DESIGN GUIDELINE FOR UTM ACADEMICIAN PERSONAL RESEARCH AND PUBLICATION DASHBOARD

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To my beloved parents,
Mr. Harun Bin Nahudah and Mrs Persia Buklaw Samsu,
and my precious sibling.

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ABSTRACT

The dashboard displayed the organization's important information on a single screen which enables them to monitor their performance and make necessary decisions. However, the biggest issue that a dashboard has is it does not have specific design guideline for the developer to follow. Addressing this issue, this study is executed to find a suitable dashboard design guideline and use it to design a dashboard for the academicians from Universiti Teknologi Malaysia (UTM). The purpose of this study is to identify dashboard design guideline for UTM APRPD, visualization features to be included in the UTM APRPD, and to validate the dashboard design guideline identified. UTM Academician Personal Research and Publication Dashboard (UTM APRPD) is a dashboard designed to monitor and analyze UTM academician's individual performance in publication and research grant performance. This study is using the Research and Development Information System (RADIS) as its case study. The dashboard design guideline used to design the UTM APRPD was validated by analyzing the result obtained from the interview session with the respondents. In contrast to the RADIS, UTM APRPD interface design was improved to visually aid the academicians in monitoring their performance. The academicians agree that the dashboard was designed fine and are relevant to be used. Thus, the dashboard design guidelines identified in this study can be used to design the UTM APRPD.

ABSTRAK

Dashboard merupakan salah satu aplikasi *Business Intelligence* (BI) yang telah digunakan secara meluas dalam industri yang berbeza bagi tujuan yang berbeza. *Dashboard* memaparkan maklumat penting sesebuah organisasi pada satu skrin yang membolehkan mereka memantau prestasi dan membuat perancangan yang diperlukan. Walau, dashboard tidak mempunyai garis panduan reka bentuk yang khusus untuk digunakan oleh pereka sistem. Kajian ini dijalankan untuk mencari garis panduan reka bentuk *dashboard* yang sesuai dan menggunakannya untuk mereka bentuk papan pemuka untuk ahli akademik dari Universiti Teknologi Malaysia (UTM). Terdapat tiga matlamat yang ingin dicapai dalam kajian ini iaitu bago mengenalpasti garis panduan reka bentuk untuk UTM APRPD, untuk mengenalpasti ciri visualisasi yang boleh digunakan oleh UTM APRPD, dan untuk mengesahkan garis panduan reka bentuk *dashboard* yang telah dikenal pasti. UTM *Academician Personal Research and Publication Dashboard* (UTM APRPD) merupakan sebuah *dashboard* yang direka bagi memantau dan menganalisis prestasi individu ahli akademik dari UTM dalam penerbitan dan geran penyelidikan. Kajian ini menggunakan *Research and Development Information System* (RADIS) sebagai kajian kesnya. Garis panduan reka bentuk papan pemuka yang digunakan untuk merekabentuk UTM APRPD telah disahkan dengan menganalisis hasil sesi wawancara yang telah dijalankan. Berbeza dengan RADIS, reka bentuk antara muka UTM APRPD ditambah baik untuk membantu para ahli akademik dalam memantau prestasi mereka. Kesemua responden bersetuju untuk menggunakan UTM APRPD, ini menunjukkan bahawa ianya telah direka dengan baik dan relevan untuk digunakan. Oleh itu, garis panduan reka bentuk papan pemuka yang dikenal pasti untuk kajian ini boleh digunakan untuk merekabentuk UTM APRPD.

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LIST OF ABBREVIATIONS

3D	-	Three Dimension
APRPD	-	Academician Personal Research and Publication Dashboard
BI	-	Business Intelligence
GP	-	Graphical Presentation
IT	-	Information Technology
KAI	-	Key Amal Indicator
KPI	-	Key Performance Indicator
LR	-	Literature Review
MyRA	-	Malaysia Research Assessment Instrument
PIM	-	Personal Information Management
RADIS	-	Research and Development Information System
RMC	-	Research Management Centre
UTM	-	Universiti Teknologi Malaysia

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CHAPTER 1

INTRODUCTION

1.1 Overview

Data visualization plays an important role in delivering effective information to the user in a system. The existing mode of data delivery like standardized report distribution or drag-and-drop reporting does not seem enough nowadays (Malik, 2005). The traditional ways of presenting the data are often not rational anymore as they often seem too static. For instance, most of the report analysis is presented in a table, it may work for a number of data, but when it comes with a large set of data it may cause data overload.

The availability of Business Intelligence (BI) tools nowadays has given a solution for this problem. One of the BI tools is a dashboard (Presthus & Bergum, 2015). The dashboard is widely used in different industries for different purposes. According to Wajong (2015), the dashboard is displaying important information in the form of visual indicators, tables, reports, and alert mechanism which happens in performance management. However, the visual content of the dashboard is depending on its user's level of management or their position in the organization. The organization needs to employ different types of dashboard for the staff accordingly to their managerial level in order to enhance their decision making

As one of Malaysian Research University, Universiti Teknologi Malaysia (UTM) is emphasizing on producing high impact research publication (Hair Zaki, 2016). UTM is encouraging the academician, which consist of the postgraduates and lecturers to publish research papers by following the Key Performance Indicator (KPI) set by the university's top management. UTM is also giving out funding from their collaborators to the academician to boost their research works. UTM Research Management Centre (RMC) plays an important role in this mission. They are responsible for managing the research activities within the UTM. All the academician in UTM are using Research and Development Information System (RADIS) to keep their research information like research grant, research publication, their Key Amal Indicator (KAI) and their awards list. By using RADIS, their research information is available to be accessed when necessary. This study will use the RADIS as the case study to apply the dashboard design, which will improve the RADIS's data visualizations.

1.2 Research Background

RADIS stand for Research and Development Information System that used by UTM academician to keep their research and development's work information. This system is handled by UTM Research Management Centre (RMC). One of the RMC responsibility is to manage and facilitate research and development activities around UTM. They collaborate with many organizations internally and externally such as Ministry of Higher Education (MOHE), Ministry of Science, Technology and Innovation (MOSTI), Small and Medium Industry Development Corporation (SMIDEC), a research institute and other universities. Through this collaboration, RMC is putting all their effort on acquiring funding from the potential sponsor (Research Management Centre UTM, 2016)

The academician will apply for the research grant from the RMC to fund their new project. All the information about the research and development activities are stored in the RADIS. The information stored in RADIS is academicians' list of grants applied, the total number of publications that they have made, their award and recognition and also their Key Amal Indicator (KAI) to be achieved. This system helps the academician to keep track of their research activities and they can easily access the system by using their own user id and password

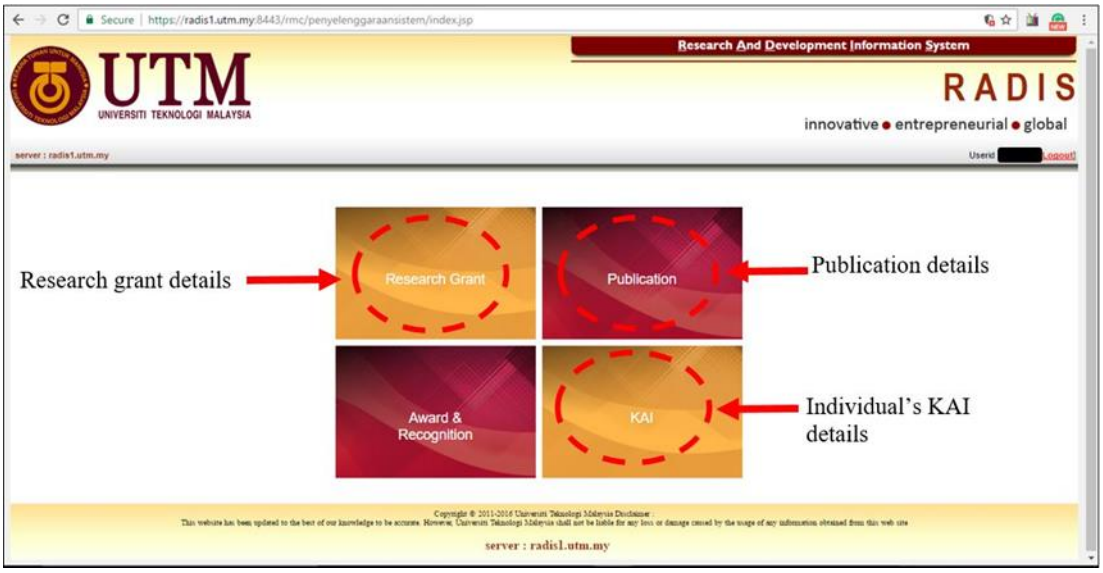

Figure 1.1 RADIS Homepage

RADIS is following the KPI that is set accordingly to the Malaysia Research Assessment Instrument II (MyRA II). This instrument is to evaluate matured research university, which focusing on producing excellence and high quality of research (UTM, 2012). According to Hair Zaki (2016), instead of using Key Performance Indicator (KPI) terminology, UTM is using the Key Amal Indicator (KAI) term as their performance measuring scheme. KAI act as the UTM's strategic plans monitoring tool (Key Amal Indicator, 2015). The UTM strategy map can be seen in Appendix A. In RADIS, the KAI is set as a different module apart from the publication and research grant module. The user needs to perform different task in order to check for the details of their research grant, research publication and their KAI achievement (As shown in Figure 1.1).

All the data presented in the RADIS is in the form of tables, which some time showing the unnecessary data that the user wants to see. The data presented is sufficient enough for the user to view, but it does not deliver the information effectively. This derived the problem of "rich in data, poor in information" (Malik, 2005; Presthus & Canales, 2015). Data visualization concepts play an important role to solve this problem, how the data is presented can help the user to understand the information more clearly.

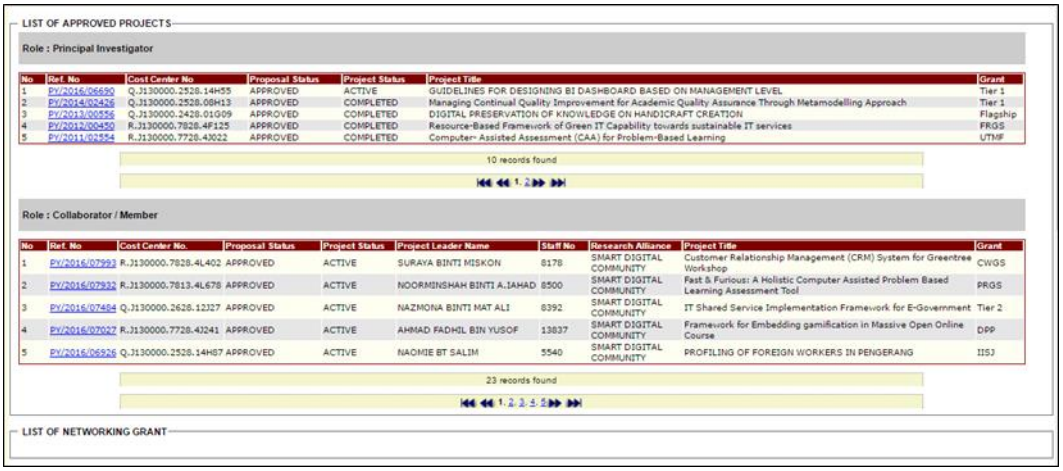

Figure 1.2 Example of RADIS interface

Figure 1.2 shows the example of RADIS interface. Both publications and research grant module are using the same type presentation display. A table is used to view all the information and categorized into specific group of data. In addition, other difficulties for the user is their publication list is too long and there is no mechanism that notifies their achievements within the two modules. They need to refer to the KAI module to see their performance analysis. Figure 1.3 shows the interface for the KAI module. This study proposes the usage of dashboard to display the academician's personal research and publication information. Although the use of dashboard can improve the interface design of a system, there is no specific design for the developer to follow.

Figure 1.3 KAI's interface

The data can be presented in a form of two-dimensional reports, scorecards, dashboard and data mining (sophisticated searches and queries) (Presthus & Canales., 2015; Watson, 2016; Yigitbasioglu & Velcu, 2012). In this study, the dashboard is selected to improve RADIS data visualization and will only focus on Research Grant module and Publications module. The purpose of this study is to identify the design guideline for UTM academician personal research and publication dashboard.

1.3 Problem Statement

As mentioned earlier, how the data presented in a system are very important for the user, as they will have to make a decision or for them to analyze the information presented. Since the RADIS is mainly using tables to display information, the use of dashboard can enhance RADIS interface design, other than that, the dashboard can reduce the unnecessary data from the user view. The dashboard application can help the academician to be more alert with their performance and work to achieve their KAI. However, in order to deploy this application in an organization, there are several things to be clarified first. In the previous study, Yigitbasioglu and Velcu (2012) had addressed that there is no specific guideline to design the dashboard. They also mentioned that if the developers overdo the design, it can distract the attention of the

user and caused decision distraction. Thus, this study will try to address the gap by researching the design guideline for the UTM academician personal research and publication dashboard.

1.4 Research Questions

Based on the discussion made in research background section, a list of research questions for this study is identified as follows:

1. What is the dashboard design guideline for UTM APRPD?
2. What are the visualization features to be included in the UTM APRPD?
3. Does the dashboard design guideline identified meet the UTM academician's requirement?

1.5 Research Objectives

From the research question formulated for this study, the research objectives of this study are listed as follows:

1. To identify the dashboard design guideline for UTM APRPD.
2. To identify the visualization features to be included in the UTM APRPD.
3. To validate the dashboard design guideline identified for UTM APRPD.

1.6 Scope of the Study

This research is focusing on identifying the design guideline for the proposed dashboard. The dashboard will be displaying user's individual Research Grant module and Publications module of RADIS. UTM APRPD will improve the visual representation of the system, which will enhance the information display for the user. The respondents for this study is the UTM academician, in this context they are the lecturers in UTM who are using the system. Their level of management in UTM is as the operational manager. The purpose of the dashboard of this study is to monitor and analyze the academician individual performance in publishing and their research grant performance.

1.7 Significant of the Study

The outcome of this study will help to design the UTM APRPD, which will be used to view the academician personal Research Grant module and Publications module. This improvement is to ease the academician to view the necessary information before going into the details of their Research Grant information and Publications information. UTM APRPD can be used to monitor individual performance in publication and analyze their research grant progress. The use of UTM APRPD can motivate the user to perform well to achieve their KAI in research and development activities.

1.8 Thesis Structure

This study is divided into six chapters. The first chapter discussing on the overview of the problem arises, research questions and its objectives, research scope and significance of the study. Secondly, Chapter 2 provides the literature studies

performed to identify the research gap of the study. The second chapter will cover all the related concepts such as the dashboard overview, data visualization study, and personal information management. Next, Chapter 3 elaborates the step taken in order to execute all the objectives of the study. Chapter 4 is where the UTM APRPD prototype is designed following the design guideline identified from the second chapter. Chapter 5 explained the validation step taken for the study. An interview session was conducted with the users to measure their willingness to use the dashboard. Finally, Chapter 6 provides the overall achievements of the study, research contribution, research limitation, and the conclusion of the study.

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