

**THE IMPACT OF THE INTRODUCTION OF CDMA
TECHNOLOGY ON THE TELECOMMUNICATION
INDUSTRY IN SRI LANKA**

By

**Amal Rohitha Dharmasiri
(GC/MC/2502/2004)**

**Thesis submitted to the University of Sri Jayewardenepura
for the award of the Degree of
Master of Science in Management**

**M.Sc. in Management Degree Programme [2004/2005]
Faculty of Graduate Studies
University of Sri Jayewardenepura
Sri Lanka
2007**

Declaration of the Candidate

The work described in this thesis, was carried out by me under the supervision of Dr. Sampath Amaratunge (Head, Department of Business Economics, Faculty of Management Studies and Commerce, University of Sri Jayewardenepura, Sri Lanka) and a report on this has not been submitted in whole or in part to any university or any other institution for another Degree/Diploma.

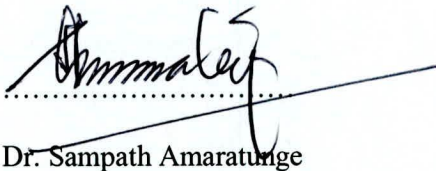


.....
Amal Rohitha Dharmasiri

(GS/MC/2502/2004)

Certification

I certify that the statement made by the candidate is true and that this thesis is suitable for submission to the University for the purpose of evaluation.



Dr. Sampath Amaratunge

Head - Department of Business Economics,
Faculty of Management Studies and Commerce,
University of Sri Jayewardenepura,
Nugegoda,
Sri Lanka.

Approved by the Examining Committee



.....

.....

Contents

	Page
Table of Contents	i
List of Tables	v
List of Figures	vi
List of Abbreviations	vii
Acknowledgement	ix
Abstract	xi
Chapter 1 - Introduction	
1.1 Background of the Study	01
1.2 Research Problem	08
1.3 Research Questions	09
1.4 Objectives of the Research	10
1.5 Significance of the Research	11
1.6 Research Design	12
1.7 Limitations	15
1.8 Organization of Chapters	16
Chapter 2 - Review of Literature	
2.1 Introduction	18
2.2 CDMA Technology Overview	19
2.3 Technical Advantages of CDMA Technology	21
2.4 Global Trends in Telecommunication	23

2.5	Regulatory Framework	25
2.6	Wireless Technology Evolvement	26
2.7	CDMA in Development	33
2.8	Technology Adoption	35
Chapter 3 - Conceptualization and Operationalization		
3.1	Introduction	38
3.2	Overall Conceptual Framework	39
3.2.1	Government	40
3.2.2	Regulator	41
3.2.3	The Operators	41
3.2.4	Industry	42
3.2.5	Stakeholders of Operators	42
3.2.6	Policy Advisors	43
3.2.7	Customers	43
3.3	Conceptualization Model & Operationalization	44
3.3.1	Customer Benefits	45
3.3.2	Operator Advantages	46
3.3.3	Technological Advancement	47
3.3.4	Regulatory Framework	48
Chapter 4 - Research Methodology		
4.1	Introduction	51
4.2	Data Collection Methodology	51
4.3	Sources of Data	52

4.3.1	Primary Data	53
4.3.2	Secondary Data	59
4.4	The Sampling Plan	60
4.5	Data Processing	61
4.6	Data Analysis	64
4.6.1	Quantitative Methods	64
4.6.2	Qualitative Methods	64
Chapter 5 - Presentation and Analysis of Data		
5.1	Introduction	66
5.2	Information based on the Questionnaire	67
5.2.1	General Information	67
5.2.2	Customer Perception on Flexibility	73
5.2.3	Perceived Quality of Service by the Customer	78
5.2.4	Cost Reduction for the Customer	84
5.3	Information based on the Interviews	91
5.3.1	Interviews with the Operators	92
5.3.2	Interviews with the Regulator	99
Chapter 6 - Conclusions & Recommendations		
6.1	Overall Summary	104
6.2	Conclusions	106
6.3	Recommendations	111
References		118
Appendices		
Appendix 1	Frequency Charts of SPSS Output	121

Appendix 2	Questionnaire for the Customer	129
Appendix 3	Letters for Permission for Interviews	132
Appendix 4	Interview Guidelines	136
Appendix 5	List of Interviewees	139

List of Tables

Table		Page
Table 2.1	Development of Cellular Communication Technology	28
Table 2.2	Development of Fixed & Mobile Broadband Technology	30
Table 2.3	Development of WLAN Technology	31
Table 4.1	Classification of Responses of the Questionnaire	62
Table 4.2	Average/Mean Value Classification	62
Table 4.3	Mean Values for Responses for the Section 2 of the Questionnaire	63
Table 5.1	Classification of the Respondents	69
Table 5.2	Ownership Duration of CDMA Phones	71
Table 5.3	Usage of CDMA Phones	72
Table 5.4	Flexibility Involved in CDMA Phones	76
Table 5.5	Classification of the Ratings for Flexibility with CDMA Phones	77
Table 5.6	Perceived Quality of Service by the Customer	83
Table 5.7	Classification of the Ratings for Quality of Service by the Users	83
Table 5.8	Cost Reduction Occurred for the Customer	90
Table 5.9	Classification of the Ratings for Cost Reduction for the Customer	91

List of Figures

Figure		Page
Figure 3.1	An Efficient Healthy Industrial Model	39
Figure 5.1	Age of the Respondents	68
Figure 5.2	Education Level of the Respondents	68
Figure 5.3	Profession of the Respondents	69
Figure 5.4	Previous Service Provider	70
Figure 5.5	Distribution of Previously Owned Phones	70
Figure 5.6	Distribution of CDMA Phones	71
Figure 5.7	Money Spent on Monthly Telephone Bills	72
Figure 5.8	Possibility of Obtaining a New Telephone	73
Figure 5.9	Time within which a New Telephone is Provided	74
Figure 5.10	Reservation of a Preferred Telephone Number	75
Figure 5.11	Mobility with the Phone	76
Figure 5.12	Voice Clarity of the Phone	78
Figure 5.13	Successfulness of Getting a Call Through	79
Figure 5.14	Customer Service Related Indicators	80
Figure 5.15	Number of New Services and Facilities Offered to the Customer	82
Figure 5.16	Cost Reduction for the Customer	85
Figure 5.17	Call Charges	85
Figure 5.18	Monthly Rentals	86
Figure 5.19	Other Charges	87
Figure 5.20	Financial Benefits	88
Figure 5.21	Informal Costs	89

List of Abbreviations

1G	1st Generation
2G	2nd Generations
3G	3rd Generations
4G	4 th Generations
BTB	Better Than Before
BTS	Base station Transceiver Station
CDG	CDMA Development Group
CDMA	Code Division Multiple Access
CPE	Customer Premises Equipment
CRBT	Colour Ring Back Tones
DECT	Digital Enhanced Telecommunication Technology
DGM	Deputy General Manager
EBITDA	Earning Before Taxes Depreciation and Amortization
EDGE	Enhanced Data for GSM Evolution
ETDMA	Extended Time Division Multiple Access
EVDO	Evolution Data Only
EVDV	Evolution Data and Voice
GDP	Gross Domestic Product
GM	General Manager
GMSA	Global Mobile Suppliers Association
GOSL	Government of Sri Lanka
GPRS	Global Positioning Receiving System
GSM	Global Standard for Mobile Communication
HLR	Home Location Registry
HSDPA	High Speed Download Packet Access
ICI	Information Communication Industry
ICT	Information Communication Technology
IEEE	Institute of Electrical and Electronics Engineers
IMF	International Monetary Fund
IMT	International Mobile Telecommunications

IN	Intelligent Networks
ITU	International Telecommunication Union
LAN	Local Area Networks
MBTB	Much Better Than Before
MIMO	Multiple Input, Multiple Output
MMS	Multimedia Message Service
MOU	Memorandum of Understanding
MWTB	Much Worse Than Before
NC	No Change
NTT	Nippon Telegraph and Telephone Corporation
OFDM	Orthogonal Frequency Division Multiplexing
OTAPA	Over The Air Parameter Administration
PCM	Pulse Coded Modulation
PCS	Personal Communication Service
R&D	Research and Development
RFI	Radio Frequency Interference
RTT	Radio Transmission Technology
SAARC	South Asian Association for Regional Cooperation
SLT	Sri Lank Telecommunication Limited
SLTC	Sri Lank Telecommunication Corporation
SMS	Short Message Service
SSE	Small Scale Entrepreneur
TDMA	Time Duration Multiple Access
TRCSL	Telecommunication Regulatory Commission of Sri Lanka
UMTS	Universal Mobile Telephone Systems
VAS	Value Added Services
W-CDMA	Wideband - Code Division Multiple Access
WLANS	Wireless Local Area Networks
WLL	Wireless Local Loop
WTB	Worse Than Before
WTO	World Trade Organization
WiMAX	Wireless Interoperability for Microwave Access

Acknowledgement

My sincere thanks and gratitude should first go to Dr. Sampath Amarathunge, the supervisor of this thesis. His constructively critical approach, greater commitment and professionalism accompanied with a synergistic interactive process, resulted in the completion of this study. Then Mrs. Sunethrani Amarathunge, Senior Lecturer of the University of Kelaniya for her enormous support extended throughout the research is much appreciated.

I am also grateful to Mr. Mohammed Hassan, the General Manager-Network of Suntel Ltd, for his inspiring guidance as a resource person, for spending many hours giving me support and words of wisdom. Then my brother, Ajantha Dharmasiri for the support extended to me during the research project in various ways and for the guidance given to me, throughout my life.

This acknowledgment will not be completed without mentioning of my wife, Samitha, who has supported all my endeavours with a gentle spirit and who has always encouraged me. I can always count on her for being there, and I am very much thankful to her. And also, I would like to mention my two daughters, Tharushi and Hirushi, who have been a source of my joy, their laughter and cheerful spirit have always given me strength during challenging parts of this research project. And my heartiest gratitude should go to my beloved parents for bringing me up so well and for their continuous blessings towards completion of this study.

I would be failing in my duty if I do not express my thanks to the top management of the three fixed telephone operators and the Telecommunication Regulatory Commission of Sri Lanka and their resource personnel with whom I conducted interviews. Finally, I appreciate all others including my colleagues, who have helped me in various ways, in the completion of this thesis.

The Impact of the Introduction of CDMA Technology on the Telecommunication

Industry in Sri Lanka

Amal Rohitha Dharmasiri

ABSTRACT

Focusing on the ongoing CDMA deployment process in the Sri Lankan telecommunication industry, the research problem was formulated. It is “How Impactful is the Introduction of the CDMA Technology to the Sri Lankan Telecommunication Industry?” Based on that, research questions were formulated and objectives were set accordingly. They were: To assess and analyze the overall impact of the introduction of CDMA technology on the telecommunication industry in Sri Lanka, to suggest urgent improvements necessary for the ongoing CDMA Technology Implementation process and to suggest recommendations for future introductions in Telecommunication related Technologies to Sri Lanka.

The scope of the research was limited to direct users of telecommunication services in Kelaniya provincial council area having both business and residential telephone users. Accordingly, a field survey was conducted to gather information of the end user and a series of interviews were conducted with senior personnel of the three fixed line operators and the personnel from TRCSL.

A review of literature in relation to the intended study was done. Diverse literature on CDMA and other Wireless technologies, global trends in telecommunication, CDMA in Economic Development, Regulatory aspect and Technology Adoption were reviewed.

Based on the conceptualization model adopted, the study took a four dimensional approach, which were Customer Benefits, Operator Advantages, Technological Advancement and the Regulatory Framework. Accordingly, the related elements in those dimensions were operationalized. A comprehensive questionnaire, designed and developed thoroughly by means of pilot survey findings was utilized in the field survey carried out to gather information of the perception of the customers and structured interview were carried out with the senior industry experts, to obtain their perspective of the other three dimensions of the study.

The data analysis was carried out based on the primary data gathered. Based on the responses conclusions are drawn in relation to the objectives of the study. Considering the findings, it can be mentioned that there has been a marginal improvement overall in relation to the benefits achieved by the end user. Anyhow, findings strongly show that the introduction of the CDMA technology has been much beneficial to the operators and also CDMA has brought advanced technology to Sri Lanka on a larger picture. In relation to the regulatory aspect of the whole process, it is found that there is further room for improvement, which is much needed to be done in order to have a smooth operation of new technology deployment in Sri Lanka in the future.

Based on the findings, appropriate recommendations were made. The emphasis required by the related parties is to act proactively, ensuring that the best service is delivered at the lowest possible cost; resulting up lifting of the living standard of the masses is aptly highlighted in the recommendations.

CHAPTER 1

Introduction

1.1 Background of the Study

In an emerging global economy, the ability of the Telecommunication sector to provide an internationally competitive network for transferring information has significant implications for trade and economic growth. Because of recent large worldwide investments in the Telecommunication infrastructure, quantifying the impact of Telecommunication in economic growth has received much attention. The world is now going through a communication revolution. According to Gunarathne (1997), this revolution, which is the third of this nature, is a result of the convergence of communication satellites, computers and digitization. Digitization converts all information text, sound and pictures into a binary code that can promptly travel through a global network of computers linked by telephones, fibre optics and satellites. The first two communication revolutions were the evolution of writing and the invention of printing. Sri Lanka has to face the third revolution head on to compete in the global material economy.

“Just as in the case of the Four Tigers, particularly Singapore and Taiwan, Sri Lanka must set a goal to enter the portals of the information society with the sound advice of the Computer and Information Technology Council, the Arthur C. Clarke Center for Modern Technologies and similar bodies. With a highly literate workforce, Sri Lanka is in a good position to move from an agriculture/ manufacturing-based economy into one that place emphasis on information technology.” (Gunarathne, 1997)