UAE use. Furthermore, the results highlight the business value creation process of BI tools and how the effective use BI offers an information advantage that facilitates decision-making and eventually promotes financial and non-financial benefits for the organization.*

Keywords: Business Intelligence, Business Value, Business Intelligence Tools, Analytics, Competitive Advantage.

Introduction

In today's digital era, organizations are constantly striving to get a competitive advantage over each other. One of the biggest challenges they face is the availability of technology in abundance. Hence, the aim of the race is not to do it better but to do it first by increasing their agility that is, the ability to effectively identify and respond to dynamic market changes (Ghasemaghaei et al., 2017). This is one reason why organizations need an effective and efficient medium that facilitates quick and efficient decisions (Bordeleau et al., 2018) by interpreting the massive data that are collected by the applications and systems that they use daily (Grytz & Krohn-Grimberghe, 2018).

In the past decade, the variance and ease of use of BI have increased, making it one of the most important technologies used in business today, as ranked by the chief information officers in the case study conducted by Al-Hadad and Zota. Wiede and Ossimitz describe business intelligence (BI) as an "analytic, technology support process" that converts the enormous data collected by organizations into meaningful information or knowledge that helps the organization acquire an overview of where they stand (Wiede & Ossimitz, 2015, p. 1164), which enables them to improve innovation and organizational performance (Božič & Dimovski, 2019). It helps businesses acquire an information advantage by enabling efficiency in the tasks that they already perform (Larson & Chang, 2016). Various BI tools help the organization collect, cleanse, process, and analyze (Al-Hadad & Zota, 2016) this information through data-mining, data-warehousing, and digital dashboard applications (Wiede & Ossimitz, 2015). Moreover, using BI systems increases the likelihood of accomplishing "information asymmetry and differentiation from competitors" that is, competitive competency (Popovič* et al., p. 6) as it helps organizations acquire an overview of their internal and external positions.

However, organizations have always been reluctant to invest in IT systems, as they are considered black boxes or productivity paradoxes into which money goes but value does not come out. Hence, in today's restricted IT investment environment, it is essential for practitioners and researchers to understand whether and how the millions of dollars spent on BI investments in the form of infrastructure, systems, and applications improve business performance, as BI provides the tools that are essential for business performance (Popovič* et al., 2010). Business value or organizational or business performance is often misinterpreted as a medium through which to evaluate an organization's monetary gain from an investment. However, IT investments can result in various nonfinancial benefits, such as an improved reputation, better relationships with customers and vendors, improved efficiency, and many other advantages that would add more value to the organization in the long run, compared to monetary gain, as IT is a strategic asset (Krishnamoorthi & Mathew, 2018).

Despite the existence of research on BI value using various "theories, research lenses and empirical approaches," (Trieu, 2017, p. 111) it is difficult to acquire a holistic view of BI's value creation process, as the existing research papers have diverse interpretations of BI. Trieu (2017) adapted some of the frameworks suggested by other researchers to develop an integrated framework for BI value. The framework illustrates the chain process of business value creation, which consists of three subprocesses. The first is called the "BI conversion process," whereby BI investments lead to a rise in BI assets. The second is called the "BI use process," which is the effective use of IT that links BI assets to BI impacts. The final process, which is called "BI impacts to organizational performance," uses a competitive position and competitive dynamics (Trieu, 2017). This paper uses this framework as a guideline to study how the use of various BI tools creates business value for organizations in the UAE.

The popularity of the use of BI has captured the attention of many academicians, making it a hot topic for research. In the academic literature, most of the papers published on BI describe its importance and how its use aids the decision-making process and quality compared to decision support systems (DSS) (Wiede & Ossimitz, 2015). Other papers describe the process

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of getting business value from BI, but according to Trieu (2017), a "deeper analysis of the processes of organizations getting value from BI" is required, as there is no comprehensive research dedicated to understanding the "process of organizations obtaining business value from BI." (p. 111) The purpose of this research is to obtain data to verify the framework proposed by Trieu to fill this gap in the research by identifying the business value creation process for the BI tools used by organizations in the UAE.

Furthermore, in Trieu's (2017) systematic review of getting business value from BI, he explained that there is a lack of research on how the different types of BI investments help create business value, and according to Fourati-Jamoussi & Niamba (2016), there is limited research on the monitoring of the BI tools that are used by organizations. The aim of this paper is to fill this gap in the research and to understand the process by which organizations in the UAE spend millions of dollars on BI tools to create business value. The questions answered in this research are the following: *What are the business intelligence tools used by the organizations in the UAE?* and *What is the business value creation process for business intelligence tools?*

Background

Business Intelligence

The term *business intelligence* was invented by Richard Millar Devens in 1865 to describe the way in which bankers receive information about the environment and act on it to gain a profit before their competitors. To date, the theoretical underpinning of BI is collecting information and acting upon the collected information to gain a competitive advantage (Davis & Woratschek, 2015). However, over the years, the definition of BI has evolved, and researchers have described BI in numerous ways. Trieu describes BI as an umbrella term that is used to describe processes or concepts and methods that help improve decision-making in organizations. He also mentions that in the academic literature, the terms "business intelligence, business analytics, big data, data mining and data warehousing" are used interchangeably to describe BI as a "process and product" (Trieu, 2017).

Jourdan et al. (2008) explain the "process and product" facet of BI. They describe the process aspect of BI as the method that organizations use to generate meaningful information using their internal and external data, as this caters to the survival of the organization in the global economy. The product aspect is the predictions that the organizations can make about "competitors, suppliers, customers, technologies, acquisitions, markets, products and services, and the general business environment" using the information that was generated (Jourdan et al., 2008). Hence, it can be used as an analytic technology support process that converts the enormous amount of data collected by organizations into meaningful information or knowledge that helps the organization acquire an overview of its economic and strategic position (Wiede & Ossimitz, 2015). Moreover, BI includes a spectrum of areas, such as "competitor intelligence, customer intelligence, market intelligence, product intelligence, strategic intelligence, technological intelligence and business counterintelligence" (Kimble & Milolidakis, 2015).

The first organization to use BI was Gartner Group Inc. in 1996. Gartner Group Inc. is one of the top information technology companies in the world, and in one of the company's reports from 1996, it described BI as follows:

> [The] information and applications available broadly to employees, consultants, customers, suppliers, and the public. The key to thriving in a competitive marketplace is staying ahead of the competition. Making sound business decisions based on accurate and current information takes more than intuition. Data analysis, reporting, and query tools can help business users wade through a sea of data to synthesize valuable information from it—

today these tools collectively fall into a category called Business Intelligence (Shariat & Hightower, 2007).

Business Intelligence and Analytics

In today's changing business environment, it is essential for top management to understand the position of the organization and make timely decisions to gain a competitive advantage. To achieve this, organizations need to be aware of what is happening in the organization in real time. Many organizations today use BI and analytics (BI&A) as a medium to acquire an inside view of their business, as this helps them strategize and solve complex problems in the organization (Chen et al., 2012).

BI&A refers to the "techniques, technologies, systems, practices, methodologies and applications" that businesses use to make sense out of their data and convert this information into meaningful knowledge that can cater to the process of decision-making. The information that is collected helps the organization to acquire an overview of its current internal and external position. Moreover, BI&A supports business-centric applications and procedures that can be applied to market intelligence, e-commerce, e-government, health care, and security (Chen et al., 2012). Furthermore, it helps the management to track the impact of decisions that were made and to analyze the effects of these on other aspects of the business.

Business Intelligence for Decision-Making

The advantages of BI in decision-making have been mentioned repeatedly in the literature, as BI gives organizations access to the information they need to influence decision-making (Mihai, 2014). Singer (2001) explains that BI is the value proposition that enables businesses to view decision-making information in a way that standard reporting does not provide. In addition, Negash & Gray (2008) describe BI as a data-driven process that involves knowledge management, data collection, and data management and that works as an input for decision-making. To facilitate and optimize the process of decision-making, many organizations have started using BI instead of standard DSS.

BI systems can be contrasted with DSS in many ways. First, BI aids fact-based DSS, as it supports the "aggregation and management of structured and unstructured data." Second, BI systems are designed to govern large amounts of data, also known as big data. Big data is one of the top problems that organizations face with regard to the technologies they use, as they generate vast amounts of data that cannot be handled by their existing systems. Hence, it is essential for the organization to move to systems that can support the exponential growth of their data and help them analyze these, which is supported by BI systems. Third, BI systems also support data interrogation and information delivery, which are not supported by DSS (Wiede & Ossimitz, 2015).

Business Intelligence and Related Fields

Cloud computing and the Internet of things are fields that drive the implementation of BI in organizations. The process-related data produced from the use of the Internet of things are in abundance, as they connect everyone and all the technologies that generate event data (Khan et al., 2012). For organizations to use their data effectively, they require a medium to convert the raw data into meaningful information so that this can be used for strategic and tactic intelligence. However, today's enterprises fail to do so, as there is an absence of dedicated technologies that aid the processing and analysis of the enormous volumes of generated data (Polyvyanyy et al., 2017). Conversely, cloud computing enables a "reliable, fault-tolerant, available and scalable environment" for storing big data distributed by management systems. Hence, big data and cloud computing go hand in hand, as cloud computing aids the availability of scalable and fault-tolerant big data (Boncea et al., 2017). However, the big data that is stored on clouds are so "large (from terabytes to exabytes) and complex (from sensor to social media data)" that advanced technology is required to store, manage, analyze, and visualize

these complex data (Chen et al., 2012). Hence, to enable the effective and efficient processing and analysis of the data generated from the Internet of things and cloud computing, organizations are implementing BI systems (Polyvyanyy et al., 2017). The BI systems facilitate the organization, visualization, analysis, and processing of organizations' big complex data.

The Application of Business Intelligence

In today's digitized era, all organizations, regardless of the industry to which they belong, are moving toward the automation of manual tasks and going paperless; this has resulted in the popularity and growth of mobile, web, and other applications that use sensors. These applications generate terabytes of data on a regular basis; these are called big data, which is unstructured data that are stacked in data warehouses or repositories that are used by the organizations. However, despite having easy access to these large volumes of data, this can only help the organization if these data are converted to relevant information. According to Popovič* et al. (2010), organizations today are "data-rich but information-poor."

To convert the enormous data into meaningful information, almost all industries and sectors have adapted BI tools or systems that help bridge this gap by giving organizations access to only relevant information that would have a positive effect on organizational strategies and decision-making processes (Andronie, 2015; Chen et al., 2012). However, even though the use of BI tools might vary from industry to industry, the result that is expected from BI tools/systems remains the same that is, easy access to relevant information to sustain the optimal running of activities to maximize profits and gain competitive competency (Andronie, 2015).

Some examples of industries that use BI are airline, health care, and supply chain. First, the airline industry uses BI tools, as they enable the efficient processing of large volumes of process-related data, such as flight tracking, airport operations, airline information, economic information, passenger information, and aircraft information. The aim behind using BI tools is to ensure smooth operations to maximize profits while fulfilling customer requirements (Andronie, 2015). Second, the health-care industry uses BI, as it requires easy access to clinical and administrative information because it is essential to fulfill legal and customer-centric requirements, which are, in turn, vital to enhancing the quality of services and diminishing risks (Mettler & Vimarlund, 2009). Third, the use of BI enables an agile supply chain process, as it provides structured data, which play a "pivotal role in the supply chain," as it enables management to quickly respond to responsive demand changes. Moreover, it helps predict the real-time demand for raw materials based on current and past trends (Sarangi, 2016).

Business Intelligence Tools

To achieve BI, organizations need a list of tools, applications, and technologies that help them to collect, cleanse, process, and analyze their information (Singer, 2001). One of the primary advantages of using BI tools is their remoteness and independence from other operational systems. This segregation helps protect operational systems from processing enormous volumes of data that they cannot withstand. Moreover, this enables organizations to select the data they need from the operational systems and inject these into data warehouses. Furthermore, it helps increase the strategic level of the organization as it provides information about the external environment that can help the business to strategize (Fourati-Jamoussi & Niamba, 2016). BI tools also help in "analyzing forecasts, analyzing financial data and empowering smarter decisions" (Koupaei et al., 2016). There are various types of BI tools available today. Some of the most important BI tool types include the following.

Data Warehouse

The large volumes of data that are collected from the systems that organizations use are stored in data warehouses (Al-Hadad & Zota, 2016). Larson and Chang describe a data warehouse as an "integrated, subject-oriented, non-volatile, time-variant data store." Juki et al. (2015) describe data warehouses as a storage medium that helps maintain analytic data separately from operational databases. They are a vital part of the BI architecture, as it acts as the central repository for the organization's integrated data (Larson & Chang, 2016). Additionally, they are used to analyze and store transactional data that can help the business. The use of data warehouses enables the organization to achieve its strategic objectives, as it provides real-time, clean, and homogenous data, as the stored data can be easily retrieved from different sources (Al-Hadad & Zota, 2016; Juki et al., 2015).

Data Mining

The volume of data that organizations have today is impossible to analyze manually, hence the need for organizations to have database tools that can help analyze this vast data has now become a necessity. Data mining helps organizations to integrate and discover knowledge from sources such as "databases, data warehouses, statistics, machine learning, high-performance computing, pattern recognition, neural networks, data visualization, information retrieval, image and signal processing, spatial or temporal data analysis," and other integrated repositories (Wahbeh et al., 2008). Moreover, data-mining tools use algorithms to identify patterns that can be used to analyze advanced data, as well as for predictive analysis, hypothesis formulation, forecast testing, and reporting (Aschbacher et al., 2009; Mihai, 2014).

Online Analytic Processing

Online analytic processing (OLAP) solves the problems of operational databases, as it provides an aggregated approach that enables organizations to create and manage organizational data from warehouses for analysis of data from multiple prospects (Cabibbo & Torlone, 1997; Ceci et al., 2015; Rouhani et al., 2012). Moreover, OLAP allows users to "query, browse and summarize" multidimensional information in an interactive, efficient, and dynamic way; hence, it is sometimes called a cube or hyper cube (Al-Hadad & Zota, 2016; Shariat & Hightower, 2007). OLAP cubes store information that can be used later. Despite being complex in nature, OLAP cubes are easy to use. Furthermore, OLAP cubes have two main aspects that are "hierarchy and binding in network of cubes" (Cristescu, 2016).

Dashboards and Scorecards

Digital dashboards help organizations acquire a visual overview of vast volumes of data that are collected by different sources and can aid the analysis of organizations' performance metrics (Chen et al., 2012; Dagan, 2007; Lia, 2015). According to Skorka (2017), dashboards are an "intuitive communication platform" that supports the organization and aids the decision-making process, as it contains "gauges, dials and alerts that indicate" how the organization is doing in regard to specific parameters at specific periods so that corrective actions can be taken (Dagan, 2007).

Scorecards, conversely, are like report cards that show the KPIs for all the sections of the organization; this helps the management to acquire an overview of the performance of all the sections individually with regard to preestablished KPIs. Furthermore, it helps discover the sections that fail to meet the targets and indicates the "relative level at which they are failing to meet their goal" (Dagan, 2007). The applications use models such as the Balanced Scorecard (developed by Kaplan and Norton), "Total Quality Management, Six Sigma or other approaches" to analytically develop KPIs that cover all the significant areas of the organization (Dagan, 2007).

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The Business Value of IT: What We Know

IT was considered a black box or productivity paradox, into which millions of dollars go but nothing comes out. Hence, the IT value creation process has been a focal topic for research for many years, as academics have tried to understand the paradox of IT investments and examine the IT value creation process. Many researchers and practitioners have concluded that IT investments improve organizational performance and create value for businesses; this is usually measured using financial indicators such as return on assets, return on investment, and ratio of expense to income (Mahmood & Mann, 1991; Soh & Markus, 1995; Weill & Olson, 1989).

According to Bedeian (1984), organizational performance can be divided into three perspectives, depending on how the organization is viewed: If the organization is a rational, goal-seeking entity, then the successful achievement of goals would be used to measure the performance of the organization. If the organization is a "coalition of power constituencies," then its performance would be measured by the degree of satisfaction of its constituents, who may include employees and customers. If the organization has a bargaining affiliation with its surroundings, then the various scarce resources it inputs are used to measure performance by returning them as valued outputs (Bedeian, 1984). Hence, organizational performance is a multidimensional concept that can be financial, affective, or intermediate, depending on the way in which the organization is viewed; this creates value for the business (Brynjolfsson & Hitt, 2000; Kohli & Devaraj, 2003; Soh & Markus, 1995).

In the literature, many areas of the IT value creation process for business are yet to be investigated. Weill 1989 was one of the first academicians to present the perception of *IT conversion effectiveness* to justify IT investment failures. Since then, many researchers have developed theoretical frameworks to analyze the trail that IT investments take to provide "productivity increase, realized business value and organizational performance improvements" (Soh & Markus, 1995). Past research has proven that unaided hardware and software cannot create value; for IT to create value, IT hardware and software need to have synergy with the other IS and operational systems in the organization (Melville et al., 2004). This shows that the IT value creation process is a cause–effect approach (Soh & Markus, 1995). In addition, factors such as "IT people and management, routines, and policies or the organizational system including non-IT people and management, business processes, knowledge assets, relationship assets, culture, structure, and policies" can be included with IT-based systems as they contribute to the business value creation process (Kohli & Grover, 2008).

IT business value is not necessarily monetary; there are many other ways in which IT business value can be evident in an organization, such as improved process cycle time, profitability, or consumer surplus. These can help improve the supply chain or the organizations internal innovation. However, past research has suggested that the IT value creation process is not immediate and that it can sometimes take years before the value creation process starts; this is the latency or lag effect (Santhanam & Hartono, 2003). Moreover, studies have shown that external forces, such as "context, environment, and time lags" (Soh & Markus, 1995), also affect the IT value creation process (Kohli & Devaraj, 2003).

Theoretical Framework: The Business Value of Business Intelligence

Trieu (2017) developed a framework that provides an overview of the current environment of BI value (Trieu, 2017). The framework in Figure 1 below shows that the process of extracting organizational performance from BI investments can be demonstrated as a chain process, whereby the extraction of organizational performance depends on the degree of BI impacts, which, in turn, necessitate BI assets that arise from BI investments. Each link in the chain imitates a probabilistic process; for instance, the link from BI investments to BI assets reflects

the "process of BI management/conversion and investment in complementary (non-BI) investments" (Trieu, 2017).
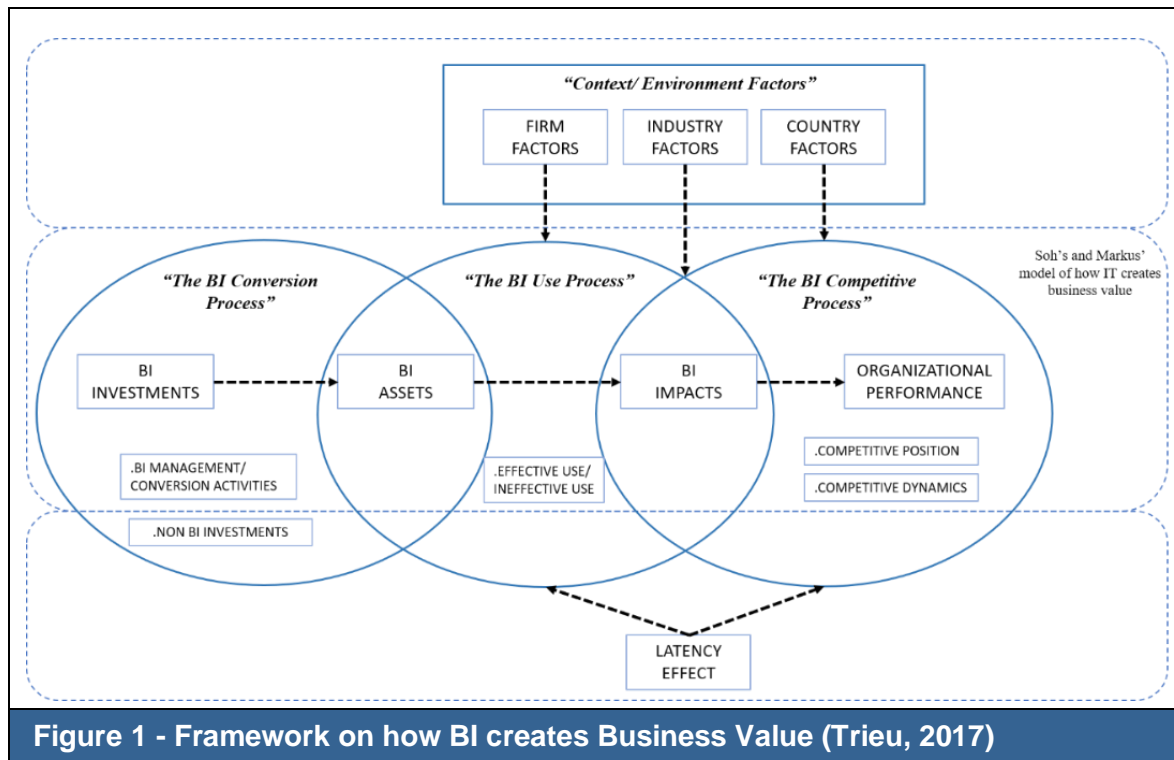

Figure 1 - Framework on how BI creates Business Value (Trieu, 2017)

The second link from BI assets to BI impacts reflects the BI use process, which defines the effective use of BI systems. The third link from BI impacts to organizational performance reflects the competitive process through the competitive position and competitive dynamics. Furthermore, the framework indicates the contextual/environmental factors (such as firm, industry, and country), and the latency effects for learning and adjusting need to be considered in the value creation process. Overall, the framework shows that the BI value creation process includes essential conditions and probabilistic processes, such as the need for organizations to invest in BI and focus on the fluctuating degrees of "effectiveness in the BI management process and non-BI investments." In addition, if BI assets are used effectively, they can produce BI impacts, which can lead to an increase in organizational performance (Trieu, 2017). Trieu's (2017) framework is used as a conceptual framework in this research to provide a deeper understanding of the business value creation process of BI tools in the UAE. The framework was verified through the data that were collected using the qualitative research process.

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Research Methodology

The aim of this qualitative study was to find the types of BI tools that are used by organizations in the UAE and to study the business value creation process for these BI tools. A qualitative approach was adopted for this study, as qualitative research provides a subjective point of view that enables the in-depth investigation of a phenomenon by focusing on discovering, exploring, or generating hypotheses and observing people in their own environments (Jager, 2012). The research design that was followed in this study is shown in the figure below.

Figure 2 - Research Design
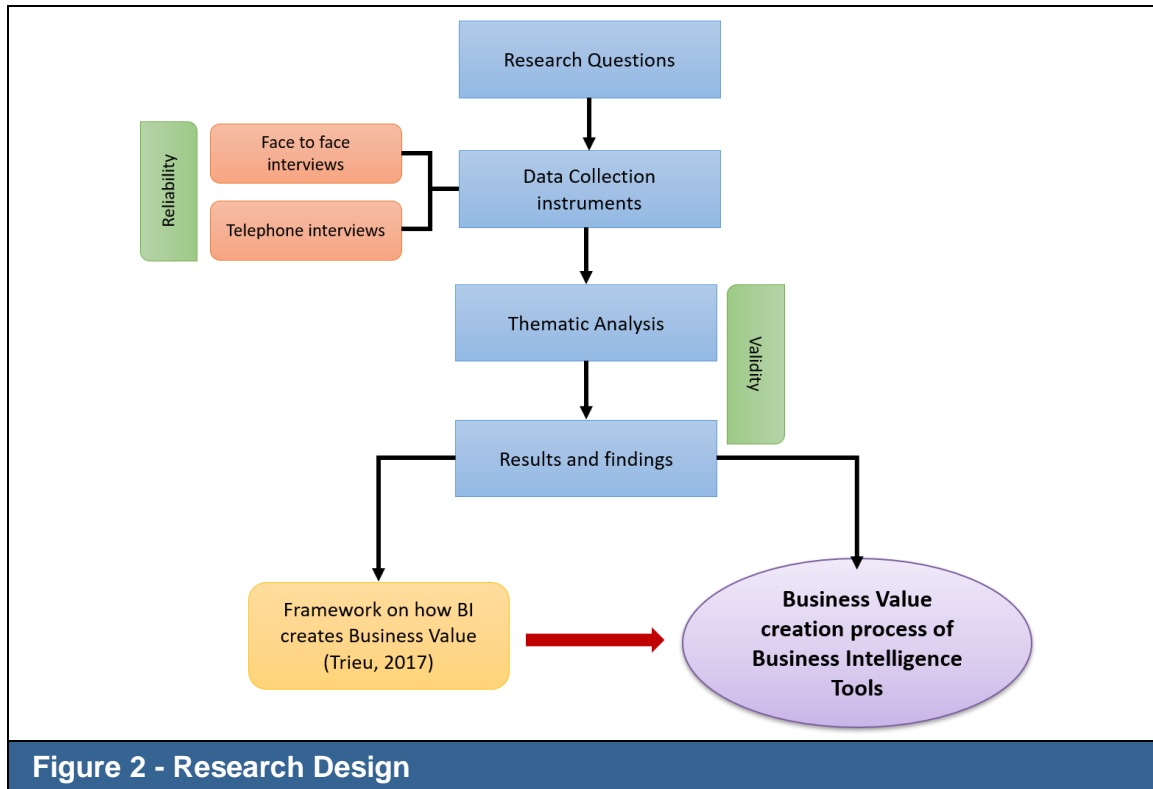
Data Collection

The data for the study were collected through face-to-face and telephonic semi-structured interviews with 19 managers from organizations in the UAE who were working in roles such as sales manager, product manager, and procurement manager and who belonged to the following industries: telecommunications, fast-moving consumer goods, networking equipment, aerospace and military, IT, news and publishing, financial services, distributors, oil and gas, and travel and tourism. The key reason for choosing these criteria for recruiting participants was that business-related departments are the core of any organization, and the managers of these departments are extensive users of BI tools (Andronie, 2015). Hence, they were the most suitable people to interview for this study, as they provided an in-depth understanding of the business value creation process. Another vital criterion that was considered during the recruitment process was that the participants were required to belong to a spectrum of industries to enable evaluation and understanding of the use of BI tools across various industries.

The non-probability sampling techniques that were used to find participants for this study were snowballing and purposive sampling. Most of the participants were found on LinkedIn through profile searches. The profiles that matched the criteria (product/project/program managers and other similar roles in organizations in the UAE) were approached via direct messages on LinkedIn and informed about the study. The key reason for using LinkedIn to find participants

was that all the information shared on LinkedIn is public and published by the user, hence maintaining the privacy of the participants. Some participants were approached through referrals—that is, the people who were approached through LinkedIn shared the profiles of their acquaintances who met the criteria for the study. One of the other reasons for using LinkedIn to find participants was to ensure that the participants were unknown to the researchers and belonged to organizations that had no link with the researchers. This ensured that the researchers were not biased during data collection and data analysis, thereby maintaining the reliability of the study.

After the respondents agreed to participate, they were contacted via email or phone call to schedule a telephone or in-person interview. The respondents had to sign a consent form prior to the interview, and after obtaining approval from them to record the interview, all the interviews were recorded for transcription and data analysis purposes. To maintain the confidentiality and privacy of the participants, the audio files were stored in a password-protected folder on the researcher's laptop. Most of the in-person and telephone interviews were conducted inside the offices of the interviewees. This is why they were the ideal data collection tool for this study, as this helped the researchers obtain an in-depth understanding of the use and impact of BI tools in the organizations based on the interviewees' experiences and viewpoints (Turner III, 2010).

The duration of the interviews was between 45 and 60 minutes, and the questions were divided into four broad categories: overview of the interviewee and organization, types of BI tools, application and benefits, importance of BI tools and future of BI in the organization. The interview protocol (Appendix A) was designed using the research questions and components described in the theoretical framework of the value creation process for BI tools to acquire an in-depth understanding of each component of the framework. The interviews were stopped after reaching the saturation point—that is, the information that was communicated by the interviewees was being repeated, and no new information toward the study was being communicated. Hence, the number of participants for the study was 19.

However, four participants had responses that were not related to the study, as their understanding of BI tools did not suffice to meet the criteria used to categorize BI tools. According to these participants, all the systems used in the organization that automate a manual process or do not require manual input fall under the BI tools umbrella. The tools described by these interviewees were project management software and an ERP system. This was revealed after completing an Internet search for all the tools that were mentioned by all 19 interviewees to ensure the validity of the study by verifying that all the tools were in fact BI tools. As these tools/systems mentioned by the four participants could not be classified as BI tools, the responses of these four participants were not considered for data analysis.
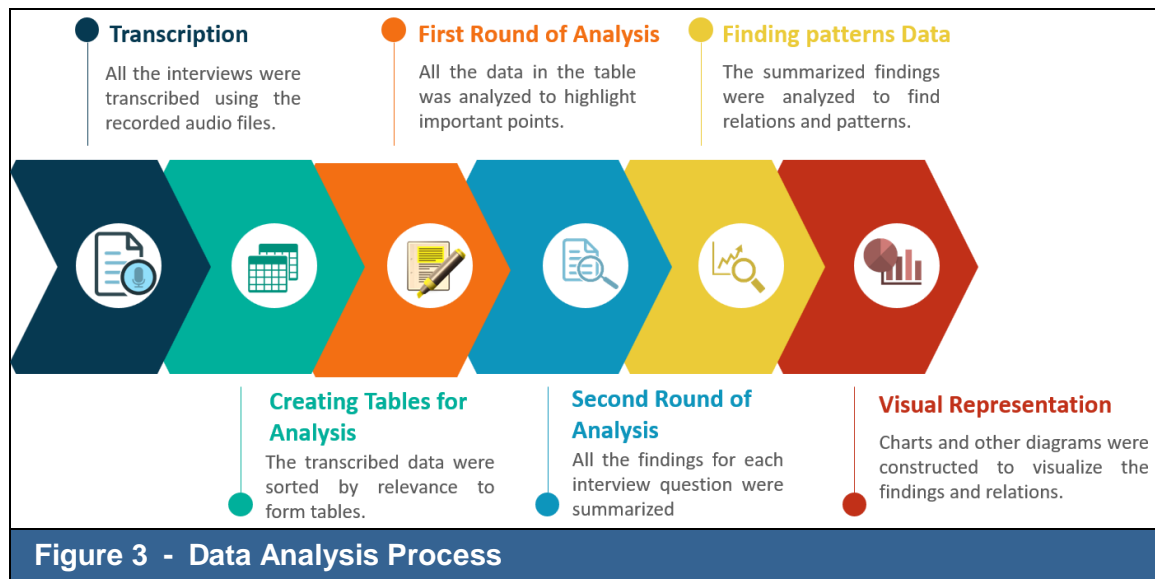
Validity and Reliability

To maintain the reliability of the data collection process, the interview protocol was consistent across all the interviews to ensure stability and consistency. In addition, all the selected interviewees were strangers to the researcher, and the researcher had no interaction or connection with the organizations of all the participants. This was to ensure that the researcher was not bias against the interviewees or any responses provided by them.

To validate the data provided by the interviewees, Internet research was done on all the BI tools mentioned by the interviewees to verify that the tools were BI tools and not other tools, such as project management software or ERP systems, as many people are still unaware of the actual definition of BI tools and categorize all apps and software used in a business as BI tools. Moreover, the uses of BI tools mentioned by the interviewees were validated via Internet research and the literature review to ensure that the application and use of the tools were a part of the capabilities of the BI tools. This step was done to ensure content validity. In addition,

the results of the study were validated based on the definition of the theoretical framework to ensure construct validity.

Data Analysis

The data collected were analyzed using thematic analysis. This was based on the use of the elements in the theoretical framework developed by Trieu (2017), and the research questions were used as guidelines to find patterns in the data that were collected through face-to-face and telephone interviews, as according to Turner III (2010), the collected data should be interpreted by grouping them into themes or codes. The data from the interviews were analyzed using the process shown in Figure 3.

Transcription
All the interviews were transcribed using the recorded audio files.

First Round of Analysis
All the data in the table was analyzed to highlight important points.

Finding patterns Data
The summarized findings were analyzed to find relations and patterns.

Creating Tables for Analysis
The transcribed data were sorted by relevance to form tables.

Second Round of Analysis
All the findings for each interview question were summarized

Visual Representation
Charts and other diagrams were constructed to visualize the findings and relations.

Figure 3 - Data Analysis Process

Transcription

All the interviews were transcribed word for word using the recorded audio files, as all the interviewees permitted audio recording of the interviews. All the transcribed interviews were sorted by industry and then allocated a number. The purpose of sorting by industry was to ensure that all the responses related to the same industry were together to enable evaluation of the impacts of industry factors. A reference table was then created to map the interview number with the industry to which the respondent's organization belonged.

Creating Tables for Analysis

All the transcribed interviews were filtered and sorted to create tables for each question. Each interviewee's responses were added as rows and categorized into two columns: supportive statements and informative statements. The purpose of this classification was to sort the data by relevance to aid the analytical process.

First Round of Analysis

For the first round of analysis the tables for each question were reviewed and all the important points and statements that emerged from the responses were highlighted.

Second Round of Analysis

In the second round of analysis, all the findings for each interview question were summarized to extract the themes and statements that answer the interview question directly or indirectly. The result of this step was that sticky notes were added to the tables with emerging themes and concepts for each question. Furthermore, some of the obvious industry-related themes were highlighted and added as separate sticky notes for each table.

Finding Patterns in Data

A more in-depth analysis was conducted to extract patterns and relationships in the data collected from the interviews. The aim of this process was to find links between the responses from the interviewees and the environmental factors, such as the industry, size of the organization, and use of BI tools. The findings were then mapped to each component of the theoretical framework to identify how the findings validate and contribute to each of its components. The results of this step were the sticky notes for each component that was added to the framework.

Visual Representation

The final step in the process was to summarize and represent the findings visually using tools such as charts, diagrams, and tables for clear representation and summarization.

Results

Types of BI Tools

The types of BI tools used by the organizations in the UAE were dashboards, OLAP, scorecards, data warehouses, spreadsheets, and 3D data visualization. The findings show that 14 of the 15 organizations used dashboards as a visualization tool to represent the information extracted from their applications and systems; this evidently shows the importance that data visualization holds in regard to the use of BI for organizations, as it makes the aggregated data easy to understand. Moreover, it is a necessity for management (Dagan, 2007), as it helps managers find trends and patterns in historic data, which aids the strategic planning process. The only organization that did not use dashboards was from the service industry, which required other forms of visual illustrations to show the online presence and usage of its customers. The key reason for the dashboard being the most popular type of tool was that it provides an easy-to-read and consolidated visual summary of enormous data that can aid the process of decision-making, which is vital to the growth of the organization (Dagan, 2007). According to one interviewee, it helps the employees save time as they can do complex analysis "with the click of a button." Another participant added that some BI tools allow for the creation of custom dashboards that enable managers and other employees to correlate and analyze data with just a few clicks.

Spreadsheets were the second most common type of BI tool used. Three of the five organizations that use spreadsheets had ERP systems that had information from client-facing departments, such as Sales and Marketing. The product manager from one telecommunications company stated, "We write a macro that downloads data from [the ERP system], and then the downloaded data is processed, analyzed, and modified in [spreadsheets], which is then submitted to our headquarters monthly, weekly, and quarterly." This helps the managers generate reports, such as sales turnover, shipments booked for the quarter, and employee utilization.

Data warehouses were the third most common type of BI tool used to collect and store an enormous amount of historic data (Al-Hadad & Zota, 2016) from all the applications and

systems used by the organization. The four organizations that used data warehouses were multinational companies (MNCs) which have a global footprint, as it helps them aggregate large volumes of data from all of their subsidiaries. The other types of BI tools that were used included OLAP, which was used by three organizations; scorecards, which were used by two organizations; and 3D data visualization, which was used by only one organization.

Figure 4 - Types of BI tools used by organizations in UAE
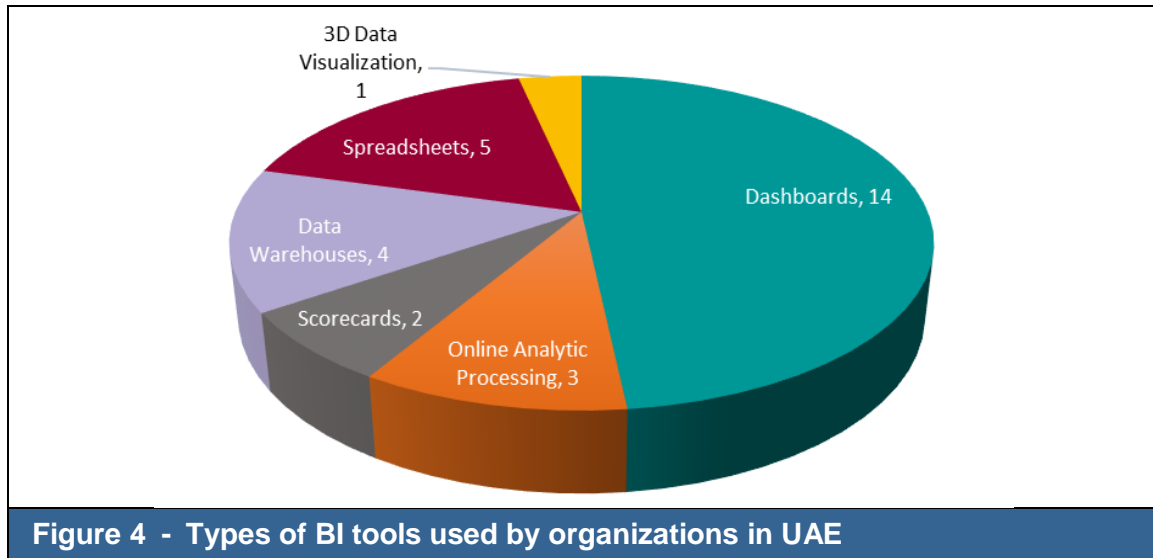
BI Investments

Most of the participants who belonged to MNCs that were founded outside the UAE were unaware of the investment in BI tools per annum. One key reason for this was that for MNCs, the company headquarters take care of all BI expenditure, and access is cascaded down to other branches; therefore, the employees in the other countries are unaware of how much is spent. Only 6 of the 15 participants were able to give an approximate expenditure on BI tools. The minimum investment was 100,000 dirhams for an organization of over 5,000 employees worldwide, and the maximum expenditure was between two million and five million dirhams for an organization with more than 100,000 employees worldwide.

An organization's BI investments include various types of expenditures. First, to purchase a BI tool/system from a vendor, the organization has to pay a setup cost for all the systems and software necessary for the use of the tool. Second, a transfer cost is accrued if the organization requires the migration of data from other tools to the new BI tool. The interviewee from the network equipment industry stated, "the tools are purchased from the vendor and modified in-house." For some of the other organizations, the IT department handles the maintenance after the tool is purchased, while for others, they must pay an annual maintenance cost to the vendor. Finally, some software require organizations to pay a licensing fee per user annually to enable use of the nonrestricted version of the software.
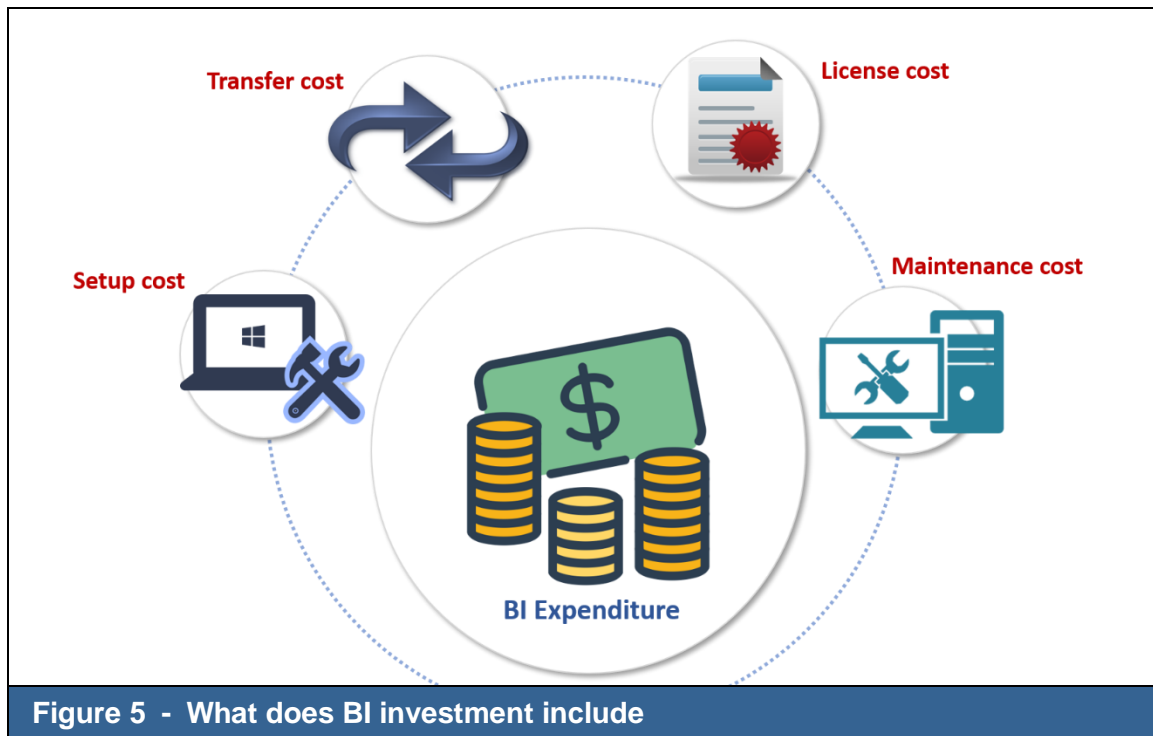
Figure 5 - What does BI investment include

The Use of BI Tools

The comparison table (Table 1) shows all the BI tools/systems used by the organizations to which the interviewees were employed. The table was constructed by consolidating the responses of the interviewees regarding the features and capabilities of the tools they used. However, the tools were categorized in the **BI tool category** column based on online reviews of the products.

The findings show that the BI tools were divided into four categories: custom, integrated performance system, self-service, and web analytics. Self-service tools allow users to drag and drop components to customize the dashboards based on their requirements, and integrated performance management systems are used to track the performance of the organization end to end using parameters such as KPIs, cost, serviceability, and availability. Customized BI tools, conversely, are BI tools/systems that are developed and maintained in-house by the IT team/department of the organization to cater to the needs of the organization. These tools connect all the systems of the organization to provide a one-stop solution for their employees by facilitating the option to track the organizational cycle end to end and providing a holistic view of the organization's position. The four organizations that developed their BI tools in-house were MNCs with over 100,000 employees all around the globe, and these companies were founded outside the UAE (i.e., South Korean, French, German, and Anglo-Dutch). This is one key reason why internal systems were extremely crucial for them, as these help them track their live performances by integrating information from all the applications and tools from all of their branches worldwide.

Table 1 - Comparison table of the BI tools used by the organizations in UAE								
	Developed Inhouse	**Agile Visual Analytics Platform**	**Data Visualization Software**	**Interactive Data Visualization Tool**	**Data Visualization & Analytics Software**	**KPI Dashboard Management Tool**	**Analytics & Mobility Platform**	**Web Analytics Software**
No of organizations using it	4	3	2	1	1	1	1	1
Industries that use it	Telecommunication, IT Software, Oil & gas, FMCG	Network Equipment, Aerospace/ Military, Telecommunication	Network Equipment, Oil &Gas	Distributor	FMCG	FMCG	Travel & Tourism	News & Journalism
BI tool category	Custom	Integrated performance management system	Self-Service	Self-Service	Self-Service	Self-Service	Self-Service	Web Analytics
Integrates from multiple sources?	✔	✔	✔	Only ERP	Only ERP	Only ERP	✔	✘
Allows customizing dashboards?	✔	✔	✔	✘	✘	✘	✔	✘
Used to track KPIs	✔	✔	✔	✘	✔	✔	✘	✘
Data input manually?	✘	Depends on the company	✔	✘	✘	✘	✘	✘
Need Experts to use the tool?	✘	✘	✘	✘	✘	✘	✘	✘
Mostly used for	Tracking internal performance.	Performance management	Customizing dashboards	Forecasting	Monitoring KPIs	Monitoring budget and procurement performance	Strategic decisions	Track article popularity

The second most common BI tool used by three organizations was an Agile Visual Analytics Platform, which is a tool that can be modified to cater to the requirements of the organization. The tool is an Enterprise Performance Management System that helps the organization gain insight into its performance by tracking KPIs and other transactional information by representing it visually as a dashboard. The program manager for an aerospace/military organization stated that he mainly uses the tool to budget his labor and material costs for the year and track them on daily basis. The strategy and planning lead for a network equipment company stated that he mainly used the tool to forecast and acquire business visibility to strategize and plan for the future. However, the operations team manually enters all the data at the aerospace/military organization, and for the network equipment company, the data come from various sources; a part of the data is inputted manually, and the remaining data come from other tools used by the organization. The third most common BI tool was a Data Visualization Software, which is one of the top off-the-shelf BI tools in the market, and it is used by 2 out of 15 organizations. It was awarded the Best Business Intelligence Software Award for the unique benefits it offers to its users.

As highlighted by the respondents, the tool provides drag-and-drop customization that allows the user to modify the dashboard according to his or her preferences and requirements. Hence, the tool was categorized as a self-service tool. Despite being a powerful and easy-to-use tool, both the organizations that use the Data Visualization Software have to manually input data into the database for people at the managerial level to view the dashboards. Furthermore, according to the strategy and planning lead, "They spend a lot on BI because the license and maintenance of the tool is expensive." The interviewee from the oil and gas industry stated, "The tool is only used by managers and above because of its cost." Nevertheless, because of its easy-to-use interface and excellent data visualization capabilities, it does not require an expert to use the tool. Hence, both the organizations continue to use the tool without any plans to stop doing so, despite the cost.

Interactive Data Visualization Tool, Data Visualization & Analytics Software, KPI Dashboard Management Tool, and Analytics & Mobility Platform are the other self-service BI tools that do not require experts for their use; each of these tools is used by one organization. All of them, with the exception of the Analytics & Mobility Platform, integrate data from only the ERP system to which it is connected. However, all the four self-service tools allow dashboard customization and filtering, which help the employees of the organization to compare and contrast data for analysis. In addition, none of the four tools requires any manual intervention for data input, as they all take data directly from the system(s) to which they are connected. Additionally, they are used to track the internal performance of the organization through KPIs and the monitoring of other factors that aid strategic decisions and strategic intelligence, as mentioned by Ployvyanyy et al. (2017).

Web Analytics Software provides a spectrum of functions and data visualization options. However, in the news and publishing industry, the software is primarily used for tracking the reach of online articles. The organization is able to analyze multiple factors, such as how many views an article got, in which country the article was most read, etc. The software is considered a very powerful and self-sufficient tool for web analytics. It also enables the user to customize the dashboard and extract a wide range of reports from it.

Despite having BI tools to track internal performance, some organizations required other data to analyze their market performance and enable them to acquire external knowledge, giving them insight into what their competition is doing (Božič & Dimovski, 2019). Of the 15 organizations, 4 used external tools and detailed reports from other market research companies, consultants, and market intelligence companies. The purpose of using fabricated reports from these third parties was to track the market and the competition closely to know where they stood in order to enable them to improve their innovation and performance (Božič

& Dimovski, 2019). All the types of organizations that provided these tools and reports to these firms are shown in Table 2.

Table 2 - Organizations that provide reports about the market			
Type of Organization	**Industries that use it**	**Products/ Services**	**Mostly used for**
Market Research companies	Telecommunication	Products	Information about the market and sales from distributors
Market Intelligence	Financial Services & Technology	Services	Get information about clients
Consultants	Chemical Products	Products	Information about the market and global trade
Market Research Companies	FMCG	Products	Competitive market shares and brand attributes

The Application and Uses of BI Tools

As mentioned by Popovič et al. (2010), organizations use BI regardless of the industry to which they belong. The results of this study validate this and evidently show that every industry utilizes BI tools in a different way. Table 3 shows the application and uses of BI tools, as stated by the interviewees.

Table 3 - Application/ Use of BI tools per industry	
Industry	**Application/ Use**
Distribution	• Use dashboards to see the daily progress on improvements • Product performance analysis • Track competition • Boost efficiency of people • Forecasting Sales and Customer demand • Planning and managing inventory levels • Understand demands of customers
Telecommunication	• To dissect information deeper about sales • Track how well a product is doing in the market • Track every single step of the product • Sellout performance and visibility on the actual sellout • Performance in the market • Get the number of live devices in the market • Track purchase orders with suppliers • Keep a close eye on how the competition doing, to strategize effectively • Aids analysis of changes in pricing • Helps analyze the cost of product against the revenue for the year • Allows the users to cross reference data • Helps find trends • Forecasting • Plan future orders
FMCG	• To monitor values and KPIs • Helps perform analysis to aid management decisions • Forecasting • Monitor budget • Vendor rating for Performance of supplier • Track cost variance to know where they stand in their budget • Analyze which are the popular brand attributes • Streamline customer base • Analyze purchase order cycle times (to see if it is meeting the target)

	• Report and track Sales turnover • Track Competitive market shares • Track how the brands and each product are doing in the market
Chemical Products	• To understand customer interactions (how do they see it) • Analyze global trade • Generate reports about shipments for the quarter. • Track what the competitors are doing • Analyze market trend • Forecasting sales to stock up • Track global availability of stock, raw materials, plant, warehouse • To track orders from suppliers • Analyze full supply chain cycle as it gives full connectivity of all departments • Benchmark pricing trends • Get visibility to improve customer service • Track stock availability
Financial Services and Technology	• To get information about the presence of clients (how global are they, number of employees, marketing strategy etc.) • Helps with getting the numbers about the population before starting a new service- size of population, annual spent, lifestyle environment
IT Software	• Used to track inventory, ticketing and IT targets • Helps know the customer better by tracking what the customers are using and what are they buying • Track problems faced by customers and resolution time to strategize on how to support customers betters • To understand where their customers are to know the target customers better • To see what the customers are doing with the software
Network Equipment and services	• Forecasting • Business visibility • Strategy and planning • To get an insight on sales to upsell and predict • Get more knowledge about customer • Planning future structures and events
Oil and Gas	• Data analysis • Decision making • Auditing • Financial Forecasting • Track KPIs and decide KPIs for next year • View headcount for budget for department. • Employee utilization on the field
Aerospace/ Military	• Track KPIs • Track cost (labor and material) on daily basis • Monitor availability and serviceability of aircrafts • Manage budget based on cost (labor and material) to monitor everything that is spent • Track all other expenditure • Track Annual budget cost on monthly and quarterly basis • Monitor live data to rectify and inform customers immediately
News	• Track online presence of customers • To know customers better and serve them better • Monitor KPI and internal performance • To track how an article is doing online by analyzing their popularity, reach etc. • Mitigate risks • Personalize customer experience by processing and curating relative content to customers

Travel and Tourism	• Analyze how the organization is doing in the industry • Where are they losing money • Where are they gaining profit • Find opportunities to gain profit • Strategic decision making • Maintain an effective cost solution in terms of routes / flights • Enhance customer experience by knowing the customer better. • Analyze sales reports

The Financial and Nonfinancial Benefits

As the use of IT provides tangible and intangible benefits that are converted to business value (Krishnamoorthi & Mathew, 2018), the participants were asked about the perceived financial and nonfinancial benefits of using BI tools in their organizations. The table below shows the responses from the interviewees.

Table 4 - Financial and non-financial benefits of BI tools per industry		
Industry	**Financial Benefits**	**Nonfinancial Benefits**
Distribution	• Has helped build an effective procurement system that has reduced financial investment on holding inventory drastically • Reduce delivery time and cost • Helps monitor sales and the number of defective items returned	• Improved customer relationships as demands met on time • Improved vendor relationships because of proper planning • Makes work easier for employees
Telecommunication	• Helps track the financials to see how they are doing in the market • Cost reduction • Helps gain profit	• Improve brand reputation • Track sales in individual countries, that helps plan strategy for countries • Get an idea about customer behavior • Facilitates quick and prompt decisions
FMCG	• Helps understand which supplier is better, so you can save on cost and distribute business accordingly • Helps get leverage on pricing from suppliers • Improves financial performance	• Helps mitigate risk effectively • Provides data clarity that helps negotiate better with suppliers. • Saves time • Access to information 24/7 • Track and monitor competition • Helps understand the problems in the attributes of each brand. • Improve vendor relationship by offering a bigger market share to them • Improve performance of procurement
Chemical Products	• Cost reduction • Benchmarking for pricing trends which helps negotiate better prices	• Visibility
Financial Services and Technology	*The benefits are not quantifiable*	• Takes relationships with customers to the next level • Improves communication with stakeholders • Enables effective discussions with stakeholders

IT Software	• Track payment patterns of customers • Track outstanding balance against revenue • Forecasting	• Understand and plan future products • Helps strategize
Network Equipment and services	• Helps upsell • Provides visibility on sales, that helps plan the marketing strategy • Saves headcount	• Visibility about the customer that helps understand the needs of the customer • Saves a lot of time • Helps with competition
Oil and Gas	• Forecasting • Budgeting for headcount • Review sales targets on daily basis	• Employee utilizations • Helps make effective decisions
Aerospace/ Military	• Track penalties and KPIs • Track unforeseen expenditure • Reduce labor and material cost	• Mitigate risk
News	• Customer retention	• Customize customer experience
Travel and Tourism	• Profit • Reduce route cost	• Helps know the customer better so they can Increase customer loyalty • Helps with strategic decision making

MNCs and In-House-Developed Tools

As mentioned earlier, 4 of the 15 organizations to which the interviewees were employed have developed their BI systems in-house instead of using an off-the-shelf BI tool. All of these organizations were MNCs with over 100,000 employees around the globe, and these companies were founded outside the UAE (i.e., South Korean, French, German, and Anglo-Dutch). The in-house-developed tools help the organizations track the cycle end to end. Moreover, for some organizations, it helps them track their live performance, which is one key reason why internal systems are extremely crucial for large MNCs and the organizations promote and mandate the use of these systems for their employees. These findings clearly highlight the relationship between the size of the organization, its global reach, and the need to develop in-house BI tools, which validates that larger firms are capable of making bigger BI investments compared to smaller firms, as the global reach of the organization necessitates and facilitates BI maturity (Božič & Dimovski, 2019).

The Number of BI Tools and Corporate Headquarters

All the organizations (8 of the 15) with their corporate headquarters outside the UAE had a minimum of two BI tools. One tool was to track the internal performance of the organization, such as KPIs, both locally and globally. The second tool or report from external organizations, such as consultants and market research companies, was used to track the external performance of the organization and its competitors. This helps the organization strategize effectively by analyzing its internal capacity and the external market situation. This evidently shows that BI is given more importance in foreign countries, as BI has become a part of the organizational culture because it is one of the core systems that are essential to enabling organizations to develop an analytics culture which is the "organizational norms, values, behavioral patterns" that are reflected in the way the organization creates, gathers, consolidates and analyzes the data that it has (Krishnamoorthi & Mathew, 2018, p. 653). In addition, in MNCs, data warehouses and other BI initiatives are taken care of at the corporate level, and then access is cascaded down to the satellite branches. Hence, most of the BI

expenditure and investment is taken care of at the headquarters, which is also responsible for the decisions about BI.

In contrast, the organizations with headquarters in the UAE (7 of the15) have only one BI tool that is used to track internal performance and forecast. However, the organizations with headquarters in the UAE, with the exception of one, spend millions per annum on their BI tools, which shows that the importance of BI is growing in the UAE. However, BI is not yet being utilized to its full capability. One reason for this is the lack of awareness about BI tools in the UAE; this was apparent when 4 of the 19 participants were not aware of what BI tools were and what they were used for.

BI tools and Customer Relations

Customers essentially make or break a business, making them the most critical factor for organizations in all industries (Chen et al., 2012). The constructs that emerged from the study show that the extensive use of BI tools plays a vital role in helping organizations understand their customers' needs. However, the BI tools used to retain customers vary in the product and service industries. Organizations from the product industry (9 out of 15) use BI for forecasting, business visibility, and monitoring pricing trends, which helps managers strategize and plan promotions and price discounts and bundle offers effactually. Such efforts help improve relationships with existing customers and attract new customers. By contrast, organizations from the service industry (6 out of 15) use BI tools to know their customers better. An emerging trend in the market is to personalize and customize the customer experience as much as possible to help the customer feel "special" (Chen et al., 2012). Organizations in the service industry segment their customers into categories to customize their services to match the customers' needs depending on the category to which they belong. Knowing one's customers is essential in both industries. However, enriching customer relations is more important in the service industry because it can foster customer loyalty by giving the organization insights into the problems and concerns that the customers have.

Users of BI tools

Findings of this study also identified the users of BI systems in organizations in the UAE. According to the participants (9 out of 15), BI systems are used by most employees, but access to them differs depending on the employee's role, domain, and geographical location, as shown in Figure 6. However, for organizations founded in the UAE that have fewer than 10,000 employees, access to BI tools is restricted to mangers and higher management (2 out of 15), and those below the managerial level input data so that the managers can make sense of reports and use the findings therein. Moreover, in small organizations with 200–500 employees, the usage is restricted to business units such as sales, marketing, and the product team.
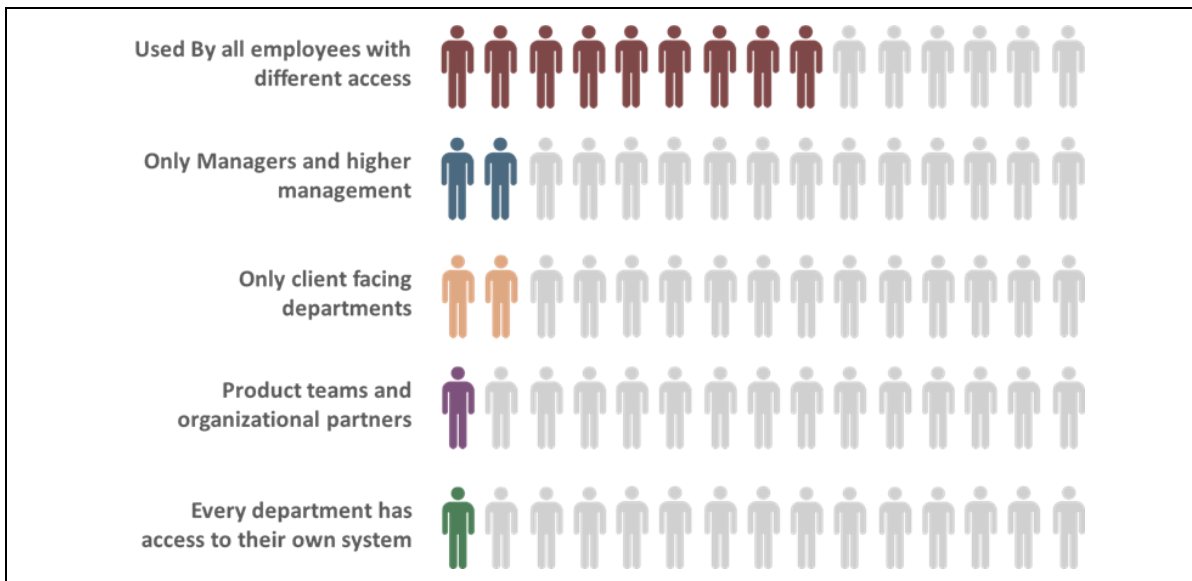
Figure 6- Who uses the BI tools

Importance of BI tools in the organization

The findings of the study also highlighted the importance of BI tools to organizations. The participants confirmed that their organizations could not survive without BI tools and, without these tools, there would be financial impacts including customer and market share losses. Moreover, the absence of BI tools would impact the staff's efficiency and productivity as tasks that could be done with the click of a button would take hours to complete.

Figure 7- How does the use of BI help the organization

One of the most important uses of BI for 12 out of 15 organizations was tracking the business end-to-end as it gave managers a holistic view of the firm's internal and external positions. For organizations in the product industry, the use of BI facilitated business visibility, which helped them stock intelligently. For organizations in the service industry, the use of BI allowed them to analyze problems that help the organization understand its customers and, thereby, improve the quality of its services. Other important uses of BI across all industries included analysis of historic data, budgeting, improved negotiations, and minimization of loss.

Dropping and Updating BI tools

None of the organizations were willing to drop any of their BI tools, evincing the impact of the BI tools on the organization. The participants confirmed that they would have zero visibility of the market and their internal process would topple without the BI tools that they have at their disposal. The only case where existing BI tools would be dropped is when another tool in the organization provides the same functionality and duplication would result in an added cost. In contrast, the organizations in all industries were constantly seeking ways to update or upgrade their BI tools to dissect and improve their functions. Some of the reasons for this included new customer needs, new business requirements, the need to add a new data point to the tool, and problems/bugs in the system. However, the frequency of updates differed from one organization to the next.

The Value Creation Process for BI Tools

All the findings of the study show that the use of BI tools has positive impacts on the performance of the organization, which is the result of the three-stage process of the value creation of BI tools. All the components of the framework and the three-stage value creation process of BI based on Trieu's (2017) framework were verified by the data that were collected for this study from multiple organizations in various industries in the UAE. Figure 8 and the paragraphs below explain the process in detail using the findings as the lens.

The BI Conversion Process

For the acquisition of a new BI system/tool to occur, organizations have to make large BI investments to set up its architecture and infrastructure (Al-Hadad & Zota, 2016; Božič & Dimovski, 2019). These BI investments include setup costs and transfer costs, if applicable. The transfer cost is added when the organization wants to transfer the data from an existing BI system or other systems to the new BI tool. However, the expenditure on BI tools does not stop here; as a part of the BI management process, organizations have to spend annually to maintain the tool. For some organizations, the IT department maintains the tool, and some organizations pay an annual maintenance fee to the vendor. Conversely, if the BI tool is a licensed software, the maintenance cost is replaced by a licensing fee that is paid per user.

The BI investment becomes a BI asset for the organization when using the tool becomes an integral part of the daily routine for the employees; this is the BI conversion process. Of the 15 participants, 13 use the BI tools daily. The remaining two stated that they used it as frequently as twice a week. In fact, some organizations mandate the use of BI tools on a daily basis as a part of the conversion activities that take place in an organization to enable conversion of a BI investment into a BI asset. These organizations track the number of times the employees log in to the system and the menus they use; this is done to promote the use of the BI tool and ensure that it is being used effectively. This highlights that the conversion is the stepping-stone in the process of converting BI investments to business value, as the first step in the value creation process is to convert the investment into an asset by making it an integral part of the organization (Soh & Markus, 1995).

Second, all the organizations provide their employees with some kind of training about the use of BI tools. This training improves the quality of the most important asset of the organization—its employees. For some organizations, the training process is as simple as knowledge transfer between employees, but for some organizations, the training requires the employees to go off site, as it takes place on the premises of the vendor organization. All the training that employees undergo is a part of the conversion activities, and the cost is categorized as a non-BI investment.
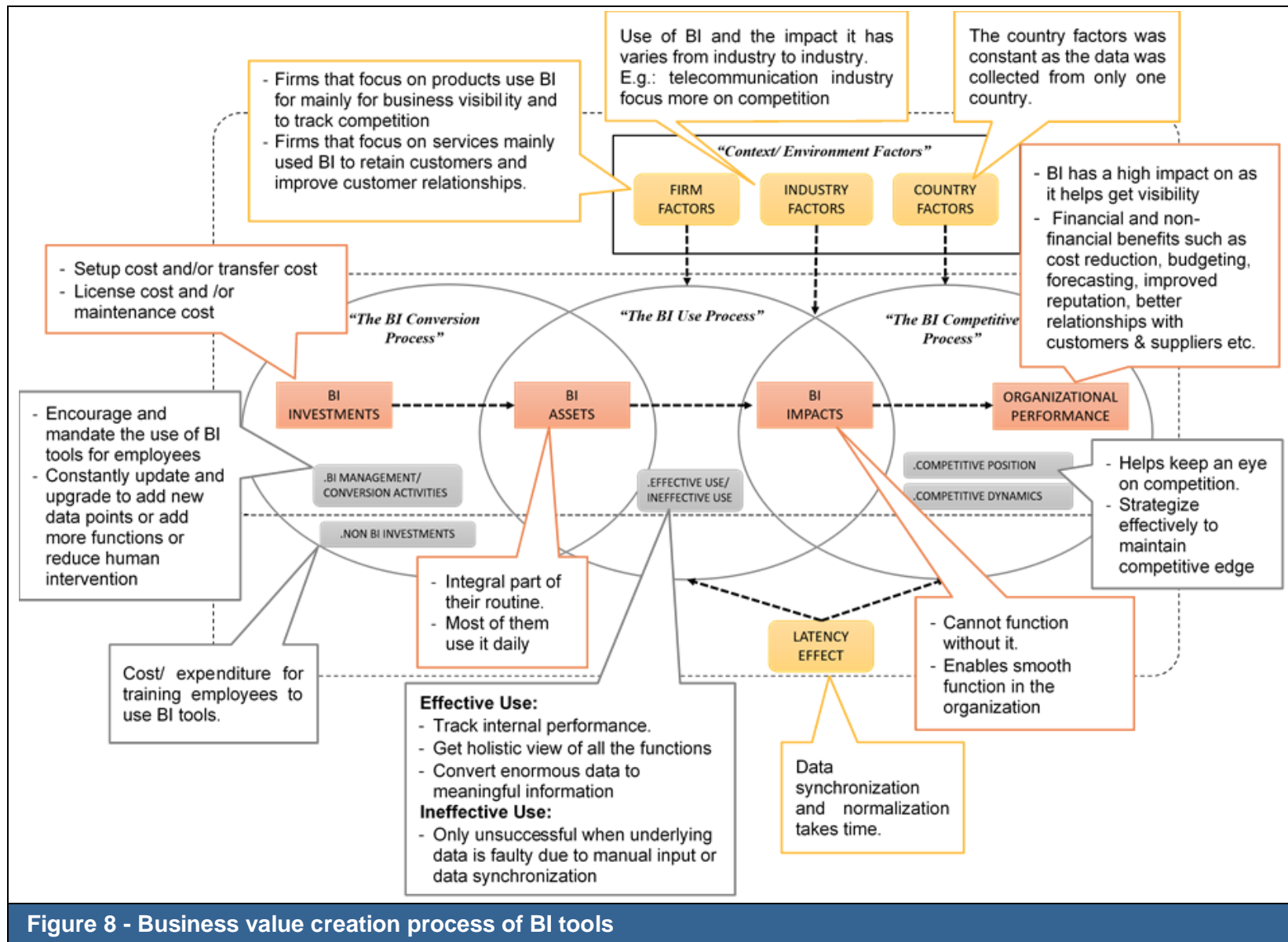
Figure 8 - Business value creation process of BI tools

In addition, all the organizations are constantly looking for ways to update and upgrade the system by either adding more data points or functions to it or by trying to reduce human intervention in the system. In fact, for the IT software industry, the updates are as frequent as weekly to improve the customer experience or fix bugs to improve the customer experience. Updates are an essential part of BI management, as they help the system to cater to the dynamic changes in requirements of the customers and the market. All of these factors show the importance BI tools in the organization, which, in turn, illustrates that BI investments have become valuable BI assets for all the organizations.

The BI Use Process

The use of BI varies among organizations, as they use a spectrum of BI tools, depending on their requirements. However, the use was similar among organizations within the same firm type (product or services) and industry. The organizations that focus on products used BI extensively for business visibility and to track competition, whereas the organizations that focused on services mainly used BI to retain customers by improving customer relations. The common use of BI among all the industries was to track the internal performance of the organization using KPIs and acquire a holistic view of all the functions of the organization. This shows that the use of BI is essential for the organization regardless of the type of firm, as BI tools convert an enormous amount of data from different systems and applications and converts it into meaningful information that helps the organization perform its daily operations and functions smoothly. These uses indicate the effective use of BI in organizations.

Conversely, there are some scenarios in which the use of BI is ineffective, as there were some mistakes in the analysis that resulted in incorrect forecasting. However, the use of BI is only unsuccessful when the underlying data are faulty, which can happen because of incorrect manual input or unsuccessful data synchronization between the BI tool and the source that inputs the data into the BI tool. One of the main causes of this is that organizations sometimes have diverse BI tools that are not linked with each other, and the format of the data varies across all BI tools and other organizational systems. Hence, to ensure that all the systems complement each other and work smoothly, organizations have to spend time evaluating and scrutinizing the compatibility and ease-of-data synchronization of the tools/systems before investing in them. Moreover, the impact of a tool on the existing BI/ IT architecture of the firm has to be evaluated prior to the investment.

Furthermore, none of the organizations were ready to completely drop using BI tools, as they could not function without them, which shows the high impact that the use of BI has on the organization. In addition, the use of BI is so vital for some organizations that they would topple without it. Hence, it is evident that the effective use of BI has a positive impact on the organization and acts as a lubricant that enables smooth functioning across the organization. However, the BI impact on the organization is gradual, and it sometimes takes time to show positive results; this is the latency effect of the BI use process. Hence, it sometimes takes time to utilize BI tools to their full potential when the data connected to them are enormous, as data synchronization and normalization take time.

The Competitive Process

The effective use of BI has many financial and nonfinancial benefits for the organization, and these differs from industry to industry. (Table 4 lists the benefits of BI for every industry in detail.) Some of the most common financial benefits of using BI were cost reduction, as well as improved budgeting, forecasting, and benchmarking. Moreover, some of the nonfinancial benefits were improved reputation, better relationships with customers and suppliers, time saving, and more efficient and effective organizational strategies. In addition, BI plays a vital role in helping organizations gain a competitive edge. There were some organizations that used reports from market research companies and consultants to acquire an overview of the market and gain insight into global trade to evaluate their competitive positions. One reason

for doing this is that being informed about what the competition is doing is vital for the organizations, especially in the product industry, because it helps them benchmark their sales and position their pricing to enable them to compete effectively and make prompt decisions to retain their competitive edge.

Moreover, all the respondents stated that BI was important for their organization, and 12 out of 15 participants said that the absence of BI would have financial implications for the organizations. Additionally, for some organizations, BI was essential, and the interviewees stated that they could not work without it, as it did a considerable amount of processing for them that could not be done manually, thereby making BI a necessity that they could not survive without. In contrast, for some organizations, BI was merely a means of adding value to their existing process and gaining visibility. However, for most of the organizations, BI helped them strategize effectively to gain a competitive edge by tracking and monitoring their competitive dynamics, which shows the importance of BI for competition.

In addition, the historic data that are available on BI tools are extremely important for the organizations, as this information helps the managers make forecasts at the beginning of every financial year, which provides numerous advantages. First, it helps allocate the budget effectively, as sales and costs vary per country. Second, it helps them stock intelligently and negotiate better deals with their suppliers and logistic companies. This would be impossible to achieve without historic data, and it would be a time-consuming process if the data had to be collected and analyzed manually. Hence, the importance and effective use of BI in organizations highlight its high impact.

The significant impact of BI contributes to organizational performance, as revealed by the financial and nonfinancial benefits observed in the organizations. These benefits improve organizational performance, which is the business value that is created for the organizations. Nonetheless, it sometimes takes time for the financial and nonfinancial benefits to show, as the competitive process is gradual. It takes time for the benefits it provides to show prominently; this is the lag or latency of the competitive BI process. The impact of country factors was not evaluated in this study, as the interviews were restricted to the UAE, thereby keeping the country factor constant.

Furthermore, the organizations that spent the most on their BI tools were the same ones whose representatives stated that BI plays a very important role in their organizations and that they cannot function without the BI tools that they have. Hence, it can be concluded that the BI investment directly relates to organizational performance, which is the business value that BI generates for the organization.

Conclusions

In today's world, with the dynamically changing requirements of customers and the market, the need for an analytical technology that can enable organizations to visualize the data is greater than ever; this is one key reason why BI systems have become the top priority for CIOs, as mentioned by Wiede & Ossimitz (2015). BI is no longer a luxury for organizations; rather, it has become a necessity, as they need an information advantage to enable them to compete effectively (Chen et al., 2012). The findings of the study show that the business value creation process for BI exists, and it verifies the three-stage business value process for BI, as proposed by Trieu (2017). In addition, all the external factors proposed in the framework were also verified, with the exception of the country factors because all the interviews were conducted in the UAE.

The use of BI differed across various industries, but the sole purpose of its use was to make sense of the enormous live and historic data that the organization has acquired from multiple

data points to make prompt decisions effectively and efficiently and to formulate their strategies (Al-Hadad & Zota, 2016; Larson & Chang, 2016; Wiede & Ossimitz, 2015). It also highlighted that the use of BI tools is essential for managers and higher management compared to the other employees (Andronie, 2015; Božič & Dimovski, 2019), as it allows them to view the information in a simple and easy-to-understand format, which is very important when it comes to organizations making prompt decisions. It was so important that, for the Data Visualization Software, the data were inputted into the tool manually so that those at the managerial level and above could view the information in the form of dashboards. Furthermore, it was evident that keeping a close eye on the market and competition was as important as tracking the internal performance of the organizations (Chen et al., 2012).

The findings of the study also showed that the use of BI helps organizations maintain the quality of their products and services, which helps them to maintain and improve customer relationships. In addition, it helps increase the efficiency and productivity of the employees, as they can perform analyses by pressing a few button clicks instead of spending hours doing it manually, thereby saving the organization time and money. Moreover, the organizational culture also plays a vital role in contributing to the business value creation process, as the more importance an organization gives to BI tools by mandating their use and providing training to employees, the faster the BI investment will become an asset and a norm for the employees. Hence, it can be concluded that the use of BI enables and improves the overall quality of the organization, the execution of its operations and functions, and the business value it creates.

Theoretical Contribution

This research is an empirical implication for Trieu's (2017) framework for how BI creates business value. Empirical data were collected to enable an understanding of each component that constitutes business value for organizations in the UAE and to fill a gap in the research on the mechanism through which BI investments are converted to business value. The primary contribution of this study is that all of the findings validate the business value creation process for BI tools through the opinions of participants, which provided an in-depth understanding of the framework.

We identified some patterns that emerged in the results that provide links between the global reach of organizations with the urge to develop BI tools in-house and the relationship between the number of BI tools used by the organization and the location of the corporate headquarters, which has not been identified in the BI literature. Thus, our findings also enhance the BI literature by making three theoretical contributions, which are mentioned below.

First, our results highlight how the use of BI varies across industries to help organizations understand the needs of their customers. According to Chen et al. (2012), customers are what essentially make or break a business, rendering them the most critical factor for organizations in all industries. The study contributes to the literature by identifying the variant use of BI tools for customer retention in the product and service industries. BI tools are used by organizations in the product industry to develop relationships with existing and potential customers. In contrast, organizations in the service industry use BI to understand their customers better, confirming Chen et al.'s (2012) assertion that personalization is a strategy that organizations use to improve customer experience.

Second, the results identify the varying uses of BI across the organizational hierarchy and how access cascades downward as all preceding levels to the managerial level input data to the BI tools in use, and the data are then visualized for managers. This supports the extant literature by confirming the use of BI tools by top management for decision-making (Wiede & Ossimitz, 2015). Moreover, it sheds light on the divergent access that employees have according to their role, domain, and location, which helps the organization control what

information is exposed to their employees by maintaining data confidentiality across departments, branches, etc.

Third, undeniably, the results highlight the importance of BI tools in organizations in the UAE by confirming the unlikely survival of an organization in the absence of BI tools. The study highlighted some adverse financial and non-financial impacts of not using BI tools in the organization, such as reduced efficiency and productivity. Our results echo those of previous studies (Kimble & Milolidakis, 2015; Larson & Chang, 2016; Wiede & Ossimitz, 2015) confirming the implication of BI for providing an end-to-end view to the organization of its internal and external positions. Moreover, we contribute to literature by recognizing the maturity of BI in organizations in the UAE by identifying the types of updates to BI tools that various organizations in the UAE carry out on a weekly, monthly, or yearly basis.

Practical Implications

This research, which was an academic study that aimed to verify the business value creation process for the BI tools used by organizations in the UAE, that provides unbiased and reliable results that can help practicing managers. The study provides a comparison between the various tools that were highlighted by the respondents as the primary BI tools used by their organizations across various industries. Moreover, this research provides a broader view of the application/use of BI tools across various industries, along with its financial and nonfinancial benefits, which can also provide an overview for organizations that are looking to adopt BI tools. In addition, it highlights the various types of BI investments that are considered during the BI acquisition and setup process. Managers from business units can understand the business value creation process for BI tools, enabling them to prioritize investments and embark on the use of BI as a part of the organizational culture, which can help expedite the BI maturity of the organization.

Benefits of BI tools

The highlighted tangible and intangible benefits of BI tools can also be used as evidence for senior management by helping them understand the importance of BI in today's digital era and how it has become a market differentiator. In contrast, this research can also be used as a strategic enabler by managers to maximize the utilization of BI tools in their organizations by understanding how BI is used across various industries. Organizations can also evaluate the use of BI to identify areas that require attention in order for them to maximize organizational performance through rapid benefits from BI investments.

Enabling the value creation process of BI tools

Organizations can use the following recommendations derived from the research to enhance the business value creation process of BI tools. To enable the conversion process to take place in the organization, it is important for managers to understand that BI is not just a system or an application; it is a culture that must be entrenched in employees' daily routine. The first step in that direction is to identify how each department and level of the organization can contribute toward enriching the BI foundation, which are the data that are input into the BI system. Some users would solely feed data, such as transactional records and sales records, to the BI tools. The other category of users would be the modelers, who would decide how the data are to be processed and visualized. Once the use of BI tools is embedded in the daily routine of all employees, then the BI investment is converted into a BI asset for the organization.

To enable the BI use process, it is important for the modelers to use the BI tools effectually to generate reports, dashboards, and scorecards that help all levels of management gain insight into the internal and external positions of the organization. The generated reports can be used for tracking the internal performance, forecasting, identifying and analyzing trends, planning,

budgeting, etc. The BI use process is completed once the use of BI tools has an impact in a way that the organization cannot function normally without them. To enable the competitive process, managers need to interpret, plan, and act on the insights provided by the BI tools. The BI contribution to organizational performance is directly dependent on what the managers do with the insights that are highlighted by the BI tools in the BI use process. It is essential for organizations to drive their decisions through the information and forecasts that are available to them.

Use of BI per industry

The BI use process and competitive process differ from industry to industry. It is vital for organizations in the product industry to use BI to stock intelligently, increase sales, analyze market trends, understand customer demands, etc. However, for managers in the service industry, it is essential to use BI to understand customers better by segmenting them into categories to comprehend their needs and problems and consequently improve their overall experience to foster customer loyalty.

Research Limitations

After analyzing the results, we observed that one of the key limitations of the study was that most participants belonged to business-facing departments. Despite being the primary users of the data visualization and analytics tools, they were still lacking a certain level of knowledge of the usage of the other BI tools, such as OLAP and Data Warehouses, which their organizations used. Expectedly, such lack of knowledge of the acquisition process and expenditure on BI tools was acceptable because the IT department or BI department was usually responsible for developing, acquiring, and setting up the tools to prepare data and feed it to the data visualization and analytics tools used by the business-facing departments.

Second, we obtained rich, in-depth information from our participants. Yet we observed limited sharing of information about the BI tools used by the organization. Such lack of revelation was due to the fact that some organizations mandate that all employees sign a non-disclosure agreement to prevent them from sharing information about the systems that the organization uses to improve its organizational performance. This limitation posed some key challenges to using BI tools effectively. Nevertheless, to certain extent, this is understandable because BI tools are considered to be a source of competitive advantage that can be replicated.

Future Research Direction

In terms of the empirical implications of the framework, as data collection was restricted to organizations in the UAE, we did not evaluate the impact of country factors on the three-step business value creation process. Hence, future research can investigate the business value creation process for BI tools across different countries to evaluate the effects of country factors. Moreover, our study can be extended to evaluate the use of BI tools in other industries besides the 11 industries investigated in this study to acquire an in-depth understanding of the industries' external factors in the three-step process and to further evaluate how the use of BI tools varies across industries. Furthermore, to gain a comprehensive understanding of the process, participants working in IT or BI departments should be involved in a future study.

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Appendix

Interview Protocol

1. What is your designation in the organization you work for?
2. Which industry does your organization belong to? And does your organization focus on products or services?
3. Do you use BI tools as a part of your daily routine? If no, can you tell me how frequently do you use it?
4. Which Business Intelligence tools are used by your organization (eg: data warehousing, data mining, online analytical processing or dashboards and scorecards)?
5. Where do these BI tools come from? Are they purchased from a vendor or are they developed inhouse?
6. If the BI tools are purchased from a vendor(s), can you tell me who is/are the vendor(s)?
7. What is the application/use of business intelligence tools in your organization?
8. Where does the data that is input to the BI tools come from? Can you give me examples of the type of data that is input to BI tools.
9. Approximately how much does your organization spend on BI tools per annum?
10. How does the use of BI tools improve/maintain customer relations and how does it help the organization get more customers?
11. What are some of the other perceived financial and non-financial benefits of using BI tools in your organization?
12. What are the most used and important BI tools in your organization?
13. Are the BI tools used by all the employees in the organization or is there a specific level or department that uses BI tools?
14. Are all the employees familiar with the use of BI tools or only some employees know how to use them? And does your organization promote trainings for the use of BI tools?
15. Are the BI tools important for your organization or can the organization function normally without them? And would it impact the organization financially?
16. Can you give an example of the kind of problems that BI has been used for solving it, as success story.
17. Can you give an example of the kind of problems that BI has been used for solving but it was unsuccessful. How has the use of BI tools impacted your organization? Please elaborate.
18. Does your organization consider dropping the use of BI tools? Can you tell me some reasons why it considers dropping it?
19. Does your organization do anything to improve/update the BI tools? If yes, how frequently.

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