Business Intelligence (BI):
A Critical Strategy for University Success and Sustainability

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ABSTRACT

Generally, BI plays a very significant role in promoting the success of any organization, particularly the universities; however, not all BI projects have been implemented successfully by the universities across the word, suggesting that only a few universities appear to have faith in BI as strategy for success and sustainability particularly in this era where data speak. As a result, this study attempts to establish the relationship between BI and university sustainability and success. Therefore, the major objective of the study is to find an empirical link between BI and university sustainability and success with particular interest in Saudi Arabia. Overall, the study found that business intelligence affects the university sustainability but not its success. It shows that BI assists the university in making good decisions that may sustain the university while ensuring that the university does not fall below break-even in terms of success. By implication, the university can use business intelligence as a strategy for sustainability but not work well for achieving the desired success.

KEYWORDS

Business Intelligence, Saudi Arabia, Success, Sustainability, University

INTRODUCTION

Every business, including the universities, relies on effective and efficient systems that would enable them to achieve their goals and objectives. However, many businesses mainly aimed at sales and marketing while some failed to optimize their operations. Fortunately, BI devices are shaping the ways and manners organizations are managing their data and universities are not exception in this regard. Besides, it has been observed that the business intelligence outcomes affect the long-term direction of business organizations as a result of trends in problems associated with data usage and technological limitations. For example, previous data by Gartner (Van der Meulen & Rivera, 2014) revealed that BI is growing faster than technologies in the general software markets. Its growth is close to 7% per annum and it is believed to hit over $17 billion by 2016. Accordingly, UK JISC between 2011 and 2012, a recognize NGO that involves in digital technologies in UK education and research, was able to start BI programmed as aspect of its JISC strategy 2010-2012 aimed at assisting schools build and use their corporate and business systems efficiently and effectively (Ong, 2016). It also observed

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that with business intelligence universities would equally make a GDP that would equate per unit of expenditure particularly when compared with other sectors. As important as business intelligence, it is perceived that business intelligence applications are becoming complex, however, business intelligence programs are becoming more user-friendly to the users such as the academic institutions, entrepreneurs and small business owners. The importance of business intelligence to universities is huge. For example, it plays a very significant role in promoting cost efficiency, optimize inventory levels, reduce waste and improve business processes in the universities (Van der Meulen & Rivera, 2014). Also, the application of BI in businesses has a very enormous effect which is not only visible in enterprise organizations that have clear intentions on Return on Investment (ROI) (Anjariny & Zeki, 2014; Williams & Williams, 2003), but also to the educational institutions as well. The Higher Education Institution (HEI) sees the aptitudes of BI as able to assist the management of tertiary institutions in their business process in decision making (Kokin & Wang, 2014).

Furthermore, with the continuous rise in quantity of data being generated for looking for internal and external sources, tertiary institutions are looking for more effective and efficient ways of using data and information available. Therefore, BI as an instrument shows the capabilities to transform data from distributed and heterogeneous sources into valuable information that could support organizational decision-making, management, and strategic planning (Hasan et al., 2016). Besides, there are several evidence which suggest that higher institutions are good places where BI can be executed and using business intelligence project (Popovič, Turk, & Jaklič, 2010) and have much potential to further exploits the values of business intelligence. It is observed that a successful implementation of business intelligence projects by the universities would enable the university's management to arrive at better decisions. However not all BI projects have been successfully executed (Farrokhi & Pokoradi, 2012; Popovič et al., 2010). Hasan et al. (2016) affirmed that the study of business intelligence in the academic institutions are very crucial and indispensable. In a related development, (Ong, 2016) noted that transformational issues relating to big data analytics in to organization should be ongoing because tertiary institutions are still looking for strategies to manage business and big data alignment including knowledge management among others. This study indeed has some limitations. For example, the scope covered by the study appears limited in addressing issues associated to BI success factors in the research domain. Apart from relatively few articles on business intelligences university sustainability found in most developing countries including Saudi Arabia, (Ong, 2016) equally suggested that business intelligence is a potential topic for further research. Therefore, needs additional studies using different research approaches with particular focus on more specific areas including the university sector. Also, the conceptual framework offered by previous studies on business intelligence may not be applicable to other countries due to cultural differences. The present study heeds the call and therefore attempts to investigate business intelligence and how it affects the university's success and sustainability.

LITERATURE REVIEW

Conceptualizing Business Intelligence

There is no doubt that Business Intelligences is a new concept in the area of business technology. Being a new concept academics have made several attempts in defining what business intelligence should connote. For example, (Yoon, Ghosh, & Jeong, 2014) described business intelligence as assembly of devices that include such as data analysis and query that produces robust reports presentations which enable a strong precision in decision-making. The recent definition of business intelligence (Hasan et al., 2016) points out that the term readiness is very essential in defining business intelligence, and readiness itself connotes stage-by-stage evaluation of projects without errors by the organization and should be related to the organization's objectives and goals. As stated by (Gaardboe & Jonasen, 2018) BI covers things such as technologies, applications including data analysis which facilitate decision

making. It has equally been noted that many organizations view business intelligence as nothing but technological investment which its internal and external forces determines its business value (Olbrich, Poeppelbuss, & Niehaves, 2011). In this extension of business intelligence, several definitions have been proposed shown in Table 1. BI was first defined in 1958 by Hans Peter Luhn, who wrote,

Business is a collection of activities carried on for whatever purpose, be it science, technology, commerce, industry, law, government, defense, etc. The communication facility serving the conduct of a business may be referred to as an intelligence system. The notion of intelligence is also defined here, in a more general sense, as "the ability to apprehend the interrelationship of presented facts in such a way to guide towards a desired goal.

Conceptual analysis shows that the content of definitions of BI has not varied much from the 1980s to the present, although there is no consistent or broad definition and the choice of content is author-specific as authors tend to promote their own assertions. The newer definitions are consistent with the old definitions, although the capabilities provided by information technology have developed significantly. This may be a sign that BI is more like a management philosophy or management tool and that technology is actually an enabler of BI. Technological progress adds great value to information management and therefore its importance is certain, but business intelligence cannot be used effectively by applying technical solutions alone. It is also worth noting that because every company is unique and BI is highly situational and company-specific, it is important to view BI within its own framework.

Business Terminology has become familiar with many Businesses Intelligence (BI) concepts since the late 1990s. Business Intelligence (BI) is often used as an umbrella term for large-scale decision support systems (DSS) in organizations. This study can definitions business intelligence can simply be defined as a combination of tools and technologies for data analysis for better reports and decision making by the organization. Above Business intelligence definitions share the same focus, even though definitions have been defined from two broad perspectives of managerial and technical (Casado, 2004; Niu, Lu, & Zhang, 2009; Petrini & Pozzebon, 2009). According to Business Intelligence definitions highlight the important elements of Business Intelligence. The first important part of business intelligence is collecting, storing and managing data available internally and externally. Critical analysis of available data using BI tools emphasizes BI.

The definition also emphasizes the complex and competitive information provided by AI, which is critical to executives and decision-makers in organizations. Also defining is the idea (and perhaps ideal) that business intelligence systems provide actionable information that is delivered at the right time, in the right place, and in the right format to assist decision makers. The goal is to improve the timeliness and quality of input into the decision-making process, thus facilitating administrative work. In summary, the main idea of business intelligence is to identify information needs, process the collected data and information, and transform them into useful and valuable management knowledge and intelligence.

Business Intelligence and University Success and Sustainability

The study by Hasan et al. (2016) on BI readiness factors for tertiary institutions documented how business intelligence significantly affects the tertiary institutions. With deductive and inductive analysis of previous literature of business intelligence within the higher education institution sectors, the study identified three major broad factors that affect business intelligence readiness by the higher education institution. These three broad factors include organization, technology and social factors. The study argued that business intelligence readiness of any universities is determined by these three factors. They suggested that these three major factors are assumed to be the key elements which are supported by the by their sub-elements for higher education institution to ensure the deployment of business intelligence will meet the institution's objective. They claimed that their model of business

Table 1. Type of Business Intelligence Definitions

(Golfarelli, Rizzi, & Cella, 2004)	"Business Intelligence (BI) can be defined as the process of turning data into information and then into knowledge."
(Wixom & Watson, 2010)	"Business intelligence (BI) is a broad category of technologies, applications, and processes for gathering, storing, accessing, and analyzing data to help its users make better decisions."
(Pemmaraju, 2007)	"Business intelligence encompasses all of the software applications and technologies that a company uses to gather, provide access to, and analyze data and information about its operations."
(Clark Jr, Jones, & Armstrong, 2007)	"Business intelligence encompasses a set of tools, techniques, and processes to help harness this wide array of data and allow decision makers to convert it to useful information and knowledge."
(S. Negash, 2004)	"Business Intelligence (BI), to clarify key definition alongside managerial effects resulting from its implementation in organizations."
(Ghoshal, 1987; Gilad & Gilad, 1986)	"BI is defined as a managerial concept or a tool that is used to manage and enrich information and to produce up-to-date knowledge and intelligence for operative and strategic decision making"
(Pirttimaki, 2007)	"BI is defined as an intelligence process that includes a series of systematic activities, being driven by the specific information needs of decision makers and the objective of achieving competitive advantage."
(Lawton, 2006)	"Business intelligence has long offered the promise of letting companies gather, store, access, and analyze huge amounts of data so that they can make better decisions regarding customers, suppliers, employees, logistics, and infrastructure."
(Shariat & Hightower, 2007)	"Business Intelligence (BI) represents a set of business information processes for collecting and analyzing enterprise (business) information, the technology used in these processes, and the information (knowledge) obtained from these processes."
(S. a. G. Negash, P., 2003)	BI systems "combine data gathering, data storage, and knowledge management with analytical tools to present complex and competitive information to planners and decision makers"
(Eckerson, 2007)	BI "the tools, technologies and processes required to turn data into information and information into knowledge and plans that optimize business actions."
(Rouibah & Ould-Ali, 2002)	"Business intelligence is a strategic approach for systematically targeting, tracking, communicating and transforming relevant weak signs into actionable information on which strategic decision-making is based."
(Atre, 2004)	business intelligence as business success realized through rapid and easy access to actionable information through timely and accurate insight into business conditions about customers, finances and market conditions."
(Ansoff, 1975)	"Business intelligence is a strategic approach for systematically targeting, tracking communication and transforming relevant weak signs into actionable information on which strategic decision making is based".
(Chung, Chen, & Nunamaker, 2003; Chung, Chen, & Nunamaker Jr, 2005; Davies, 2002; Liebowitz, 2005)	"BI enables organizations to understand their internal and external environment through systematic acquisition, collation, analysis, interpretation and exploitation of information in the business domains".
(Tyson, 1990)	"BI comprises of a variety of information -customer intelligence, competitor intelligence, market intelligence, technological intelligence, product intelligence and environmental intelligence for continuous monitoring of customers, competitions, suppliers and other fields".
(Herschel & Jones, 2005)	"BI can be used to empower knowledge workers with information that allows them to make decisions based on a solid foundation of fact".
(Boon, 1998)	"BI provides access to data that has been integrated and cleaned so that it combined to discover correlations, trends, and patterns that offer new insights, aid in decision making, and alter the competitive scene".

intelligence readiness could formed the basis upon which studies could validate the BI readiness factors model and this would provide relative empirical importance of the readiness factors. Using the case of UK higher education institutions, (Ong, 2016) examined the BI and big data analytics for tertiary institutions in UK. For this reason, the paper conducted a review of eleven cases of big data analytics. Apart from that, the study also through one of the projects explained how big data and business intelligence can be analysed and applied student engagement. The study found that there is a positive relation between business intelligence and higher education particularly in the area of students' engagement. First the university was knowledgeable that business intelligence has great potential and therefore went further to build one. The university, through the funding of JISC's business intelligence programmed, developed a business intelligence solution with enhanced functionalities for big data analytics. With business intelligence, the university can now observe student engagement behavior at various echelons (individual, group and cohort, etc) in various period of time.

Villegas-Ch, Palacios-Pacheco, and Luján-Mora (2020) attempted to analyses the educational data using the business intelligence Framework. In other words, the study aims to use a business intelligence framework to analyses data that has to deal with educational institutions. For this reason, the study utilized a method which integrates models and techniques of data mining in BI architecture in taking decisions regarding factors that affect learning development. Additionally, it is an alternative method to the natural science method which is central in information system research. In design science research, the scientist builds and assesses ICT artifacts designed to resolve any problem in the organization that is identified. The testing of the method as proposed by the study, which is a case study in nature employed students, and then grouped in line with the data gathered in various information systems of a university. The study argued that their business intelligence framework has some good contributions such as its resourcefulness and the way it is being used to resolve various issues arising from the environment. It further claimed that their business intelligence framework is built on the basis of some lacunas spotted out from the reviewed literature. (Scholtz, Calitz, & Haupt, 2018) study the business intelligence frameworks with respect to sustainability information management in tertiary institutions. Due to the problems faced by higher institutions in managing and reporting on sustainability information, the study proposes a business intelligence framework for the long-term management sustainability information that is useful in tertiary institutions. The study equally uses the design science research approach with tertiary institutions in South African as a case which helped them to identify problems associated with sustainability information management and then a theoretical framework was proposed. Additionally, the study provided a practical BI software device a conceptual proof to resolve problems associated with management of strategic sustainability information in tertiary institutions while the developed sustainability BI device was assessed via heuristic and usability assessments with senior management. And it was found that the usability of the BI device was positively ranked as a framework which has the ability to resolve problems that tertiary institutions are confronted with in their effort to effectively manage sustainability information. The framework provided by this study is claimed to be one of the most all-embracing business intelligence frameworks that direct the design of a BI device which helps sustainability information management in tertiary institutions. The framework also offered detailed information on information management for sustainability reporting in tertiary institutions.

Shahrizal, Nazri, Iskandar, Bakri and Ashaari (2019) examined how organizational performance is being affected by the adoption of business intelligence in Malaysia higher institutions. Its focus was to provide conceptual model that would establish the impact of BI adoption on organizational performance in the tertiary institutions. The study first recognized the importance of higher education institutions' operation structure and further noted the need for increasing demand for data by higher education institutions. It was argued that this increasing demand for data will be addressed by the adoption of business intelligence which has the ability to reduce data costs and thus improve competitive advantages. The study evaluated the relationship between the BI adoption and organizational performance of tertiary institutions in the aspect of its financial rewards including

employees' learning and growth. And this was demonstrated using a conceptual model from Kaplan and Norton's balanced scorecard (BSC). The major contribution of this study is that it extends the existing knowledge on business intelligence particularly in Malaysia higher education institutions as a way for organizational performance.

This model by Nazri, Ashaari, Iskandar, and Bakri (2020) is believed to be unique as it related business intelligence to organizational performance of the tertiary education institutions in Malaysia. The framework provided by the study demonstrated that business intelligence is capable of affecting performance of Higher Education Institutions in terms of their financial gain, customer management, internal process and learning and growth. It argued that a strong relationship exists between business intelligence and organizational performance. A similar study of this nature by Moss and Atre (2003) claimed that business intelligence adoption enhances income, lower cost, and customer satisfaction. Thus, organizations that intend to achieve better performance should strive to adopt business intelligence.

Another documented evidence on the success factors of business intelligence though theoretical in nature by Gaardboe and Jonasen (2018) points out that BI is a strategic tool in many organizations. In an attempt to examines the key success factors that business intelligence, by (Adamala & Cidrin, 2011; Gaardboe & Svarre, 2017) adopted a literature review approach in which they reviewed about many as 43 research papers after a critical evaluation of the identified papers. In other to distinguish critical success factors affecting business intelligence, papers were related to relevant areas such as management, project management etc.

There are two major weaknesses of this study are: first, it is purely theoretical in nature. In other words, it is a literature review of past studies. This may not be sufficient enough to draw conclusions on the position of business intelligence. Second, the paper is not related to academic or higher institutions. Hence, how business intelligence affects higher education institutions or academic institutions are not mentioned. By way of conclusion, the paper in all identified 34 variables as the predictors of business intelligence. This they claimed is an extension of previous critical success factors original 43 variables in (Petter, DeLone, & McLean, 2013) framework to 47 variables, necessitating the creation of four new critical success factors (CSFs) Vision and strategy, development of competences, organizational structure, and organizational culture. Of the 47 variables indicated in the framework, 34 were studied and compared to business intelligence success (Petter et al., 2013).

On like the previous study by (Gaardboe & Jonasen, 2018; Ravasan & Savoji, 2019) adopted a literature review approach to look into business intelligence critical success factors implementation. Therefore, its major objective was to find and document critical success factors that influence a successful implementation of business intelligence systems in an organization. In line with the objective, 26 critical success factors were identified which were further subjected to exploratory factor

Figure 1. A Business Intelligence Framework for Organizational Performance
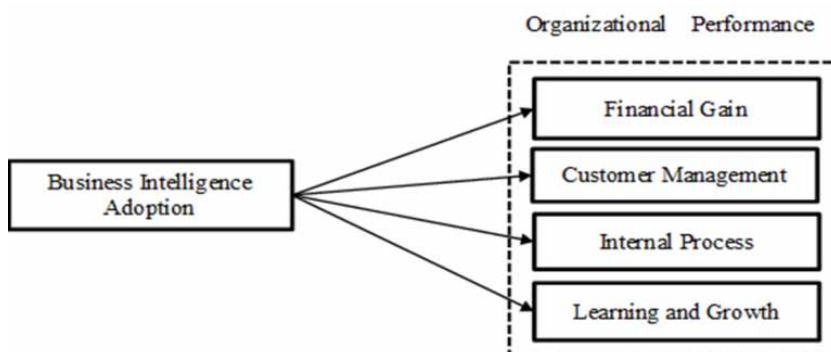
analysis (EFA) technique which finally classified 26 critical success factors into four groups namely "organizational," "human," "project management," and "technical". Hence, the finding from the study revealed that four major categories of critical success factors affect business intelligence. For this reason, the study advanced a framework for business intelligence critical success factors classification in Iranian industries. On the contrary, the study was only limited to factor analysis technique which lacks the ability to predict a relationship between business intelligence and its success factors.

In other to describe the role of business intelligence, (Kleesuwan, Mitatha, Yupapin, & Piyatamrong, 2010) investigated the business intelligence in Thailand's tertiary institution resources management with the sole objective of looking into its implementation, the technology, and its key success factors. The study claimed that business intelligence is a very useful tool for the university decision support system (DSS). Further research enquiry into the importance of business intelligence (Muntean, Bologa, Corbea, & Bologa, 2019), went further to determine how business intelligence systems affect or support the university strategy. Thus, the aim of the paper is to determine how a university can use business intelligence to assess an e-learning platform. The paper argued on the need for an effective framework to understand how business intelligence affects the university operation. It was further noted that business intelligence determines the key university performance indicators which are people and processes. The model focused on the strategic areas of the university including the university Key Performance Indicators (KPI).

Unlike other previous studies, (Parks & Thambusamy, 2017) adopt a qualitative approach to examine the success and impact of business intelligence in which they refer to as business analytics. The study aimed to address the gaps and weaknesses of the past studies by providing clear evidence of business analytics success factors with its impact on organizations. The study gained several deep insights into the success factors and consequences of business analytics business intelligence. In this respect, a framework that not only captures major constructs that span across industries, but also links these constructs to what matters most to organizations: actionable business analytics that leads to increased performance, enhanced competitive advantage, and better ethical and legal use of the data was developed. From the face-to-face interview on the executives, the finding revealed that organization, processes and technology which are classified into 2nd order themes and 1st order

Figure 2. A business intelligence framework for universities (Muntean, Bologa, Bologa, Alexandra, & Florea, 2011)
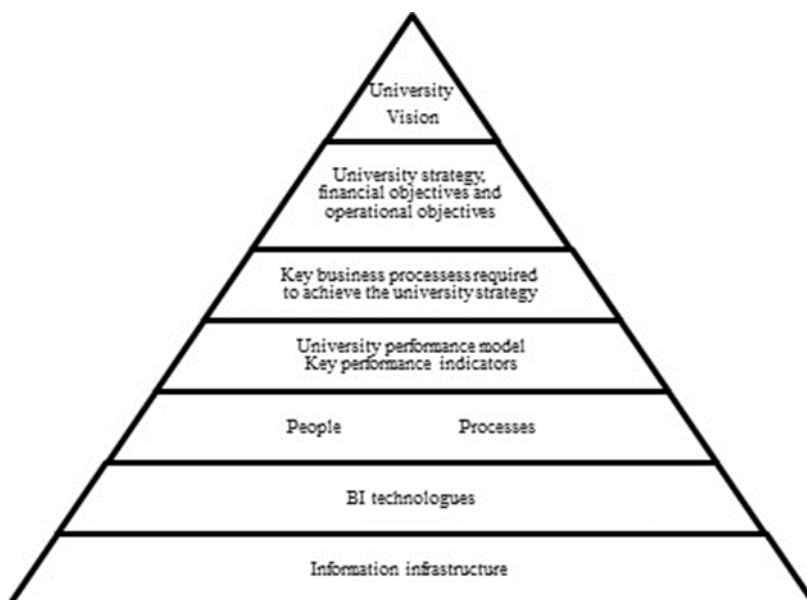
concepts are believed to be the key success factors affecting business intelligence. Although the study adopts a qualitative approach, how business intelligence affects the success and sustainability of the business appeared to be ignored.

In a similar dimension, (Alwashahi, 2015) studies framework for BI in tertiary institutions in Oman. The paper argued on the need for the application of BI in Higher Education Admission Centre (HEAC). The purpose is to make admission simpler in HEAC through the use of a functional database approach of active rules that is referred to as Event-Condition-Action (ECA) rules. The paper draws a strong correlation between business intelligence and higher education admission center (HEAC) in Oman. For example, it is noted that the data from BI systems are vital for decision processes such as higher education admission. The paper tends to lack a strong analytical base to predict how business intelligence affects the success of the university.

On this note, the following hypotheses are formulated.

H1: Business intelligence is significantly related to university sustainability.
H2: Business intelligence is significantly related to university success.

METHODS

This study adopted a cross-sectional survey design with interest on survey questionnaire. The population of the study covers 16 respondents who are experts in business intelligence. The population of the study only covered the 16 respondents who are experts in business intelligence. Snowballing sampling technique was employed to reach out to 16 business intelligence experts. In this case, the study identified the initial business intelligence expert within the study area, and each was meant to subsequently identify others until the study was able to get only 16 business intelligence experts, who now formed the population of the study (Sekaran & Bougie, 2016) from the population that participated in the study in Saudi Arabia. Apart from that, previous knowledge of experts in business intelligence is a criterion to be included in the study. The study data were collected through a survey questionnaire prepared with the aid of Google form, using the email procedure. We gathered information through a survey that was distributed throughout experts in business intelligence in Saudi Arabia. Thus, only those with business intelligence experience were included in the business as criteria. It is indicated on the questionnaire that only those with business intelligence experience should complete the questionnaire. At last, only 16 respondents were qualified to finally participate in the study. This study is considered a census in nature since all the experts in business intelligence were involved. This survey was conducted from September 2023 to November 2023. We employed the back-translation procedure, which involved writing the original survey instrument in English and translating it from English to Arabic. This process ensures the accuracy and compatibility of the language employed, as well as the preservation of each item's meaning, via the translation phase (Brislin R, 1980). As a result, two academics rewrote our questionnaire twice. This study employed an online questionnaire distributed to experts in business intelligence. Respondents were contacted via experts in business intelligence. A preliminary screening question that inquired if participants spent some of their time in experts in business intelligence of Saudi Arabia to identify if they are suitable participants.

Measurement of Variables

The variable business intelligence was measured using technologies, application and procedures involved in data collection, storing, using, disclosing and analyzing data to facilitate decision making. Hence, it reflects technological application and processes associated with collecting, storing, using, disclosing and analyzing data concerning the business of the university. Also, the university success and sustainability were measured using an increase in the number of student's enrolment and its profitability. 5-points likert scale of 1=strongly disagree to 5=strongly agree was used for all the variables.

DATA ANALYSIS

Descriptive Analysis Result

Table 2 depicts the descriptive analysis result of the respondents who participated in the study. the gender shows that 13 of them are male while only 3 of them are females accounting for 81.3 and 18.8 percent respectively with both mean and standard deviation of 1.19 and .403 respectively. The age bracket shows that nearly the majority of them are in the age bracket of 31-40 years accounting for 50 percent. 5 of the respondents are in the age bracket of 41 years and above representing 31.3 percent while only 3 of them are in the age bracket of 20-30 years accounting for 18.8 percent. Similarly, the marital status revealed 11 of the respondents are married while the rest of them are single accounting for 68.8 and 31.3 percent respectively with an overall mean of 1.69 and standard deviation of .479. Also, the years of experience for the respondents are displayed accordingly where 9 of the respondents have between 1-5 years of experience with 56.3 percent, 5 of them possess 6-10 years of experience with 31.3 percent and the rest of them have 11 years and above experience accounting only for 13.5 percent with overall mean and standard deviation of 1.56 and .727 respectively.

Table 2. Descriptive Analysis Result

Variables	Frequency	Percentage	Mean	Standard Deviation
Gender:				
Male	13	81.3	1.19	.403
Female	3	18.8		
Age:				
20-30 years	3	18.8	2.13	.719
31-40 years	8	50		
41 years and above	5	31.3		
Marital status:				
Single	5	31.3	2.13	.479
Married	11	68.8		
Department:				
Information Technology	5	31.3	8.81	.655
Business Intelligence	9	56.3		
Computer Science	2	12.5		
Years of experience:				
1-5 Years	9	56.3	1.56	.727
6-10Years	5	31.3		
11 Years and above	2	12.5		
Current Position:				
Domain	5	31.3	2.13	.885
Business Intelligence	4	25		
Information Technology	7	43.8		

Hypothesis Testing

H1: Business intelligence is significantly related to university sustainability

```
      Source |       SS           df       MS              Number of obs   =        16
-------------+----------------------------------           F(1, 14)        =      6.92
       Model |  1.25430118         1   1.25430118          Prob > F        =    0.0197
    Residual |  2.53579257        14   .181128041          R-squared       =    0.3309
-------------+----------------------------------           Adj R-squared   =    0.2832
       Total |  3.79009375        15   .252672917          Root MSE        =   .42559

------------------------------------------------------------------------------
SUSTAINABI~Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
BUSINESSIN~E |    .760315   .2889252     2.63   0.020     .140632    1.379998
       _cons |   1.055927   1.195477     0.88   0.392    -1.508117    3.619971
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$$S = 1.055927 + 0.760315 \ \mathbf{BI} + \varepsilon_t$$

Business Intelligence is statistically significant (t: 2.63; p-value 0.020) and demonstrates a positive relationship with University Sustainability which is in conformity with the economic apriori expectation of a positive impact of business intelligence on University Sustainability at a coefficient of 0.760315. Moreover, other secondary expectations are met as Probability (0.0197) is positive; R-squared (0.3309) is positive but not too strong and Adjusted R-squared (0.2832) is also positive but weak.

H2: Business intelligence is significantly related to university success

```
      Source |       SS           df       MS              Number of obs   =        16
-------------+----------------------------------           F(1, 14)        =      6.92
       Model |  1.25430118         1   1.25430118          Prob > F        =    0.0197
    Residual |  2.53579257        14   .181128041          R-squared       =    0.3309
-------------+----------------------------------           Adj R-squared   =    0.2832
       Total |  3.79009375        15   .252672917          Root MSE        =   .42559

------------------------------------------------------------------------------
SUSTAINABI~Y |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
BUSINESSIN~E |    .760315   .2889252     2.63   0.020     .140632    1.379998
       _cons |   1.055927   1.195477     0.88   0.392    -1.508117    3.619971
------------------------------------------------------------------------------
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$$US = 2.891666 + 0.3079063 BI + \varepsilon_t$$

Business Intelligence is not statistically significant (t: 0.86; p-value> 0.05 (0.402), but however, demonstrated a positive relationship with University Success which is in conformity with the economic apriori expectation of a positive impact of business intelligence on University Sustainability at a

coefficient of 0.3079063. Moreover, other secondary expectations are not met as Probability (0.4023) is positive; R-squared (0.0506) is positive but very weak and Adjusted R-squared (-0.0172) is negative, indicating a no significant relationship with the University Success.

DISCUSSIONS OF FINDINGS

The objective of this study is to examine how business intelligence affects both university sustainability and university success in Saudi Arabia. In this case, two major hypotheses were generated and tested using STATA version 15. Based on the hypotheses tested, the findings are then in two dimensions. First, the finding revealed that business intelligence is statistically significantly related to university sustainability, meaning that business intelligence is a significant predictor of university sustainability. It implies that business intelligence can play a significant role in sustaining the university. Earlier finding by Hasan et al. (2016) on the readiness of BI factors for tertiary institutions documented how business intelligence significantly affects the higher institutions. Also, (Muntean et al., 2019) claimed that business intelligence systems affect or support the university strategy and operation. It was revealed that business intelligence determines the key university performance indicators which are people and processes. The model covers elements such as university vision, university strategy, financial objectives and operational objectives, key business processes, university performance key indicators (people and processes), business intelligence technologies and information infrastructure. This finding also demonstrates that is essential to in improving business processes in the universities (Van der Meulen & Rivera, 2014).

Further findings obtained from the second hypothesis revealed that business intelligence is not statistically significantly related to university success, suggesting that business intelligence is not in any way related to university success. It implies that business intelligence does not affect the university's success. On the contrary, (Ong, 2016) reported that with business intelligence universities would equally generate a higher GDP than sectors such as health, public administration, and construction. This therefore means that this finding should be interpreted with caution and care.

Practically speaking, the findings demonstrate that business intelligence sustains the university but may not result in a significant profitability for achieving high performance. However, businesses are sustained through the profit they make. A business that is not making profit to the tone of even breaking-even cannot be sustained; rather it will cease to exist. Thus, business intelligence can play a significant role in this situation through helping the university to avoid a situation of total closing down of the business. One of the ways in which business intelligence affects the university in general is to support better business decision making leading to success. Finally, the university can use business intelligence as a strategy for sustainability but not work well for achieving the desired success.

CONCLUSIONS AND IMPLICATIONS

From the findings obtained in this study, the study draws several conclusions. First, the study concludes that business intelligence affects university sustainability but not university success. Further conclusion shows that university can depend on business intelligence for sustenance and not for success. However, success guarantees sustainability, that is, the continuous existence of the university.

One major implication of this study is that it explores a virgin subsector. The study gained several deep insights into the university sustainability and success as affected by business intelligence. The universities are the major benefactor of this study. An insight gained from this study would help the university to understand that the data from business intelligence systems are crucial in making decision processes such as higher education admission. Also, the business intelligence framework not only captures major constructs that span across industries, but also links these constructs to what matters most to the universities: actionable business analytics that leads to increased number

of students, increased performance, enhanced competitive advantage, and better ethical and legal use of the data was developed.

LIMITATIONS AND SUGGESTIONS FOR FUTURE STUDY

The findings of the present study should be interpreted by taking into account a number of limitations identified. The study suffers from the limited number of available business intelligence experts. This limitation turned the data collection process into a cumbersome endeavor for the researcher. This has a way of affecting the generalization of the finding. Therefore, increasing the sample size to a larger sample size could provide additional robust findings that might warrant more generalization. Also, the small sample size used in this study may encourage a qualitative approach that would require a face-to-face interview with the respondents.

Secondly, the study accounts only for education sector with particular interest in the university without accounting for other sectors or industries such as distribution and IT, including these sectors is well encouraged for additional insight on how business intelligence affects university sustainability and success.

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