



**ANALYSIS OF SOCIO-TECHNICAL FACTORS IN BUSINESS
INTELLIGENCE FRAMEWORK CASE STUDY OF HIGHER
LEARNING INSTITUTION**

MAILASAN A/L JAYAKRISHNAN

**MASTER OF SCIENCE IN INFORMATION AND
COMMUNICATION TECHNOLOGY**

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Faculty of Information and Communication Technology

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**A thesis submitted
in fulfillment of the requirements for the degree of Master of Science in Information
and Communication Technology**

Faculty of Information and Communication Technology

UNIVERSITI TEKNIKAL MALAYSIA MELAKA

2018

DECLARATION

I declare that this thesis entitled “Analysis Of Socio-Technical Factors In Business Intelligence Framework Case Study Of Higher Learning Institution” is the result of my own research except as cited in the references. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

Signature :

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Date :

APPROVAL

I hereby declare that I have read this thesis and in my opinion this thesis is sufficient in term of scope and quality for the award of Master of Science in Information and Communication Technology.

Signature :

Supervisor Name : DR. ABDUL KARIM BIN MOHAMAD

Date :

DEDICATION

I dedicate this thesis to my beloved father and mother, Mr. Jayakrishnan a/l Govindasamy and Mdm. Revadhi a/p Balaraman, the first whose values and early lessons molded me into the adult I've become, your guidance, love, support, patience and also to my lovely family for their encouragement of my academic and professional endeavors.

Thank you for everything. I love all of you!

ABSTRACT

The contradictory pressures and features of socio-technical factors in an organization that relates to people, processes, and technologies, create data value on organizational strategic performance using Business Intelligence (BI) engine within different conceptual frameworks and their impact on strategy development and implementation for strategic performance management. Existing studies have not sufficiently designated the interactions between all seven (7) socio-technical factors or their influences on BI utilization. The specific features of Knowledge Management (KM) and BI in this study have been outlined as a guideline for research in viewing the big picture in decision-making processes when implementing organizational performance diagnostics framework. The research goal of this study was to develop an organizational performance framework of socio-technical factors that influence on BI utilization. This study identified socio-technical factors with observing MIT90s and McKinsey seven (7) S's framework of people (staff, skills, and style), processes (strategy and structure) and technologies (systems and shared values) and their influences on BI utilization. The data needed for the study was collected from 474 current administration and academic staff of University A with the help of a 25-item questionnaire-based survey were developed for this research literature-based proposed model. The study utilized reliability analysis results to analyze 7 usable socio-technical factors. Data analysis was conducted with SPSS and results confirmed that shared values-oriented factors predicted knowledge seeking and contributing in BI utilization. Furthermore, reliability measurement was confirmed between 7 usable socio-technical factors including people (staff - 0.810, skills – 0.801 and style – 0.796), processes (strategy – 0.771 and structure – 0.780) and technologies (systems – 0.790 and shared values – 0.850). These findings extend the relevance and statistical power of existing studies on BI usage for displaying an organizational performance indicator.

ABSTRAK

Tekanan dan percanggahan pendapat yang bercirikan faktor sosio-teknikal dalam organisasi merangkumi kepada orang, proses dan teknologi bagi mewujudkan nilai data dalam sesebuah organisasi yang berprestasi dan strategik perlu menggunakan enjin kepintaran perniagaan yang mempunyai konsep rangka kerja yang berbeza dan impaknya terhadap pembangunan strategik serta pelaksanaan untuk pengurusan prestasi yang strategik. Kajian sedia ada tidak mencukupi menerangkan atau menetapkan interaksi antara tujuh (7) faktor sosio-teknikal atau pengaruh mereka terhadap penggunaan kepintaran perniagaan. Ciri-ciri yang khusus dalam pengurusan pengetahuan dan kepintaran perniagaan dalam kajian ini telah disenaraikan sebagai garis panduan untuk penyelidikan dalam konteks gambaran yang lebih jelas dalam proses membuat keputusan apabila melaksanakan prestasi organisasi, rangka kerja yang bercorakkan diagnostik. Matlamat penyelidikan kajian ini adalah untuk membangunkan rangka kerja prestasi organisasi dalam faktor sosio-teknikal yang mempengaruhi penggunaan kepintaran perniagaan. Kajian ini mengenalpasti faktor-faktor sosio-teknikal dengan menggunakan MIT90s, rangka kerja McKinsey tujuh (7) S's daripada orang (kakitangan, kemahiran, dan gaya), proses (strategi dan struktur) dan teknologi (sistem dan nilai bersama) serta pengaruh mereka terhadap penggunaan kepintaran perniagaan. Data yang diperlukan untuk kajian ini telah dikumpulkan daripada 474 kakitangan pentadbiran semasa dan staff akademik di Universiti A dengan bantuan daripada 25 item kajian berasaskan soal selidik telah dibangunkan untuk model kajian yang berasaskan kesusasteraannya. Kajian ini menggunakan keputusan analisis kebolehpercayaan untuk menganalisis 7 faktor sosio-teknikal yang boleh digunakan. Analisis data dijalankan dengan menggunakan perisian SPSS dan keputusan mengesahkan bahawa faktor yang berorientasikan nilai bersama meramalkan pencarian ilmu dan menyumbangkan dalam penggunaan kepintaran perniagaan. Tambahan pula, pengukuran kebolehpercayaan telah disahkan antara 7 faktor sosio-teknikal yang boleh digunakan termasuk orang (kakitangan – 0.810, kemahiran – 0.801, dan gaya – 0.796), proses (strategi – 0.771 dan struktur – 0.780) dan teknologi (sistem – 0.790 dan nilai bersama – 0.850). Penemuan kajian ini akan memanjangkan kekuatan dan kaitan statistik kajian sedia ada mengenai penggunaan kepintaran perniagaan untuk memaparkan penunjuk prestasi organisasi.

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LIST OF ABBREVIATIONS

AQMS	- Academic Quality Management System
AI	- Artificial Intelligence
BI	- Business Intelligence
DSS	- Decision Support Systems
EFQM	- European Foundation for Quality Management
EIS	- Executive Information Systems
HLI	- Higher Learning Institutions
HRMS	- Human Resource Management System
ICT	- Information and Communications Technology
IoT	- Internet of Things
IS	- Information System
IT	- Information Technology
JUSE	- Japanese Scientist and Engineers

KM	-	Knowledge Management
KMS	-	Knowledge Management Systems
KPI	-	Key Performance Indicator
MBNQA	-	Malcolm Baldrige National Quality Award
MIS	-	Management Information Systems
OLAP	-	Online Analytic Processing
QMS	-	Quality Management System
SMS	-	Strategic Management System
STO	-	Strategic-Tactical-Operational

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Azmi, F. R., Abdullah, A., Bakri, M. H., Musa, H. and **Jayakrishnan, M.**, 2018. The adoption of halal food supply chain towards the performance of food manufacturing in Malaysia. *Management Science Letters*, 8(7), pp. 755-766. doi: 10.5267/j.msl.2018.5.0010.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The comprehensive sight of the research study is to construct a conceptual model of socio-technical factors in an organization that relates to people, processes and technologies, create data value on organizational strategic performance using Business Intelligence (BI) engine. The proposed conceptual model is designated the interactions between all seven (7) socio-technical factors or their influences on BI utilization. This BI framework should provide an effective strategic decision-making that could assist in decision-making processes when implementing organizational performance.

The development of the conceptual model should admit to the seven (7) socio-technical factors of the strategic performance diagnostics BI framework components, for performance management. This research focuses on conceptual model development of an organizational performance framework of socio-technical factors that influence on BI utilization.

This chapter has acquaintance to the background of the study and identifies the research problems together with justifying research question and research objectives. Moreover, scope and significance of the study are identified to perform the study accordingly.

1.2 Background of the Study

Information System (IS) has become the backbone of most organizations as an integrated and co-ordinate network of components, which combine together to convert data into information (Jaques, 2017). IS is defined as the software that helps to organize and analyze data (Rahman et al., 2017). The main purpose of IS is to turn data into useful information that can be used for decision making in an organization (Murugesan and Karthikeyan, 2016).

According to Mitchell et al., (2016), decision making is the process to select and evaluate a course of action from a number of alternatives. Jaques, (2017) claim that decision-making in an organization, plays an important role by determining both organizational and managerial activities. Decisions in an organization defined as a course of action, are purposely chosen to achieve organizational or managerial objectives or goals (They and Up, 2015). Therefore, frantic search been implemented for better approach and new in IS decision making.

Strategic decision-making is a continuous process of creating organization mission, values, goals, objectives and indispensable component of managing organization for a particular action of plan in altering strategies based on observed outcomes (Kohtamäki and Farmer, 2017). Decision making process provides a critical evaluation of the relationship between decision-making and performance in Higher Learning Institutions (HLI) (Saadat et al., 2016), towards addressing the sharing information and information exchange between the people. This phenomenon is also due to human lacking knowledge to characterize strategic level information-blind spot, especially on a typical pattern of effective problematic scenarios and responses.

Furthermore, Elayyan and Shraah, (2015) claim that decision making process in HLI is a systematic approach and consists of six (6) steps, namely: gathering of

information and data, appreciating of problem, developing of alternatives, analyzing of data and information, evaluating of these alternatives and finally choosing of appropriate alternative. The decision approach in HLI depends on (3) factors: managerial level, importance of decision making process and decision-making styles (Lim et al., 2014).

According to Mitchell et al., (2016), decision making process in HLI can be classified as an university, where a university uses the information, to improve organization decision making process conceptualize and envision the future of their university. University's decision making process focus on knowledge acquisition, sharing and utilization for developing unique and rare skills and experiences (Pollanen et al., 2017). The current IS in HLI appear to mainly collect and store data in databases, thus serve as merely an information source rather than a decision support environment (Aithal and Kumar, 2016).

Business Intelligence (BI) aims to enable interactive and easy access to diverse data, enable manipulation and transformation of these data and users the ability to conduct appropriate analyses and perform actions (Baesens et al., 2016). According to Ministry of Education Malaysia, (2015), it is necessary to explore the potential of BI in making better use of education data in support of performance management and decision making because 49.0 % indicates better decision making, 16.0% shows better enablement of Key Strategic Initiatives, 10.0% indicates better relationships with customers, 9.0% shows better sense of risk, 9.0% indicates better financial performance and 6.0% shows analytics decision that helps managers and academic staff take a more proactive approach through well informed and evidence-based decisions. BI has become a strategic initiative and many business leaders now regard BI as instrumental in driving business effectiveness and innovation (They and Up, 2015). Therefore, this study attempts to investigate the diagnostic impact of decisional making process on the HLI as a university case study.

1.3 Problem Statement

Poor decision making process has been pointed out as a factor contributing directly to the problems of organization failures (Dwivedi et al., 2015). It has become the main reason for the need of new perspectives and research directions, to provide insights and further guidance for executives on factors enabling organization success and avoiding organization failure (Kohtamäki and Farmer, 2017). BI can be utilized as a new technology to support decision making and improve the efficiency and effectiveness of organization performance (Murugesan and Karthikeyan, 2016). Most of the problems occur in decision making process related to IS for strategic decision-making process from multiple perspectives, to move beyond narrow considerations of the organization artifact and to venture into underexplored organizational contexts (Pollanen et al., 2017).

The rate of organization failure remains high because, organizations fail to explore and utilize their IS structure and system for decision making process (Maier et al., 2015). More seriously, if the investment of technology is failed, that may not only cause universities financial losses, but also lead to dissatisfaction among academic staff and administrations in universities (Ministry of Education Malaysia, 2015). Thus, there are two major challenges in applying BI in HLIs, firstly, how to develop a systemic framework for decision making process, secondly, what socio-technical factors may determine the acceptance of BI in HLIs. Extensive research has been conducted on adoption of BI and social-technical factors (Shahriari, 2016).

According to Saadat et al., (2016), in explaining social-technical factors adoption and acceptance, a research paradigm is given. It focuses on how a particular social technical factor affect organization perception to an Information Technology (IT), thereby influence the usage of the specific technology. Where MIT90's model and McKinsey 7S's framework is the widest used model for this paradigm (Amarilli, 2014; Phillips-wren et al.,

2015; Murugesan and Karthikeyan, 2016; Ave, 2017; Kohtamäki and Farmer, 2017). Laumer et al., (2014), stated that organization failed to have a systemic framework for decision making process that is broad enough to represent a wide range of possible factors that may impact organizational performance and the use of the framework to delineate and assess the impact for strategic planning and process as a formalized technology-enabled IS.

Baesens et al., (2016), propose two beliefs about the socio-technical factors in MIT90's model and McKinsey 7S's framework, perceived usefulness and perceived ease of use, these two items aim to determine an organization decision making process toward utilization that BI technology, which in turn determine organization intention to use it for performance management. Perceived usefulness is the degree to which one believes that using the BI technology will enhance the organization performance. Regarding BI adoption in HLIs, there seems no attempt to study the BI acceptance in HLIs. Thus, it is important and necessary gaps to investigate social technical factors acceptance of BI in order to promote and make best utilization of BI systems in HLIs. Therefore, the intention of thesis is to promote BI concepts among HLI and understand the social technical factors determining the acceptance to BI systems in supporting decision making process.

1.4 Research Questions

There are three (3) main research questions for this study:

1. What are the social technical factor to be considered as the decision-making process for BI framework?
2. How to analyze and classify the social technical factor for BI framework?
3. How to verify the social technical factor for BI framework?