# ANALYSIS OF OPEN SOURCE COMPANIES AND THEIR SUCCESS FACTORS

## MASTER OF BUSINESS ADMINISTRATION

IN



W. A. E. S. Amarasiri

Department of Computer Science and Engineering
University of Moratuwa

December 2009

# ANALYSIS OF OPEN SOURCE COMPANIES AND THEIR SUCCESS FACTORS

#### By

### W. A. E. S. Amarasiri



The Dissertation was submitted to the Department of Computer Science & Engineering of the University of Moratuwa in partial fulfillment of the requirement for the Degree of Master of Business Administration in Information Technology.

Department of Computer Science & Engineering
University of Moratuwa
December 2009

#### **DECLARATION**

I hereby certify that this dissertation does not incorporate, without acknowledgment, any material previously submitted for a Degree or Diploma in any University and to the best of my knowledge and belief, it does not contain any material previously published or written by another person or myself except where due reference is made in the text. I also hereby give consent for my dissertation, if accepted, to be made available for photocopying and for interlibrary loans, and for the title and summary to be made available to outside organizations. Signature of the Candidate ectronic Theses & Dissertation Date To best of my knowledge the above particulars are correct.

.

Signature of the Supervisor

Date

#### **ABSTRACT**

Open source software (OSS) is gradually trying to dominate the software world. Lower hardware and software costs, simple license management, reduced dependance on software vendors and ease of customization are some of the main reasons for OSS to be more popular in the software world (Computer Economics 2005). Most of the countries are now promoting OSS since the usage of pirated software is being widely discouraged. Thus, the need for OSS is rapidly increasing in the software market. As a result, a lot of investors are eying up on companies that develop OSS. Investing on a company is known to be a risk. It is a known fact that anyone who is planning to invest on a company would consider many aspects before doing so. OSS companies are mostly funded by venture capitalists and when investing on such companies, one should make sure that they do not end up in a loss. Therefore, before investing on such companies, a background study should be done. The objective of this research study is to find out what factors are dominating the operation of OSS companies and to find out whether there are any relationships between the identified factors and the revenue generated by these companies. The analysis was done with regard to three main factors; business models followed by the companies, revenue models adopted and type of applications developed by these companies.

For the analysis, nearly ninety five OSS companies were studied. By analyzing data of these OSS companies, it was evident that some of the factors were having an impact on the revenue generated while some did not. Namely; business models, revenue models and type of licenses followed did not affect the revenue generation of the companies, while multiple applications being developed had an influence on the revenue generated. Then by analyzing the data in different ways, a model was created for investors to base their decisions when planning to invest on OSS companies. This thesis provides the key recommendation that an investor should not consider only on business models, revenue models and applications developed when planning to invest on OSS developing companies but should base investment decisions also on other important influencing factors which were highlighted in this research.

#### ACKNOWLEDGMENT

This dissertation holds the outcome of the research work which was done for nearly ten months. During this period I have been able to gain support and encouragement from many generous and inspiring people to make this dissertation a success.

First and foremost, I would like to express my appreciation and sincere gratitude to my supervisor Mr. Sanjaya Karunasena for his exceptional guidance, patience, caring and providing me with an excellent atmosphere for doing my research study. Without his guidance and persistent help, this dissertation would not have been possible.

I would like to express my deepest gratitude to Dr. Sanjiva Weerawarana of WSO2 Lanka (Pvt) Limited, my employer, for his valuable advices and guidance. Without his advise and support, I would not have been able to complete the dissertation this year. Also I would like to thank Mr. Charitha Kankanamage, my manager, for providing me required leave and freedom to work on the research. Sity of Moratuwa, Sri Lanka.

Electronic Theses & Dissertations

I further extend my gratitude to Ms. Deepthini Lansakara, who as a good friend was always willing to help and give her best suggestions. I would not have been able to go in the right track and complete the dissertation without her valuable advise. Thank you for the encouraging words, thoughtful criticism and your valuable time. I thank all personnel of open source software companies around the globe who participated and contributed their views and responses for the questionnaire and all my friends at work for their encouraging words. Special thanks to the staff of Computer Science & Engineering of the University of Moratuwa, specially to Ms. Vishaka Nanayakkara for her excellent support extended to me.

Last, but not least, my heartiest thanks to my mother, my sister and my husband for their support and encouragement that have been given to me over the years for the completion of the MBA.

# TABLE OF CONTENTS

DECLARATION	ii
ABSTRACT	iii
ACKNOWLEDGMENT	iv
TABLE OF CONTENTS	V
LIST OF TABLES	ix
LIST OF FIGURES	xi
LIST OF ABBREVIATIONS	xii
CHAPTER 1 – INTRODUCTION	1
1.1 Background	1
1.2 Problem statement	3
University of Moratuwa, Sri Lanka.  1.3 Research objectives Electronic Theses & Dissertations	4
1.4 Scope of the research www.lib.mrt.ac.lk	
1.5 Main findings	6
1.6 Guide to the report	7
1.7 Summary	8
CHAPTER 2 – LITERATURE REVIEW	9
2.1 Overview	9
2.2 About Open Source software	9
2.2.1 The Open Source definition	10
2.2.2. Why go for Open Source software?	10
2. 3 Open Source software licensing	12
2.3.1 Introduction to different Open Source licenses	12

2.3.2 Non-copyleft licenses	14
2.3.3 Copyleft licenses	14
2.3.4 Project-based licenses.	14
2.4 Open Source business models	15
2.4.1 Dual licensing model	16
2.4.2 Open Source software together with commercial products	17
2.4.3 Pure Open Source	17
2.4.4 Badgeware	18
2.5 Type of products/applications developed by Open Source companies	19
2.5.1 Operating system software	19
2.5.2 Middleware	20
2.5.3 Business/Enterprise applications	20
University of Moratuwa, Sri Lanka.  2.5.4 Database packages ————————————————————————————————————	20
2.6 Open Source revenue models h.m. 1.2.1k.	21
2.6.1 The subscription model	21
2.6.2 Licensing	22
2.6.3 Distribution and services model	22
2.7 Previous researches done on open source business models, revenue models and other success factors	
2.8 Summary	23
CHAPTER 3 – METHODOLOGY	24
3.1 Overview	24
3.2 Parameter identification and conceptual framework	24
3.3 Hypothesis	27
3.4 Population, sample selection and sample size	29

3.5 Questionnaires prepared
3.6 Modes of data collection
3.7 Summary
CHAPTER 4 – DATA ANALYSIS34
4.1 Overview
4.2 Questionnaire response rate analysis
4.3 Variable categorization and frequency distribution
4.3.1 Frequency distribution of Open Source business models
4.3.2 Frequency distribution of Open Source revenue models
4.3.3 Frequency distribution of Open Source licenses used
4.3.4 Frequency distribution of Open Source applications used41
4.3.5 Frequency distribution of multiple revenue models being followed43
4.3.6 Frequency distribution of the condition whether multiple applications are being developed
4.4 Inferential Statistics
4.4.1 Testing the relationship between the business model adopted and revenue generated
4.4.2 Testing the relationship between type of OSS license used and revenue generated 51
4.4.3 Testing the relationship between type of revenue model used and revenue generated
4.4.4 Testing the relationship between multiple revenue models being followed and revenue generated
4.4.5 Testing the relationship between type of application being developed and revenue generated
4.4.6 Testing the relationship between whether multiple applications are being developed and revenue generated
4.5 Framework for investors

4.5.1 Selecting best business model to be used depending on the type of application developed and revenue model used	
4.5.2 Testing the relationship between type of application and license used with the generated yearly revenue	
4.5.2 Testing the relationship between type of application and business model used the generated yearly revenue	
4.6 Summary	75
CHAPTER 5 – CONCLUSION	76
5.1 Overview	76
5.2 Explaining the research summary against the research objectives	76
5.3 Recommendations	83
5.4 Enhancements to future researches	83
5.5 Summary	84
REFERENCES University of Moratuwa, Sri Lanka.	85
APPENDICES Electronic Theses & Dissertations	90
Appendix A - Initial questionnaire	
Appendix B - Final questionnaire	97
Appendix C - Modeling Open Source success factors	101

## LIST OF TABLES

Table 2-1 Types of operating system software	19
Table 3-1 List of parameters	25
Table 3-2 List of hypotheses	27
Table 4-1 Response rate for the questionnaire	34
Table 4-2 Total companies which information is available	35
Table 4-3 Frequency distribution of open source business models	36
Table 4-4 Frequencies of open source revenue models	38
Table 4-5 Frequencies of open source licenses used	40
Table 4-6 Identified categories of open source applications and their frequencies	42
Table 4-7 Frequencies of whether multiple revenue models are being used	44
Table 4-8 Frequencies of whether multiple applications are being developed	45
Table 4-9 Chi-square tests of business model followed and the revenue generated	
Table 4-10 Business model Vs revenue generated cross tabulation	49
Table 4-11 Chi-square tests of different license types and the revenue generated	51
Table 4-12 Type of licenses used Vs revenue generated cross tabulation	52
Table 4-13 Chi-square tests of different revenue models and the revenue generated	54
Table 4-14 Revenue model Vs revenue generated cross tabulation	55
Table 4-15 Chi-square tests of multiple revenue models being followed and the revenue generated	
Table 4-16 Multiple revenue models being followed Vs revenue generated cross tabulat	
Table 4-17 Chi-square tests of type of application developed Vs revenue generated	60
Table 4-18 Type of application being developed Vs revenue generated cross tabulation	61

Table 4-19 Chi-square tests of multiple applications being developed Vs revenue generated
Table 4-20 Multiple applications being developed Vs revenue generated cross tabulation 64
Table 4-21 Observed and predicted frequencies of business models Vs application
developed and revenue models
Table 4-22 Chi-square tests of type of application and license against the revenue generated
Table 4-23 License Vs application and revenue generated of all ranges cross tabulation68
Table 4-24 License Vs application and revenue generated cross tabulation69
Table 4-26 Business model Vs application and revenue generated of all ranges cross
tabulation
Table 4-27 Business model Vs application and revenue generated cross tabulation73
Table 5-1 Results of hypotheses
Table 5-2 Summary of the research findings
www.lib.mrt.ac.lk

## LIST OF FIGURES

Figure 3-1 High level conceptual framework
Figure 3-2 Detailed conceptual framework
Figure 4-1 Graphical representation of the frequency distribution of business models37
Figure 4-2 Frequency distribution of open source revenue models
Figure 4-3 Frequency distribution of open source license types
Figure 4-4 Frequency distribution of open source application categories43
Figure 4-5 Frequency distribution of multiple revenue models being followed44
Figure 4-6 Frequency distribution of whether multiple applications are being developed46
Figure 4-7 Revenue generation among business models. Sri Lanka  Electronic Theses & Dissertations
Figure 4-8 Revenue generation among different license types
Figure 4-9 Revenue generation levels of different revenue models
Figure 4-10 Revenue generation levels of whether multiple revenue models being followed
Figure 4-11 Revenue generation levels when different applications are developed62
Figure 4-12 Revenue generation levels when multiple applications are developed64
Figure 5-1 Factors influencing revenue generation of open source companies

### LIST OF ABBREVIATIONS

AGPL - Affero General Public License

BSD - Berkeley Software Distribution

FLOSS - Free/libre/open source software

FOSS - Free and Open Source Software

FSF - Free Software Foundation

GPL - General Public License

ITSC - Installation/Training/Support/Consulting

LGPL Lesser General Public License

MPL Electronic The Mozilla Public License

OSS www.lib.mrt.ac lk Open Source Software