

**KNOWLEDGE AUDIT ON RESEARCH ACTIVITIES TOWARDS  
RESEARCH UNIVERSITY  
AT UNIVERSITI TEKNOLOGI MALAYSIA (UTM)**

**NUUR SHUHADA BINTI MOHD NAJIB**

**A project report submitted in partial fulfillment of the  
Requirements for the award of the degree of  
Master of Science (Information Technology - Management)**

**Faculty of Computer Science and Information System  
Universiti Teknologi Malaysia**

**JULY 2009**

Dedicated to my beloved family especially my parents – Mohd Najib Bin Zakaria and Safiah Binti Abdullah, my supportive supervisor – PM Dr Azizah Binti Abd Rahman, my helpful friends – Fadillah Binti Ismail, Mazlini Mazlan, Munirah, Hafizah Nor, Ismaliza dan Rizka Kurnia. Thank you very much for being supportive, helpful and understanding.

## ACKNOWLEDGEMENTS

Alhamdulillah to Allah SWT for showing the way, giving me patience and the will to complete this report. I would like to express my greatest gratitude to my supervisor Asst. Professor Dr. Azizah binti Abdul Rahman for her great support and guidance in helping me to complete this project, the one who always inspire me and give me ideas to construct my project and make me think and come out with great invention. I also would like to give my appreciation to all lecturers and researchers who had participate in this research and had been helping me all this while. Thanks to my parents for keep supporting me and believe in me. Thank you very much to all my friends for the great support especially Fadillah binti Ismail for guiding me to do the analysis using SPSS and for all the information given to me. Last but not least, to the panel of assessors who has assessed this project, thank you very much.

## ABSTRAK

Projek dilakukan untuk menjalankan audit ke atas pengetahuan yang dipunyai oleh pengkaji di UTM dalam aktiviti kajian yang mereka jalankan. Projek ini mengenalpasti kewujudan pengetahuan di UTM and pengetahuan sebenar pengkaji dalam melakukan aktiviti kajian mereka. Dengan menggunakan formula, dapatan dari soal selidik telah dibandingkan dengan pengetahuan yang benar-benar wujud di UTM. Pengetahuan tersebut telah dibahagikan kepada 3 fasa iaitu fasa sebelum menjalankan kajian, fasa ketika menjalankan kajian dan fasa selepas menjalankan kajian. Selepas analisis keatas setiap data dijalankan, satu binaan pengetahuan telah dicadangkan kepada RMC untuk digunakan dalam melancarkan perkhidmatan mereka dan bagi membantu pengkaji-pengkaji di UTM dalam menjalankan kajian mereka dengan lebih mudah. RMC boleh merancang dan menggunakan dapatan dari kajian untuk meningkatkan perkhidmatan mereka dan menyediakan segala kemudahan yang diperlukan oleh pengkaji dalam melakukan aktiviti kajian mereka.

## **ABSTRACT**

The project is done to audit the knowledge owned by researchers in UTM related to their research activities. This project determined the knowledge existence in UTM and knowledge own by researchers. By using a formula, findings from questionnaire being compared with the real existing knowledge that exist in UTM. The knowledge had been divided into three phases which the Applying Research Grant phase, the Conducting Research phase and the Intellectual Property and Commercialization phase. After analysis done, a knowledge architecture had been proposed in order for RMC to upgrade their services to help researchers in their research activities. RMC can planned and upgrade their services according to proposed architecture and recommended ICT tools in this project report.

## TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	<b>DECLARATION</b>	ii
	<b>DEDICATION</b>	iii
	<b>ACKNOWLEDGEMENT</b>	iv
	<b>ABSTRAK</b>	vi
	<b>ABSTRACT</b>	vii
	<b>TABLE OF CONTENTS</b>	viii
	<b>LIST OF FIGURES</b>	xii
	<b>LIST OF TABLES</b>	xiv
	<b>LIST OF APPENDIXES</b>	xvi
1	<b>INTRODUCTION</b>	
	1.1 Introduction	1
	1.2 Background of problem	3
	1.3 Statement of the problem	5
	1.4 Project objective	5
	1.5 Scope and Limitations of the Study	6
	1.6 Importance of project	6
	1.7 Chapter summary	7
2	<b>LITERATURE REVIEW</b>	
	2.1 Introduction	8
	2.2 Research University (RU) Criteria	9
	2.2.1 Goals of RU	12

2.3	Universities Involved with RU	12
2.4	Knowledge	13
2.4.1	Knowledge Audit	15
2.4.2	Objectives of Knowledge Audit	16
2.4.3	Components of a Knowledge Audit	16
2.4.3.1	Knowledge Needs Analysis (K-Needs Analysis)	17
2.4.3.2	Knowledge Inventory Analysis (K-Inventory Analysis)	17
2.4.3.3	Knowledge Flows Analysis (K-Flows Analysis)	19
2.4.3.4	Knowledge Mapping (K-Mapping)	20
2.5	Knowledge Management Model	21
2.6	Knowledge Architecture Definition	22
2.7	Conclusion	23
<b>3</b>	<b>RESEARCH METHODOLOGY</b>	
3.1	Introduction	24
3.2	K-Mapping	25
3.3	Research Instrument	27
3.4	Method of Data Analysis	28
3.5	Data Collection Method	29
3.5.1	Primary data	30
3.5.2	Secondary Data	30
3.6	Conclusion	31
<b>4</b>	<b>RESEARCH ANALYSIS</b>	
4.1	Introduction	32
4.2	Interview	33
4.3	Questionnaire	36
4.4	Analysis	40
4.4.1	Analysis of Demography	41
4.4.2	Analysis of Knowledge	46

	4.5 Conclusion	60
5	<b>FINDINGS</b>	
	5.1 Introduction	62
	5.2 Findings	66
	5.2.1 Comparison between Findings from Questionnaire and Findings after Analysis Phase 1	72
	5.2.2 Comparison between Findings from Questionnaire and Findings after Analysis Phase 2	74
	5.2.3 Comparison between Findings from Questionnaire and Findings after Analysis Phase 3	76
	5.2.4 Comparison between Findings from Questionnaire and Findings after Analysis for All Phases	78
	5.3 Applying Nonaka Model In Findings	80
	5.4 Conclusion	82
6	<b>KNOWLEDGE ARCHITECTURE</b>	
	6.1 Introduction	83
	6.2 Proposed Knowledge Architecture for Research Activities	84 85
	6.3 Conclusion	89
7	<b>DISCUSSION AND CONCLUSION</b>	
	7.1 Introduction	90
	7.2 Summary of Overall Chapter	91
	7.3 Project's Constraint	92
	7.4 Recommendations	93
	7.5 Chapter Summary	93



**LIST OF FIGURES**

<b>FIGURE NO</b>	<b>TITLE</b>	<b>PAGE</b>
Figure 2.1	Four Mode of Knowledge Creation	14
Figure 2.2	K-Audit Components	16
Figure 2.3	Main approach in K-Mapping	20
Figure 2.4	Model in capturing organization's knowledge	21
Figure 3.1	Framework of Knowledge Mapping in Organization	24
Figure 4.1	Phases in questionnaire	34
Figure 4.2	PROJECTS And Grants Allocation By Faculty Year 2008	38
Figure 4.3	Frequency of selected faculty that responds to questionnaire	39
Figure 4.4	Years of Involvement of Researchers in Research	42
Figure 4.5	Frequency of Respondents Towards Academic Qualifications	43
Figure 4.6	Fields of Research of Respondents	44
Figure 4.7	Role of respondents in Research	45
Figure 4.8	Division of Determining Knowledge Existence	47
Figure 4.9	Changing of Likert Scale from 5 scale to 2 scale	48

Figure 4.10	Summary of all knowledge required for stage 1	51
Figure 4.11	Summary of all knowledge required for stage 2	56
Figure 4.12	Summarization of knowledge of all phases and its existence status.	57
Figure 5.1	Summary Phase 1	64
Figure 5.2	Summary Phase 2	68
Figure 5.3	Summary Phase 3	71
Figure 5.4	Frequency of Knowledge Own by Researchers: Findings From Questionnaire, Phase 1	72
Figure 5.5	Frequency of Knowledge Own by Researchers: Findings After Analysis, Phase 1	72
Figure 5.6	Frequency of Knowledge Own by Researchers: Findings From Questionnaire, Phase 2	74
Figure 5.7	Frequency of Knowledge Own by Researchers: Findings After Analysis, Phase 2	74
Figure 5.8	Frequency of Knowledge Own by Researchers: Findings From Questionnaire, Phase 3	76
Figure 5.9	Frequency of Knowledge Own by Researchers: Findings After Analysis, Phase 3	76
Figure 5.10	Frequency of Knowledge Own by Researchers: Findings From Questionnaire, All Phases	78
Figure 5.11	Frequency of Knowledge Own by Researchers: Findings After Analysis, All Phase	78
Figure 5.12	Determination of Knowledge Existence	85
Figure 6.1	Proposed Knowledge Architecture for RMC UTM	86

## LIST OF TABLES

<b>TABLE NO</b>	<b>TITLE</b>	<b>PAGE</b>
Table 2.1	Pre-requisites for an RU	9
Table 2.2	Malaysian Research University Assessment Criteria	11
Table 2.3	Entities of K-Inventory Analysis	18
Table 3.1	Distribution of Questionnaire	28
Table 3.2	Mean Score for Knowledge Importance	29
Table 4.1	Knowledge mapping for research	34
Table 4.2	Statistic of reliability with Alpha Cronbach Range	36
Table 4.3	Frequency of respondent by faculty	39
Table 4.4	Frequency of respondent according to years of involvement in research	41
Table 4.5	Frequency of respondents towards academic qualifications	41
Table 4.6	Crosstabulation Between Qualification and Role in Research	43
Table 4.7	Field of Research	44
Table 4.8	Role of respondents in research	45
Table 4.9	Formula to Determine Type of Knowledge Existence in UTM	47

Table 4.10	Summary of Responses from “Applying Research Grant” Phase	49
Table 4.11	Future Required Knowledge from “Applying Research Grant” Phase	50
Table 4.12	Table 4.12: Summary Respond from “Conducting Research” Phase	52
Table 4.13	Future Required Knowledge from “Conducting Research” Phase	54
Table 4.14	Summary Respond from “Intellectual Property & Commercialization” Phase	55
Table 4.15	Future Required Knowledge from “Intellectual Property & Commercialization” Phase	56
Table 4.16	Knowledge of All phases and existence status	58
Table 5.1	Comment on Findings Phase 1	62
Table 5.2	Comment on Findings Phase 2	65
Table 5.3	Comment on Findings Phase 3	69
Table 5.4	Findings Applied in Nonaka Model with Recommendations	80
Table 6.1	Formation of Knowledge Architecture	84

**LIST OF APPENDIXES**

<b>APPENDIX NO</b>	<b>TITLE</b>	<b>PAGE</b>
A	Interview Question	96
B	Questionnaire	98
C	Finding Phase 1	105
D	Findings Phase 2	109
E	Findings Phase 3	114
F	Overall Findings	117

## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1 Introduction**

In becoming one of the Research University (RU) in Malaysia, Universiti Teknologi Malaysia (UTM) now trying to increase their research done in this university involving lots of present researchers and new researchers in variety of fields such as ScienceFund, TechnoFund, Fundamental, Institutional, Contract and others.

Research University (RU) is a label of university given by the Ministry of Higher Education (MOHE) when the university manages to fulfill the concept paper deal with their vision, missions and goals, the criteria and standard for Rus, their governance, prevision of incentives, accreditation concerns, cost implications and a viable action plan. The vision of an RU expands existing philosophies and good practices to enhance overall educations system and contribute to nation building where a research university seeks to actively participate in new adventures of ideas, experiment with innovative methods, and take intellectual initiatives to further discover and expand the frontiers of knowledge.

The mission of Research University is to be an engine of growth of the nation where scholars and students exchange ideas as well as conduct research in a conducive environment that nurtures exploration and creativity discover knowledge and create wealth, leading towards an improved quality of life.

It is important to define knowledge in the first place. Knowledge is something that is contained in a person's head and is revealed in skill to operate in certain conditions that is ability of adaptation to changing conditions (Pawar & Weber, 2002). Knowledge even goes beyond the concept of information, which is generally defined as data which has been aggregated and processes into a more usable form (Alter, 2006).

Organizations are now realizing how important it is to “know what they know” and be able to make maximum use of the knowledge (Rowley, 2005). This knowledge resides in many different places such as databases, knowledge bases and peoples' head and is distributed right across the organization. Knowledge management focuses on understanding how knowledge is acquired, created, stored and utilized within an organization.

The knowledge that researchers in UTM have about RU are not being captured in a proper way where the knowledge can be shared but instead, the knowledge that they have only being applied by themselves. This condition is not suitable for UTM as this university is going towards RU and they have to really know what the knowledge they have and the knowledge that they do not have.

The focus of this project is to audit the knowledge that UTM need to support research activities in order for UTM to become RU, including any knowledge that is require to access knowledge for their research activities. This project will gather all the information and knowledge about the requirement for researchers before they start doing the research, which is the first stage, knowledge required when they are doing the research and after the done the research for the third stage.

This project will also come out with an online knowledge portal to provide researchers at UTM a platform to communicate virtually among each others across the faculty boundaries and share their knowledge in any time which is through the web. As we know nowadays, technology spreads very fast within minutes so UTM should take the challenge competing with others to become the best among the best universities in the world by applying technologies into their way of sharing knowledge in conjunction with the RU status that UTM struggling for.

This online knowledge portal can make sure that researchers in UTM are always up-to-date with new ideas, can discuss and compile those ideas to produce something greater besides the information and knowledge provided from this portal for UTM researchers. This project also audits the knowledge on tools that maybe needed by researchers in their research activities to be implemented in the portal.

## **1.2 Background of problem**

Knowledge is very important for everyone as it can give great impact from little changes. Realizing this fact, this project tries to resolve the problem faced by UTM in capturing their knowledge that related to RU in order for UTM to picture the knowledge in an arranged order.

The problem faced by UTM is because they currently do not have any specific platform that can capture all the knowledge own by its researchers and this will limit the knowledge sharing among researchers in UTM. Because of this condition, UTM do not know the specific knowledge that they have and they do not have and which knowledge that may be important for them to share with researchers.



Knowledge audit for research university at UTM is very important to be done as it can give the idea and acknowledge the Research Management Center (RMC) of who are the one that responsible on research that being done in UTM on what they should provide to the researchers towards RU.

RMC UTM currently only relies on a basic web portal to deliver information and acknowledge the researchers in UTM. The portal can be accessed online through the address <http://www.rmc.utm.my> which consists of information about research being done in UTM and their success. There also a little description about those research projects and it provide some space for updated news.

This current portal is no longer helpful as UTM will become one of the Research University in Malaysia. Knowledge portal becoming more important as it can provide more features and can be a base for researcher to gain more knowledge ad share with others. Current portal did not provide any resource information that related to any project and it is not supporting the researcher in capturing knowledge and getting more information related to their research that may be helpful.

Furthermore, portal that is being used by RMC now is not focusing on knowledge sharing but only information. Not just that, the information being shared in current portal also limited to only things that being updated by administrator and not the researchers themselves whom will have more knowledge about their projects and what is more important to be uploaded.

This show how weak the portal is and it should be change so that the limitation of usage for this portal can be replace and enlarge to a more knowledgeable and usable portal for all researchers in UTM.

### **1.3 Statement of the problem**

After going through the problems that being faced by researchers in UTM, one main question can be interpreted which is, “What is the knowledge required in research activities in order for UTM to become Research University?”

Besides that, there are few more questions that support the main question that are:

1. What are the steps to be taken in order to ascertain knowledge require?
2. What are the important things researchers really search for?
3. How far does this new knowledge portal can guide researchers in their research activities?

### **1.4 Project objectives**

There are a few objectives that can be determined in order to develop this knowledge portal. The objectives of this project are:

1. To conduct a knowledge audit among researchers at UTM on their research activities.
2. To analyze current existing knowledge, current required knowledge and future required knowledge which are owned by researchers in UTM.

3. To derive a Knowledge Architecture of research activities for RMC based on knowledge audit analysis

### **1.5 Scope and Limitations of the Study**

In this project, there are few scope and limitation that being followed in order to make sure that the objectives of the project can be achieved. The scopes in line with this project are:

1. Base on Research University (RU) requirement by Ministry of Higher Education (MOHE).
2. UTM research community.
3. Main researchers and Research Management Center (RMC) UTM.

### **1.6 Importance of project**

The important of this project is to capture the knowledge own by UTM researchers in order to study the knowledge required by them in conducting their research activities in UTM. The less awareness of RMC UTM to provide a proper site for researcher to share knowledge and get important information related to their research in a shorter time limit the knowledge spread among

researchers and RMC themselves have no idea on what knowledge own by researchers in UTM entirely. That causes them to provide something that is not necessary for researcher and not helping the researchers in conducting their research activity in UTM.

This project will formulate strategy for researchers in conducting their research base on analysis that will be discussed on chapter 4. This to make sure that all researchers will be well acknowledge on activities when conducting research and this project will map their needs.

In addition, the end of this project will produce a portal that will promote a platform for researchers to brain storm on new findings to produce greater research. With this knowledge portal, it also give advantage for new researchers where they can get proper guide towards their projects and can find more material easily from past projects done in UTM and outside.

## **1.7 Chapter summary**

This chapter tells how important this project is according to the problem faced by researchers in UTM to gain information and knowledge related to their research field. Besides, this chapter stated the objectives of this project and a brief description about the problems faced by RMC UTM in capturing knowledge. This chapter also states the scope of this study to make sure that the research done will always be on track.

## REFERENCES

- Tiwana, (2002). "The knowledge management toolkit: Orchestrating IT, Strategy and Knowledge Platforms, NJ" Prentice Hall.
- Ruzaif Adli, (2005). "The knowledge audit, Knowledge and Proces The K-Mapping and KM Implementation Strategy in Organization: A Perspectives".
- Nonaka, (1994). "A dynamic theory of organizational knowledge creation. Organization Science".
- Rowley, (2000). "Is higher education ready for knowledge management", The International Journal of Educational Management.
- Tiwana, "The Knowledge Management Toolkit." USA: Prentice Hall, (2000).
- Pawar & Weber, (2002) "A Framework for Assessing Inter-Organisational Knowledge Management in New Product Development".
- Nonaka, I. and Takeuchi, H. (1995). "The Knowledge Creating Company. New York: Oxford University Press".
- Torin Alter, (2006) "Knowledge Argument Against Physicalism", Online research in philosophy.
- Jennifer Rowley and Richard Hartley, (2005) "Organizing Knowledge (paperback)".
- Durcker, (1993). "The New Productivity Challenge" Harvad Business Review.
- Ho Abdullah & M. Yahaya, (2007). "Institutional Operational definitions of indicators".

- Alvin Toffler, (1985) "The Adaptive Corporation", McGraw-Hill
- Knowinc.com, (2001) "Knowledge Management"
- Susan Henczel, (2001) "The Information Audit as a First Step Towards Effective Knowledge Management: An Opportunity for The Special Librarian".
- Babita, (2000) "The Organizational Knowledge: Model To Capture Organizational Knowledge" .
- Sekaran, (1992) "Research Method for Business: A Skill Building Approach".
- Choo, C. (1996). "An integrated information model of the organization: The knowing Organization".
- Davenport, T.H. & Prusak, L. (1998). "Working knowledge: How organizations manage what they know" Boston: Harvard Business School Press.
- Maier, R. & Remus, U, (2001) "Towards a framework for knowledge management strategies: Process orientation as strategic starting point. System Sciences"
- Alavi, M., and D.Leidner. (1999). "Knowledge management systems: issues, challenges, and benefits. Communications of the Association for Information Systems".