ANTECEDENTS OF BUSINESS INTELLIGENCE USAGE: A CASE STUDY OF
UNIVERSITI TEKNOLOGI MALAYSIA (UTM)

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ABSTRACT

Business Intelligence (BI) is a system that uses analytical techniques to obtain knowledge from large amount of data. Business Intelligence assists organizations to make effective decisions, improve revenue, competitiveness, and to devise or produce new strategies. However, BI implementation is often plagued with many complex processes, challenges, issues, risks, and drawbacks making it difficult to achieve BI benefits. Nevertheless, the number of successful BI implementation in HEIs is still inadequate. Considering the challenge and need of implementing BI system, this research aims to contribute by determining the factors that influence BI implementation success for Malaysian Higher Education Institutions (HEIs). The study uses literature review from various resources including papers, books which were used to find the BI success factors. The literature revealed nine factors which influence the success of BI implementation. These factors are organized into three dimensions: organizational, process and technological dimension. This study deploys a questionnaire survey method to collect data from UTM BI users as the case study and descriptive statistics to validate the data. Based on the result obtained after the validation, it indicated that all the factors can be used by UTM and Malaysia HEIs in general as the factors that will help in achieving the success of BI system implementation.

ABSTRAK

Perisikan perniagaan (BI) adalah sistem yang menggunakan teknik analitik untuk mendapatkan pengetahuan dari banyak data. Perisikan Perniagaan membantu organisasi untuk membuat keputusan yang berkesan, meningkatkan hasil, daya saing, dan merangka atau menghasilkan strategi baru. Walau bagaimanapun, perlaksanaan BI seringkali dihantui dengan pelbagai proses kompleks, cabaran, isu, risiko, dan kelemahan sehingga sukar untuk mencapai manfaatnya. Kesannya dapat dilihat dengan bilangan inisiatif BI yang berjaya dilaksanakan di Institut Pengajian Tinggi Malaysia masih rendah. Memandangkan cabaran dan keperluan untuk melaksanakan system BI, kajian ini bertujuan untuk mengenalpasti faktor-faktor yang mempengaruhi kejayaan pelaksanaan inisiatif BI terutama bagi Institusi Pendidikan Tinggi Malaysia (IPT). Kajian ini menggunakan kajian literatur yang diperolehi daripada pelbagai sumber termasuk artikel dan buku untuk mencari faktor-faktor kejayaan BI. Hasilnya didapati sembilan faktor yang mempengaruhi kejayaan pelaksanaan BI yang kemudiannya disusun kepada tiga (3) dimensi utama iaitu: organisasi, proses dan teknologi. Kajian ini menggunakan kaedah soalselidik untuk mengumpulkan data daripada pengguna UTM BI sebagai kajian kes dan statistik deskriptif untuk mengesahkan data. Berdasarkan keputusan yang diperolehi selepas pengesahan, ia menunjukkan bahawa semua faktor dapat digunakan oleh UTM sebagai faktor yang akan membantu dalam mencapai kejayaan implementasi sistem BI.

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LIST OF ABBREVIATIONS

BI	-	Business Intelligence
CICT	-	Centre for Information and Communication Technology
CIOs	-	Chief Information Officers
HEIs	-	Higher Education Institutions
ISFs	-	Implementation Success Factors
KSFs	-	Implementation Factors
OLAP	-	Online Analytical Processing
RFs	-	Readiness Factors
SFs	-	Success Factors
UTM	-	Universiti Teknologi Malaysia

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CHAPTER 1

INTRODUCTION

1.1   Overview

Business Intelligence (BI) is an imperative concept, receiving an extensive interest in both academia and industry, BI systems are mostly employed in areas of businesses which involves decision-making to get value. The central IT department of an organization usually develop the BI systems, in order to support several managers or units/division across the enterprise. The enterprise BI system uses the data that comes from a data warehouse (DW) or the organization's group of data marts for its processes.

Numerous studies have shown that higher education is very important to countries' prosperity and economic development and data are crucial for large organizations particularly the higher education, to make effective decisions. The top managements of any size of institutions or firms, hold several meetings. Nevertheless, one of these meetings needs decision making to get an overall improvement. Some of these decisions are on experiences, intuitions or perceptions, while some must be based on actual numbers, examples and realities. Based on that statistics, BI and other related software are of great importance.

Business intelligence is the usage of specialized tools and information for making decision in various environments of the organization. BI is used by organizations to improve their decision-making. Today the BI system is broadly used IT solution, this is due to growing importance of BI system. However, BI implementation is often plagued with many complex processes, challenges, issues, risk, and drawbacks making it difficult to achieve BI benefits.

For instance, integration of data from several sources or systems into the organization's data warehouse is a serious issue in implementing BI as it requires

huge amount of effort. Additionally, there are other external and internal factors that affect the outcome of BI initiatives such as; level of support from senior managers, skills of technical resources, the types of industries in which the organisations compete with, investment funding and quality of the data sources. Meanwhile, the number of successful BI initiatives in HEIs is still inadequate.

Considering the challenge and need of implementing BI system, this research aims to contribute by determining the factors that influence BI implementation success for Malaysian Higher Education Institutions (HEIs) through literature review. The literature revealed nine factors which influence the success of BI implementation. These factors are organised into three dimensions: organisational, process and technological dimension. This study further deploys a questionnaire survey method to collect data from UTM BI users and Descriptive Statistics to validate the data. Based on the result obtained after the validation, it indicated that all the factors can be used by UTM as the factors that will help in achieving the success of BI initiative.

This study will act as guide to HEI's decision makers on factors to consider in dealing and managing the BI implementation challenges, which will lead to decrease in failure rates of BI system.

1.2   Problem Background

For all kind of organizations, data is considered to be a valuable asset. As it can be used to know what is happening internally and externally then improvement can be made based on the findings. Nowadays firms invest on data to obtain useful and reliable information for tactical, strategic and operational purposes (Trieu, 2017). Generally, data comes from different sources in an organisation, where it might be unclear and contradictory to each other (Alia, Mohamad, Othman and Yusuf, 2015).

In fact, due to the increasing volume of data in an organisation it becomes more difficult to understand and analyse the data, therefore one effective solution to solve the problem, is by utilizing a BI system (Apraxine and Stylianou, 2017). Business

Intelligence can be seen as the special tools and processes used by organisations to manage their raw data and convert them into meaningful and useful data. These useful data can then be used to predict the future of the organisation. With the predicted outcome, a set of actions (strategy) can be developed by the organisations to make an effective decision (Pha, M, Mai, Misra, Crawford and Soto, 2016). Business intelligence systems are designed to provide information for decision- making and has proven to be of great benefits to organizations using it (Dawson, Belle, Africa, Belle, Bag, Africa, Belle and Commons, 2011; Foshay and Kuziemsky, 2014).

Business intelligence is seen as an organization's ability to assemble, organize, and maintain their information and BI has received a significant attention from researchers and practitioners, which shows the level of data related problems in modern businesses (Kao, Yu, Masud, Wu, Chen and Wu, 2016). BI tools provide the services and solutions that assist top management to thoroughly analyze complex business situations, and streamline the processes of decision making (Antoniadis, Tsiakiris and Tsopogloy, 2015).

Nowadays, it is both a theoretical and managerial challenge to successfully implement an Information Technology (IT) invention, as there are high risk reports regarding a lot of IT implementation projects and also several IT solutions introduced by organizations are not properly used by end users (Yeoh, 2016). For decades BI systems have been of essence to Chief Information Officers (CIOs), but there is insufficient knowledge on how to manage these systems successfully beyond the implementation stage (Wieder and Ossimitz, 2015).

Furthermore, the implementation of BI systems is difficult, as it involves lots of drawbacks, complex processes, challenges, and risks (Magaireah, Sulaiman and Ali, 2017). Hence, there is a substantial request to find more success factors of BI implementation (Magaireah *et al.*, 2017). Sangar and Iahad (2013) asserts that benefits of BI system can be realized only when it is implemented successfully. Thus, it is important to understand the BI implementation success factors so as to assist any organizations to deal with complexities, avoid possible risks and ensure proper implementation of BI systems (Sangar and Iahad, 2013).

However, business intelligence is necessary for any kind of organizations including HEIs due to the fast growth of data (Apraxine and Stylianou, 2017). Presently, due to the changing environment of educational process, HEIs requires a large volume of information to support any educational related process as private and public universities are competing to identify their own exceptionality by choosing the most appropriate solution to be the worldwide leading educational institute, and for better management and improved performance (Alia *et al.*, 2015).

Many higher education institutions depend on real-time decisions (Kumaran, Othman and Yusuf, 2015). Therefore, since Business Intelligence (BI) system have the ability of analysing and combining huge volume of data, HEIs can gain insight into the studies of students which can cause better decision-making and as a result for overall performance (Apraxine and Stylianou, 2017). BI initiative can be of great benefit in achieving the set goals and objectives of any organisation (Alia *et al.*, 2015). The overall aim of business intelligence system is to improve decision making process based on quality data which are displayed in a clear and understandable manner.

Recently, the rate at which universities are depending on educational data to make decisions is increasing rapidly (Kumaran, Othman and Yusuf, 2015). With, educational institutions having a large number of students, staffs and activities, it means that a lot of data can be analysed using BI tools to predict students' academic behaviour, performance, retention or withdrawal. These data are important to decision making process as they can be used to show the need for change and improvement which result to increase in the overall academic standards of the institution (Apraxine and Stylianou, 2017).

Regardless of BI benefits, academicians and practitioners observed that BI system is costly, complex, resource-intensive and challenging to deal with (Pha, M, Mai, Misra, Crawford and Soto, 2016; Wanda and Stian, 2015; Yeoh, 2016) and its implementation is frequently plagued with issues and challenges (Anjariny and Zeki, 2011; Cidrin and Adamala, 2011; Magaireah, Sulaiman and Ali, 2017; Rajnoha, Kádárová, Sujová and Kádár, 2014). However, BI system implemention does not only involve the purchase of hardware and software; rather, it is a complex undertaking

demanding appropriate resources and infrastructure for a long period of time to support management decision-making (Arnott *et al.*, 2017; Yeoh, 2016).

Several studies indicate that BI systems consume billions of currencies yearly. Yet, more than half of these BI projects are resulting to no benefit (Anjariny and Zeki, 2014; Apraxine and Stylianou, 2017).

Meanwhile, a number of researches shows that it is essential to understand the CSFs for BI system implementation because they believe that the high rate of BI failure is due to low understanding of the CSFs of BI implementation, and by what means these factors contribute to realizing the benefits of BI system (Apraxine and Stylianou, 2017; Fadhil, Yusof, Miskon, Ahmad, Alias, Hashim, Abdullah, Ali and Maarof, 2015; Olszak and Ziemba, 2012). Therefore, for a BI system to be successfully implemented an understanding of the CSFs is essential for an organisation. Kfouri and Skyrius (2016) suggested that research on success factors should be extended to other contexts, sectors and countries.

Thus, this research addresses the gap by revealing factors that influence BI implementation success in HEIs, to serve as guide for decision makers on factors that help to solve challenges of implementing BI initiative.

1.3 Problem Statement

In Malaysian HEIs context, huge volume of data is produced daily and these data comes from several information systems or databases, where it might be ambiguous and conflicting with each other (Alia *et al.*, 2015). Using and managing data from different sources could be really challenging as there is need to get the right data at the right time within a short period of time, therefore having a successful BI system implementation will be an effective solution to the problem (Alia *et al.*, 2015).

However, universities face challenges in implementing BI (Yusof *et al.*, 2015). As discovered by Abdul Aziz, Aida Jusoh, Hassan, Mohd Rizhan Wan Idris, Putra

Zulkifli and Anuwar Mohamed Yusof (2014), first problem is the amount of academic data in the institution. Meanwhile, these academic data continuously change from time to time. Hence, will make the procedures of filtering the valuable data to becomes more complex to carry out. Second problem is the cost of implementing BI system in a university. BI systems are complex, and their implementation is time consuming and involves high risks, effort and financial resources. There are other issues that affect the outcome of BI implementation such as; the level of support from senior managers, skills of the technical resources, and quality of the data sources (Hasan, Miskon, Ahmad, Ali, Hashim, Abdullah, Alias and Maarof, 2016).

Therefore, there is need to determine the factors that enables the BI system implementation to be successful (Abdul Aziz *et al.*, 2014). Also, it is crucial to recognize the factors that affect BI implementation success so that all the data in HEIs can be handle effectively (Zulkefli, Miskon, Hashim, Alias, Abdullah, Ahmad, Ali and Maarof, 2015). Considering the challenge and need of BI, this study identified the antecedents of BI usage in HEIs so as to manage all the data efficiently since each data has different requirement and it is very important for the university performance results.

1.4   Research Questions

To address the underlying issues, the main research question for this study is "What are the factors that influence the success of BI implementation in Malaysian HEIs?". To support the main research question three (3) sub questions were formulated as follows: -

(a)   What are the factors that influence the success of BI implementation in different organizations?

(b)   What are the factors that will influence the success of BI implementation in Malaysian Higher Education Institutions (HEIs)?

(c)   How to validate the proposed success factors that influence the success of BI implementation in Malaysian HEIs?

1.5   Research Objectives

The objectives of the research are:

(a)   To identify the factors that influence the success of BI implementation in different organizations.

(b)   To identify the factors that will influence the success of BI implementation in Malaysian Higher Education Institutions (HEIs).

(c)   To validate the proposed success factors that influence the success of BI implementation in Malaysian HEIs.

1.6   Scope of the Study

To achieve the above-mentioned objectives, this study focused on Universiti Teknologi Malaysia (UTM). UTM institution has already developed and implemented its own BI system and used by UTM top management. The respondents were UTM BI users.

1.7   Significance of the Study

This study is important as it raises the awareness of the factors that will influence the success of BI implementation in HEIs and can be considered as a guide to follow when planning to implement BI initiatives in any higher education institutions (HEIs). These success factors could also help in reducing the rate of unsuccessful BI systems in HEIs and in turn will derive all the potential benefit of the system.

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LIST OF PUBLICATIONS

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1. Nani Amalina Zulkaniain, Salamatu Musa, Halina Mohamed Dahlan, Ab Ra zak Che Hussin (2017), Information Technology for Organizational Change: Lesson Learnt from Kodak And Fujifilm, Journal of Information Systems Research and Innovation (JISRI) Published on 01 December 2017