

MCKEEN MATRIX APPLICATION PORTFOLIO:
A CASE STUDY IN UTM

SUHAIRA BINTI ABU BAKAR

A dissertation submitted in partial fulfillment of the
requirements for the award of the degree of
Master of Science (Information Technology - Management)

Faculty of Computing
Universiti Teknologi Malaysia

SEPTEMBER 2015

First of all, thanks to Allah for this great opportunities.
This dissertation is dedicated to my family and friends for their endless support and
encouragement

ACKNOWLEDGEMENT

First and foremost, I would like to express heartfelt gratitude to my supervisor **Dr. Suraya Miskon** for her constant support during my study at UTM. She inspired me greatly to work in this project. Her willingness to motivate me contributed tremendously to our project. I have learned a lot from her and I am fortunate to have her as my mentor and supervisor

Besides, I would like to thank the authority of Universiti Teknologi Malaysia (UTM) for providing me with a good environment and facilities such as computer laboratory to complete this project with software which I need during process.

ABSTRACT

The importance of planning information systems to ensure all mission, vision and objectives of the organization should be focused so that all management organization running smoothly. Organizations have also been aware of this situation and have always taken the approach to improve their IT planning. However, the main problem faced by managers system is implementation of the techniques used in the process information systems. This is because many organizations simply use several toolkits only and the toolkit that they used is manually and it causes weakness of the cost of time. Therefore, this project will try to highlight a very important toolkit for managing applications in an organization and it will be automated so it may easy to use and can save time consuming. Application portfolio will help organizations to choose range of information systems that is useful only or potentially to upgrade to be maintained. This article will propose a framework that will be used as a guideline in developing and application portfolio prototype for IT planning process.

ABSTRAK

Kepentingan perancangan sistem maklumat adalah penting untuk memastikan semua misi, visi dan objektif organisasi ditumpukan agar semua organisasi pengurusan berjalan dengan lancar. Organisasi juga telah sedar akan keadaan ini dan sentiasa mengambil pendekatan untuk menambah baik perancangan IT mereka. Walau bagaimanapun, masalah utama yang dihadapi oleh sistem pengurusan maklumat adalah pelaksanaan teknik yang digunakan dalam sistem memproses maklumat. Ini kerana banyak organisasi hanya menggunakan beberapa alat bantuan sahaja dan alat bantuan yang mereka gunakan adalah secara manual dan ia menyebabkan kelemahan pada kos masa. Oleh itu, projek ini akan cuba untuk menekankan bahawa alat bantuan sangat penting untuk menguruskan aplikasi dalam sesebuah organisasi dan ia akan diautomatikan supaya ia boleh digunakan dengan mudah dan dapat menjimatkan masa. Aplikasi portfolio akan membantu organisasi untuk memilih pelbagai aplikasi yang berguna sahaja atau berpotensi untuk menaik taraf atau dikekalkan. Kajian ini akan mencadangkan satu rangka kerja yang akan digunakan sebagai garis panduan dalam membangunkan aplikasi portfolio prototaip untuk proses perancangan IT..

TABLE OF CONTENTS

CHAPTER	TITLE	PAGE
	DECLARATION	ii
	TITLE	iii
	DEDICATION	iv
	ACKNOWLEDGMENT	v
	ABSTRACT	vi
	ABSTRAK	vii
	TABLE OF CONTENTS	viii
	LIST OF TABLES	xii
	LIST OF FIGURES	xiii
1	INTRODUCTIONW	
	1.1 Introduction	1
	1.2 Problem Background	2
	1.3 Problem Statement	3
	1.4 Objectives	4
	1.5 Scope and Significance Study	4
	1.6 Summary	5
2	LITERATURE REVIEW	
	2.1 Introduction	6
	2.2 IT Planning	7
	2.2.1 IT Planning Definitions	7
	2.2.2 Advantages of IT Planning	8
	2.3 Application Portfolio	9

2.3.1	Purpose of Application Portfolio	11
2.4	Application Portfolio Matrixes	11
2.4.1	Boston Matrix	12
2.4.2	McFarlan and McKenny	14
2.4.3	Ward and Peppard Matrix	16
2.4.4	McFarlan Matrix	19
2.4.5	McKeen Matrix	20
2.4.6	Comparison Techniques in Application Portfolio Matrix	27
2.5	Application Portfolio Categorization	29
2.6	Key Issues In Application Portfolio	32
2.7	Design Science Research Process (DSRP) Model	33
2.8	Archival Analysis	38
2.8.1	Emergent Of Archival Analysis	38
2.9	Summary	39
3	METHODOLOGY	
3.1	Introduction	40
3.2	Design Science Research (DSR) in Information Systems (IS) research	41
3.3	Operational Framework	41
3.4	The Implementation of Application Prototype and DSR	43
3.5	Summary	45
4	RESEARCH ANALYSIS	
4.1	Introduction	46
4.2	Archival analysis to choose matrix for application portfolio prototype	46
4.3	Assessment Perspective	47
4.3.1	Outcome-based Perspective	48
4.3.2	Process-based perspective	50
4.4	Service Value Chain	50
4.4.1	Primary Value Process	54
4.4.2	Secondary value process	56
4.5	Workflow of application portfolio prototype	58
4.6	Flowchart of application portfolio prototype	58

4.7	Application portfolio prototype system architecture	59
4.8	Summary	60
5	RESEARCH RESULT	
5.1	Introduction	61
5.2	Applications in UTM	61
5.3	Strategic Objectives	63
5.4	Applying Service Value Chain On UTM Case Study	66
5.5	Demonstrating the Application Portfolio Prototype	69
5.6	Evaluation the Application Portfolio Prototype	72
5.7	Summary	73
6	DISSCUSSION & CONCLUSION	
6.1	Introduction	74
6.2	Constraints and Challenge	75
6.3	Recommendation	75
6.4	Summary	76
	REFERENCES	77
	APPENDIX	81

LIST OF TABLES

FIGURE NO	TITLE	PAGE
2.1	Classifying the McKeen Matrix in Application Portfolio (McKeen, 2010)	23
2.2	Comparison Techniques in Application Portfolio Matrix	28
2.3	Sample criteria for SWOT analysis	29
2.4	Classifying the Application Portfolio	30
2.5	Design Science Process Elements from IS and Other Disciplines and Synthesis elements for a DS Research Methodology in IS	34
4.1	Retention measures vs. time horizon	55
5.1	List of applications in UTM	62
5.2	UTM's Strategic Objectives	64
5.3	Calculation concept of McKeen Matrix	71

LIST OF FIGURES

TABLE NO	TITLE	PAGE
2.1	The Boston matrix (Torgnysdotter & Gottling, 2002)	13
2.2	McFarlan and McKenny Matrix (Torgnysdotter & Gottling, 2002)	15
2.3	Ward and Peppard Matrix (HASSAN, 2013)	17
2.4	Ward and Peppard Matrix (Kellerman & Löfgren, 2008)	18
2.5	McFarlan Matrix (Harwikarya et al., 2015)	19
2.6	McKeen Matrix	22
2.7	Design science research process (DSRP) model	35
3.1	Framework of Design Science Research (DSRP) model	42
4.1	Application Portfolio highlighting business value and technical condition	46
4.2	The service Value Chain	53
4.3	Workflow of application portfolio prototype	58
4.4	Flow of application portfolio prototype	59
4.5	System architecture for application portfolio prototype	60
5.1	Application portfolio prototype interface question	69
5.2	Application portfolio prototype interface result	71
5.3	Questionnaires result	73

CHAPTER 1

INTRODUCTION

1.1 Introduction

Nowadays, Information Technology (IT) plays a major role on increasing the efficiency and quality of organizations process either in government or private sector.

Rapidly changing in IT, strategies must be taken seriously so that organizations can survive along in this challenging era of technologies. Past research has shown CEO commitment, business process design, and IT planning as a key IT management practices (Zhuang & Lederer, 2004).

IT planning continues to be one of the most challenging areas in IT management. Practically every phases of IT planning must be process quickly and creative to be aligned with others competitors.

The ability of some organization choose to use information technology and betting with something innovative and creative is being identified as one of the important things in competing with other organizations. Therefore, It planning is one

of the success chances for a competitiveness with others organization (Santos, Amaral, & Mamede, 2011).

Today's, when information technology transformed as technical fabric of organizations, of course it will have so many systems being adopted by an organization. To manage all the systems we have to ensure that the system is really important will be retained in the organization. One of the toolkits that will be used as IT planning process is application portfolio. Application portfolio will help organizations to choose a system that is useful only or potentially to upgrade to be maintained.

In particular, there is a lack of research on application portfolio even though we know it is very important in the IT planning process.

1.2 Problem Background

With changing business needs, on-going economic uncertainty, poor business business-IT alignment, mergers and acquisitions, and compliance pressures, organizations over time become a hub of hundreds of legacy, sub-optimal and sometimes redundant processes and supporting applications, information silos, incompatible technologies, and an unmanageable application portfolio (Technologies, 2013).

Technologies (2013) stated that in industry statistics almost 80% of the IT budget is spent on on-going operations and maintenance, while only 29% used for future business needs. In order to have balanced application portfolio, many organizations reduce IT spend by systematically identifying and decommissioning

ageing applications to drive operational efficiency, reduce the overall complexity and risks and contain cost.

Therefore, UTM also one of the organizations in higher education institutions that face the same issues as mentioned earlier. Hence, IT planning must be done to ensure that all the mission, vision and objectives will be achieved and UTM can be competitive with other universities in Malaysia.

While there is a grow interest from organizational sectors about IT planning, the issue here is how toolkit can help organization in IT planning seems it to be largely unsolved and thereby considered to be challenging for developing a new automate toolkit for IT planning process. Moreover, it appears to be an urgent requirement to understand how IT strategic planning will try to solved and enhance their business process in the organization. This study can serve the organization in IT planning process development and strategies.

1.3 Problem Statement

Several techniques are being proposed in the literature review that being used to help in IT planning process. Example of technique that being used is SWOT analysis, Five Porter Forces, Value Chain analysis and etc.

The utility of the tools used in the strategic prospective approach is fivefold: to stimulate the imagination, reduce inconsistencies, create a common language, structure collective thought, and enable appropriation by decision makers. Application portfolio problems are:

1. Existing tools are in manual system.
2. Existing tools too generic difficult to analyse the data
3. Tools that are available now need to be enhanced

1.4 Objectives

The objectives of this study are:

1. To study the suitable matrixes to be automate for the application portfolio.
2. To analyze the needs of information requires as input to application portfolio.
3. To develop and test the prototype tools of application portfolio.

1.5 Scope and significance study

This study may prove significant in contributing the tools to support IT planning process. The main significance of this study lies in the fact of an automate way tools will support application portfolio. Knowledge and understanding of the tolls and manual way that exists now may provide additional insight for developing or enhanced the application portfolio to support IT planning process. Hence, application portfolio will provides continuous assessment in terms of business value, enhancement potential, cost and technology concerns. Comprehensive evaluations will help to facilitate strategic application development, maintenance, transformation and retirement.

Scope of this study is limited to the following item:

1. Study conducted at Faculty Computing as the case study.

2. Study only focus on matrixes of application portfolio that will help to identify the opportunities of the organization in IT planning process.

1.6 Summary

This chapter covers an introduction of the main point about the study, the problem background and statement have been mentioned, the objective scope and important about the project has also been described.

REFERENCES

- Santos, V., Amaral, L., & Mamede, H. (2011). Information Systems Planning - How to Enhance Creativity? In M. Cruz-Cunha, J. Varajão, P. Powell & R. Martinho (Eds.), *ENTERprise Information Systems* (Vol. 220, pp. 398-407): Springer Berlin Heidelberg.
- Technologies, N. (2013). Application Portfolio Rationalization Transforming Your Application portfolio.
- Zhuang, Y., & Lederer, A. (2004). The Impact of Top Management Commitment, Business Process Redesign, and IT Planning on the Business-to-Consumer E-Commerce Site. *Electronic Commerce Research*, 4(4), 315-333. doi: 10.1023/B:ELEC.0000037080.71668.70
- Archer, L. B. (1984). *Developments in design methodology*. London.
- Cuffaro, M. A. (2011). Archival Research. In S. Goldstein & J. Naglieri (Eds.), *Encyclopedia of Child Behavior and Development* (pp. 140-141): Springer US.
- Duggan, J. (2010). Key Issues for Application Portfolio Management. *Gartner RAS Core Research Note, Gartner Research*, 6.
- Eekels, J., and Roozenburg, N.F.M. (1991). A methodological comparison of the structure of scientific research and engineering design: their similarities and differences. *12*(4), 197-203.
- Fabrick, M., Brinkkemper, S., & van Dullemer, J. (2007, 28-31 Oct. 2007). *A method for application portfolio rationalization*. Paper presented at the Digital Information Management, 2007. ICDIM '07. 2nd International Conference on.
- Gilliland, A. (2011). Archival research Method. *Summer School in the Study of Historical Manuscripts, University of Zadar*.

- Harwikarya, M. S., Fitriyah, D., Sarinanto, M. M., Nurhaida, I., & Arif, R. (2015). IS Strategic Plan for Higher Education Based on COBIT Assessment: A Case Study.
- Hasan, H. D. (2013). Factors affecting effective implementation of Container Freight Station Management Information System (CFSMIS): A Case of Interpel Investment Limited. *European Journal of Business and Management*, 5(27), 16-26.
- Hevner, A., & Chatterjee, S. (2010). Design Science Research in Information Systems *Design Research in Information Systems* (Vol. 22, pp. 9-22): Springer US.
- Kellerman, J., & Löfgren, P. (2008). Application Portfolio Management. *rapport nr.: Report/IT University of Göteborg 2008: 055*.
- Ken Peffers, T. T., Charles E. Gengler, Matti Rossi, Wendy Hui, Ville Virtanen, Johanna Bragge. (2006). THE DESIGN SCIENCE RESEARCH PROCESS: A MODEL FOR PRODUCING AND PRESENTING INFORMATION SYSTEMS RESEARCH *DESRIST*.
- Ken Peffers, T. T., Marcus A. Rothenberger, Samir Chatterjee. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, 24(3), 45-78.
- Lam, W. (2005). Investigating success factors in enterprise application integration: a case-driven analysis. *European Journal of Information Systems*, 14(2), 175-187.
- Li, J., Zhou, S., & Feng, J. (2008, 20-20 Nov. 2008). *Some Thoughts on the IT Planning in Chinese Private Enterprises*. Paper presented at the Future Information Technology and Management Engineering, 2008. FITME '08. International Seminar on.
- McKeen, J. D. a. S., Heather A. . (2010). Developments in Practice XXXIV: Application Portfolio Management. *AIS Electronic Library (AISeL)*, 26(1/9), 16.

- Niu, Y., & Wang, X. (2010, 9-11 July 2010). *Research on the matching of IT strategic planning and business strategy*. Paper presented at the Computer Science and Information Technology (ICCSIT), 2010 3rd IEEE International Conference on.
- Norris, D. (2000, 2000). *Strategic IT planning: assessing the options - handling rapid changes in IT systems and availability*. Paper presented at the Software Methods and Tools, 2000. SMT 2000. Proceedings. International Conference on.
- Nunamaker, J. F., Chen, M., and Purdin. (1991). Systems Development in Information Systems Research. *Journal of Management Information Systems*, 7(3), 89-106.
- Peppard, J., & Ward, J. (2004). Beyond strategic information systems: towards an IS capability. *The Journal of Strategic Information Systems*, 13(2), 167-194.
- Riempp, G., & Gieffers-Ankel, S. (2007). Application portfolio management: a decision-oriented view of enterprise architecture. *Information Systems and E-Business Management*, 5(4), 359-378.
- Rossi, M., and Sein. (2003). Design research workshop: a proactive research approach. *26th Information Systems Research Seminar in Scandinavia, Haikko Finland: The IRIS Association*.
- Takeda, H., Veerkamp, P., Tomiyama, T., and Yoshikawam. (1990). Modeling Design Processes. *AI Magazine*, 37-48.
- Torgnydotter, L., & Gottling, C. (2002). Application Portfolio Management.
- Walls, J., Widmeyer, G., and El Sawy. (2004). Assessing Information System Design Theory in Perspective: How useful was our 1992 Initial Rendition? *Journal of Information Technology Theory & Application (JITTA)*, 6(2), 43-58.
- Fabrick, M., Brinkkemper, S., & van Dullemer, J. (2007, 28-31 Oct. 2007). *A method for application portfolio rationalization*. Paper presented at the Digital Information Management, 2007. ICDIM '07. 2nd International Conference on.

- Hevner, A., & Chatterjee, S. (2010). Design Science Research in Information Systems *Design Research in Information Systems* (Vol. 22, pp. 9-22): Springer US.
- Iivari, J. (2007). A paradigmatic analysis of information systems as a design science. *Scandinavian Journal of Information Systems*, 19(2), 5.
- Ken Peffers, T. T., Marcus A. Rothenberger, Samir Chatterjee. (2007). A Design Science Research Methodology for Information Systems Research. *Journal of Management Information Systems*, 24(3), 45-78.
- March, S. T., & Storey, V. C. (2008). Design science in the information systems discipline: an introduction to the special issue on design science research. *Management Information Systems Quarterly*, 32(4), 6.
- McKeen, J. D. a. S., Heather A. . (2010). Developments in Practice XXXIV: Application Portfolio Management. *AIS Electronic Library (AISeL)*, 26(1/9), 16.
- Niu, Y., & Wang, X. (2010, 9-11 July 2010). *Research on the matching of IT strategic planning and business strategy*. Paper presented at the Computer Science and Information Technology (ICCSIT), 2010 3rd IEEE International Conference on.
- Bruhn, M., & Georgi, D. (2006). *Services marketing: Managing the service value chain*: Pearson Education.
- Gilliland, A. (2011). Archival research Method. *Summer School in the Study of Historical Manuscripts, University of Zadar*.
- McKeen, J. D. a. S., Heather A. . (2010). Developments in Practice XXXIV: Application Portfolio Management. *AIS Electronic Library (AISeL)*, 26(1/9), 16.
- Ward, J. P. J.(2002). *Strategic Planning for Information Systems. Ed, 3*.