BUSITEMA UNIVERSITY
Pursuing Excellence

FACULTY OF ENGINEERING

DEPARTMENT OF AGRICULTURAL MECHANIZATION AND IRRIGATION ENGINEERING

APPLICATION OF SENSITIVITY ANALYSIS TO UNIVERSITY INVESTMENTS

CASE STUDY BUSITEMA UNIVERSITY

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ABSTRACT

The concept of Sensitivity Analysis is not a new idea. The real world we are living in is full of uncertainty and risks. A world whose future occurrences we are in most cases unable to predict. Permanent confrontation of institutional investors with this increasing complexity of nature, together with the need to overcome it, forces financial analysts to continually postulate future project cash flows in order to get adapted.

Therefore one is compelled to predict because he/she needs to undertake an appropriate management action with certainty. The only clear certainty is the past while investment problems relate to the future only. The university investment portfolio suffers the dilemma of predetermining the future dynamics of project investments. Sensitivity Analysis provides the solution to the lack of any possibility to predict the future project events and occurrences.

Its every clear that university investments decision making never takes place under the certainty but rather uncertainty and risk. Chapter one presents the objectives and scope of the study as well as the likely benefits of the study to the university. The study aims at analyzing university investments. An intensive literature review relating to Sensitivity Analysis methods was carried out in chapter two of this report. The methods that were used to undertake the study are presented in chapter three. The methodology includes methods of data collection and analysis.

The discussions of results of the study are in chapter four. The level of university investments was determined. Mathematical methods of Sensitivity Analysis were used; mainly Return on Capital Employed, Profitability Index, Net Present Value and Sensitivity Margins. An investment system based on the selected project appraisal methods was developed. The web application was coded using php and java script programming languages. The scripts are hosted by a WAMP Sever. Using both hypothetical and classical data via a default browser, the system was tested and verified. The system can be relied upon by any investments analyst.

Chapter five includes the conclusions and recommendations of the research. However we still do not have appropriate quantitative methods and systems today to provide us with optimal investment decisions in circumstances of uncertainty. This continuously calls for further analysis and research.

DEDICATION

To *wilbroad* and *prosy*, I wish you a bright future.

ACKNOWLEDGEMENT

There but for the grace of God, I realized when I started this.

I thank Mr. Kimera David for the tireless sensitive academic guidance throught the development of this project.

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Friendship is the greatest treasure one can ever have on this wide, wild, world of Engineering.

DECLARATION

Unless stated and indicated otherwise, I declare this is my original work and has never been submitted to any institution for any academic award. It has been organized in accordance with the regulations of Busitema University. Any views expressed therein are those of the author and in no way represent those of any third party.

..... 25/05/2015 .....

MUTABARUSYA DAVIS **Date**

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APPROVAL

This report has been submitted to the department of Agricultural Mechanization and Irrigation Engineering of Busitema University under the supervision of;

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LIST OF ACRONYMS

BU	-	Busitema University
MUK	-	Makerere University
UIA	-	Uganda Investment Authority
EVOI	-	Expected Value of Information
SA	-	Sensitivity Analysis
I.e	-	That is
NPV	-	Net Present Value
PI	-	Profitability Index
IRR	-	Internal Rate of Return
ROCE	-	Return on Capital Employed
SM	-	Return on Capital Employed
PBP	-	Pay Back Period

CHAPTER I

1.0 INTRODUCTION

1.1 BACK GROUND

While every institution is unique, all universities share the same objective of attaining the optimal returns on investments. In public institutions, there is a considerable variation of investment performance because of disparate variables including asset allocation, investment manager experiences, risk tolerances and portfolio rebalancing. Busitema University needs to know what risks are involved when trying to maximize returns on investments and the ways to counter those risks.

The **University Vice Chancellor (2014)** says that being science oriented, the university requires heavy investments in infrastructural development, lecture rooms and accommodation for students. She says that the university has also delayed to realize its plan of setting up an Information Communication and Technology park. The students currently have to queue to access the few computers for online research. The main campus is housed in the former Busitema Agricultural College and no new buildings have been constructed to accommodate the increase in the number of students, all these require finance investments.

The university needs to undertake investments in various ventures in order to develop. Investments depend on many factor inputs which vary from time to time. The impact of these variables on the project output is not usually predetermined by the investors. This delays fiancé project investment and sometimes NO investment at all. Sensitivity Analysis derives the value of creation in project finance transactions by determining the impact of variables on project output.

There are various definitions attributed to sensitivity analysis,

According to Frey**(2002)**,**Sensitivity Analysis** is the study of how the variation (uncertainty) in the output of a mathematical model can be apportioned qualitatively or quantitatively to different sources of variation in the input of a model. Put another way, it is a technique for systematically changing parameters in a model to determine the effects of such changes.

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