

DECISION SUPPORT FRAMEWORK FOR PROCUREMENT SYSTEM IN  
UNIVERSITY OF BABYLON

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## **DEDICATION**

**To My Family  
For their endless support**

**My Supervisors  
For good supervision**

**Nizamra binti Masdar  
Postgraduate Academic Assistant Administrator  
For managing the dissertation procedure.**

**My Friends  
For their support**

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## ABSTRACT

The procurement activities in organisations typically involve critical decisions made by managers. In order to make a good decision, they need to assess certain relevant criteria. Procurement decision-making faces several challenges such as selecting the best vendor with the right mix of product, price and method to procure it. After studying three multi-criteria decision techniques that have been widely used in procurement decisions, namely, the multi-attribute utility theory, Linear Goal Programming and analytic hierarchy process techniques AHP which is the technique that identified as the foundation on which to build a decision support system for procurement decisions in the University of Babylon, Iraq as a case study. A prototype is developed to realise the use of this DSS framework at the university. The research attempts to address the issues regarding information fusion by automatically integrating multiple information sources to enhance the procurement decision-making process through empirical and theoretical findings on the interdependencies that characterise the relationships between information fusion and management decision-making. A pre-implementation study is carried out in order to ascertain the usefulness of this framework in promoting user-centred decisions by explaining the various influences of different decision-making on the information systems and procurement processes at the University of Babylon, Iraq. The major contribution of this study is to develop tools that aid practitioners in decision-making processes regarding procurement decisions such as DSS planning, DSS technique identification and implementation, and how to design a DSS framework. The outcome of this study can be applied across all systems engaged in decision-making processes regarding procurement.

## ABSTRAK

Aktiviti perolehan di sesebuah organisasi secara umumnya melibatkan pembuatan keputusan yang kritikal di kalangan pihak pengurusan. Untuk membuat keputusan yang tepat, pihak pengurusan perlu mengambilkira kriteria tertentu yang berkaitan dengan aktiviti perolehan. Pada masa kini, proses membuat keputusan dalam aktiviti perolehan berdepan dengan cabaran untuk memilih pembekal yang terbaik dengan tawaran produk, harga dan kaedah perolehan yang memenuhi kehendak organisasi. Kajian ini bertujuan untuk melaksanakan rangkakerja sistem sokongan keputusan yang bersesuaian dengan keperluan pembuatan keputusan berkaitan perolehan. Untuk tujuan kajian, sebuah prototaip sistem sokongan keputusan yang mengaplikasikan rangkakerja sistem AHP telah dibangunkan. Kajian kes berkaitan penggunaan prototaip yang berasaskan rangkakerja AHP ini telah dilaksanakan di *University of Babylon, Iraq*. Penggunaan rangkakerja cadangan yang direalisasikan menerusi prototaip adalah satu usaha untuk mempermudah integrasi kepelbagaian sumber maklumat yang menyumbang kepada pembuatan keputusan aktiviti perolehan. Satu kajian penerimaan pengguna juga telah dilaksanakan untuk menilai kebolegunaan rangkakerja yang dicadangkan. Hasilnya, rangkakerja dan prototaip yang dihasilkan didapati sesuai untuk kegunaan pihak pengurusan dalam proses pembuatan keputusan berkaitan perolehan di sesebuah organisasi.

## TABLE OF CONTENTS

<b>CHAPTER</b>	<b>TITLE</b>	<b>PAGE</b>
	<b>DECLARATION</b>	<b>ii</b>
	<b>DEDICATION</b>	<b>iii</b>
	<b>ACKNOWLEDGEMENTS</b>	<b>iv</b>
	<b>ABSTRACT</b>	<b>v</b>
	<b>ABSTRAK</b>	<b>vi</b>
	<b>TABLE OF CONTENTS</b>	<b>vii</b>
	<b>LIST OF TABLES</b>	<b>xii</b>
	<b>LIST OF FIGURES</b>	<b>xiv</b>
	<b>ABBREVIATIONS</b>	<b>xvi</b>
	<b>LIST OF APPENDICES</b>	<b>xviii</b>
<b>1</b>	<b>INTRODUCTION</b>	
	1.1 Introduction	1
	1.2 Statement of the Problem	3
	1.3 Research Questions	4
	1.4 Research Objectives	4
	1.5 Scope of Research	5
	1.6 Significance of Research	5

<b>2</b>	<b>LITERATURE REVIEW</b>	
2.1	Introduction	6
2.2	Overview of the University Of Babylon	8
2.3	Overview of the Procurement	9
2.3.1	Procurement System	9
2.4	Decision Support Systems	10
2.4.1	Development in Decision Support Systems Applications	11
2.4.2	Criteria in Decision Support Systems	11
2.4.3	Multiple Criteria Decision-Making	12
2.4.3.1	Linear Goal Programming LGP	13
2.4.3.2	Multi-Attributes Utility Theory MAUT	14
2.4.3.3	The Analytical Hierarchy Process AHP	15
2.4.3.4	Summarization MCDM Techniques	23
2.5	Decision Support Systems Framework for Procurement in Materials	25
2.6	Chapter Summary	29
<b>3</b>	<b>RESEARCH METHODOLOGY</b>	
3.1	Introduction	30
3.2	Research Methodology	30
3.3	Research Operational Framework	33
3.3.1	Phase 1: Data Collection	33
3.3.2	Phase 2: Identifying DSS Technique	33

3.3.3	Phase 3: Technique Application and Design	36
3.3.3.1	General Development Processes	36
3.3.3.2	DSS Framework Establishment	37
3.4	Phase 4: Prototype Design	37
3.5	Phase 5: Validation of Framework	38
3.6	Chapter Summary	42
<b>4</b>	<b>DSS FRAMEWORK DEVELOPMENT</b>	
4.1	Introduction	43
4.2	Requirements of Proposed Framework Design	43
4.2.1	Interview	44
4.2.2	Decision Making Regulations Analysis	44
4.2.3	Identify UOB Procurement Criteria	46
4.3	The Proposed DSS Framework	46
4.3.1	First Stage: Initial Good Evaluation	47
4.3.2	Second Stage: Development of Good Evaluation	49
4.3.3	Third Stage: Vendor's Bids Evaluation	50
4.3.4	Fourth Stage: Vendor Selection	52
4.3.5	Fifth Stage: Supplements	52
4.4	Characteristics of Proposed DSS Framework	54
4.5	The Prototype Of Decision Support System Framework	54
4.5.1	The Application of the Prototype	54
4.5.1.1	Preface page	54



4.5.1.2	First Stage	55
4.5.1.3	Second Stage	58
4.5.1.4	Third Stage	60
4.5.1.5	Fourth Stage	61
4.5.1.6	Fifth Stage: Decision Page Report	61
4.6	Chapter Summary	63
<b>5</b>	<b>DSS VALIDATION</b>	
5.1	Introduction	64
5.2	Respondent Questionnaire	64
5.3	Personal Respondents Information	65
5.4	Analysing the Questionnaire feedbacks of the Technology Acceptance	67
5.4.1	Perceived Ease of Use	68
5.4.2	Perceived Usefulness	71
5.4.3	Behaviour Intention toward Using of DSS Framework	75
5.6	Result Discussion	76
5.5	Chapter Summary	77
<b>6</b>	<b>CONCLUSION</b>	
6.1	Introduction	79
6.2	Summary of Research	79
6.3	Proposed DSS Framework	80
6.3.1	Benefits of the proposed DSS framework	81
6.4	DSS Prototype	81
6.4.1	The Benefits Of The DSS Prototype	82

6.5	Significance of This DSS Framework	82
6.6	Limitations and Future Works	83
6.7	Chapter Conclusion	83
	<b>REFERNECES</b>	84
	<b>APPENDICES</b>	91

## LIST OF TABLES

<b>TABLE NO.</b>	<b>TITLE</b>	<b>PAGE</b>
2.1	The Saaty Rating Scale Table	19
2.2	Random Consistency Index Values for Different Values of n.	20
2.3	MCDM Techniques Comparison.	24
2.4	Summarization of Frameworks.	28
3.1	A Comparison between DSS Techniques with respect to UOB	34
3.2	Matching between Characteristic of UOB and Ability to Match AHP	35
4.1	Analysis of UOB Procurement Regulations	45
5.1	The Distribution of Gender between the Departments	65
5.2	The Distribution of Ages between the Departments	66
5.3	The Distribution of Educational Degree between the Departments	66
5.4	The Distribution of Service Years between the Departments	67
5.5	Feedback on Perceived Experience	69
5.6	Feedback on Perceived DSS Self-Efficacy	70

5.7	Feedback on Perceived DSS Anxiety	71
5.8	Feedback on Perceived Subjective Norms	72
5.9	Feedback on Perceived DSS Job Relevance	73
5.10	Feedback on Perceived DSS Output Quality	74
5.11	Feedback on Perceived Result Demonstrability	75
5.12	Feedback on Perceived Behaviour Intent	76
5.13	Final Results for Respondent Feedback	77



## LIST OF FIGURES

FIGURE NO.	TITLE	PAGE
2.1	Literature View Framework.	7
2.2	A Typical Decision Tree Hierarchy	18
2.3	A Sample Matrix of Pairwise Comparison for AHP Technique	20
2.4	DSS Framework for Procurement of Materials	25
2.5	Selection Process of Procurement Framework	27
3.1	Research Methodologies Framework	32
3.2	Framework of The Methodology Usability Assessment TAM3	39
4.1	The Proposed Design of UOB DSS Procurement Framework	47
4.2	Initial Goods Evaluation Activities in First Stage	48
4.3	Development of Goods Evaluation Activities in Second Stage	50
4.4	Vendor's Evaluations Activities in Third Stage	51
4.5	Vendor Selection by the System in Fourth Stage	52
4.6	Supplement Stage in Fifth Stage	53
4.7	The Preface Page	55
4.8	User Input for Order Information Part in First Stage	56

4.9	User Inputs for Criteria and Subcriteria in First Stage	58
4.10	Evaluation Inputs for Main Criteria and Subcriteria in Second Stage	59
4.11	Error Message for Wrong Evaluation Inputs	59
4.12	User Inputs Vendor Names in Third Stage	60
4.13	User Inputs Evaluations for Vendors Bids in Third Stage	61
4.14	Decision Support System Report in Fifth Stage	62
4.15	Report Details of DSS Calculations	63





**ABBREVIATION**

AHP	Analytical Hierarchy Process
CI	Consistency Index
CR	Consistency Ratio
CV	Personal Profile
DLT	Delivery Lead Time
DSS	Decision Support System
e-DSS	Electronic Decision Support System
ETU	Ease to Use
ICT	Information Communication Technology
LGP	Linear Goal Programming
MAUT	Multiple Attribute Utility Theory
MCDM	Multiple Criteria Decision-Making
MGP	Multi-Objective Programming
MWR	Meet work requirements
OPM	Option Performance Matrix
PMT	Performance Monitoring Tools
QOSS	Quality of Support Services
RCI	Random Consistency Index
RVV	Eigen Vector
SC	Software Cost

SP	Software Performance
SOS	Suitability with Operating Systems
SR	System Reliability
SS	Software Safety
SSF	System Security Features
SU	Software Upgradability
SV	Software Version
TAM	Technology Assessment Methodology
TF	Technical Features
UG	Upgradability
UOB	University of Babylon
VER	Vendor's Experience in Related Products
VFM	Value for Money





**LIST OF APPENDICES**

<b>APPENDIX</b>	<b>TITLE</b>	<b>PAGE</b>
A	Questionnaire Form	79
B	Interview Questions	83
C	Validation Examples	84

# CHAPTER I

## INTRODUCTION

### 1.1 Problem Background

The advent of distributed computing has transformed the role of the decision support system (DSS) in supporting decision-makers of various positions and organisations in areas such as financial management, operations and strategic decision-making (Power, 2008). This newly defined role aims to provide analytical guidance to decision-makers in the context of highly advanced and proliferating technological systems (Chukwunonsoet al., 2013). Edvard et al. (2009) defined procurement as a process of purchasing goods and services at the lowest price, best quantity and quality, and with timely delivery while optimising the order time so as to yield the best benefit in business process execution. This could be in the form of simple procurement procedures that include repeated purchases or complex procurement that can be achieved by finding the right partner and creation of contracts for the duration of the business endeavour itself (Edvard et al., 2009). Priyaet et al. (2012) argued that procurement goals are influenced by internal and external forces. Thus, the interactions between different elements, including the levels of professionalism, budget resources, procurement organisational structure (e.g., whether it is centralised or decentralised), rules and guidance, and procurement regulations and internal control policies, all need to be addressed as they can affect the performance of the procurement function (Patrick and Sonny, 2009).

Public procurement, as one of the functions of a government, involves decisions about the services and materials that will be delivered to local institutions and the people they serve. In this context, procurement in educational institutions is one of the highlighted applications (Tijan et al., 2011).

Educational organisations and universities have wide external and internal financial relationships with all levels in the surrounding environment. The University of Babylon (UOB), founded in 1991, is one of the biggest universities in Iraq. Located in Hilla (the capital city of Babel Province) in the middle of Iraq, it is composed of twenty faculties in various disciplines of the sciences and the humanities. The ICT Department under the direction of the University Presidency is responsible for technical and programming design at the university and for training the university staff and community in various IT fields. Furthermore, it is responsible for the design of the software systems and networks used in the university. The ICT Department provides a good network (LAN and WAN) to the university and has built several Web-based systems sharing the same database. All these systems can be accessed via the Internet and the university's Intranet (BWUN, 2011).

The University of Babylon, as an educational organisation, allocates a large budget for its procurement needs. The procurement unit in the Finance Department is responsible for the procurement process and decisions. A typical procurement procedure starts from the procurement order and proceeds to the final procurement decision by passing through many stages such as needs analysis, specification requirements, market price analysis, and choice of vendor. This procedure usually takes a long time due to the manual processes involved; prices may change during this time, thereby requiring a repetition of the entire procurement decision-making process, resulting in delays in procurement together with its associated problems and consequences.

## 1.2 Statement of the Problem

The procurement process in the University of Babylon is a general government process used by all Iraqi education institutes (BWUN, 2011). Despite being a prescribed process, this process suffers from the following problems:

- i. Lengthy cycle in which purchasing orders are analysed.
- ii. Inability to reach a balanced and optimal vendor selection decision due to the manual work processes involved and because decisions are not based on scientific techniques in procurement decision-making.
- iii. Delays which have an adverse effect on the overall educational and administrative structures of the university.

As a result of these problems, several sub-problems can surface. The information needed for decision-making (such as price information) may change after a decision has been issued due to fluctuations and instability in the market. Such changes are time consuming and lead to the need to make other decisions, over and over. In the meantime, problems may emerge with the market suppliers.

The DSS is a system applied to help managers improve their analysis of semi-structured problems using data and models. The essential purpose of designing a DSS is to support decision-makers in any position in an organisation (Eom, 2002). In the context of the DSS in procurement management, there are many sub-processes, such as defining and analysing the specifications of required goods, and vendor bids analysis. Power (2008) suggested the need for the use of new techniques in addressing the problems associated with these sub-processes in a procurement system.



### **1.3 Research Questions**

This research intends to answer the following questions:

- i. How are the decision-making processes conducted in UOB procurement??
- ii. Which DSS techniques are suitable for the UOB decision-making processes?
- iii. How can the proposed DSS technique be integrated into the UOB decision-making processes?
- iv. How can the usability of the DSS framework be validated?

### **1.4 Objectives of the Research**

The main objective of this study is to design a DSS framework based on the current requirements of the procurement system at the University of Babylon. To fulfil the main objective, several sub-objectives are identified as follows:

- i. To analyse the decision-making processes in UOB procurement.
- ii. To identify the DSS technique that is suitable for the decision-making processes in UOB procurement.
- iii. To propose a decision support framework based on the selected decision-making technique as a new mechanism for procurement decision-making.
- iv. To validate the usability of the proposed framework by using the technology acceptance model.

## **1.5 Scope of the Research**

The scope of this research is the development and proposal of a DSS framework for the University of Babylon based on the current governance processes in the university's procurement unit in order to better support the procurement decision-makers at the university.

## **1.6 Significance of the Research**

The proposed framework will not only aid decision-makers in the procurement process, but will also help minimise financial and administrative corruption, reduce time, improve work efficiency, enhance transparency in dealings, increase the possibility of the right decisions being made in government procurements, and help in drawing up strategic plans in all government institutions. This framework is important, not only for the University of Babylon but also for other organisations where sound procurement decisions are required.

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