

**A SUITABLE ICT POLICY FRAMEWORK FOR SRI
LANKA - LICENSING, INTERCONNECTION AND
SPECTRUM MANAGEMENT ASPECTS**

Anuranga Wijesinghe

(118476K)



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Degree of Master of Science in Telecommunication Engineering

Department of Electronics and Telecommunication Engineering

University of Moratuwa
Sri Lanka

December 2015

**A SUITABLE ICT POLICY FRAMEWORK FOR SRI
LANKA - LICENSING, INTERCONNECTION AND
SPECTRUM MANAGEMENT ASPECTS**

Chaminda Anuranga Wijesinghe

(118476K)



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

A Dissertation submitted in partial fulfillment of the requirements for the degree of
Master of Science in Telecommunication Engineering

Department of Electronics and Telecommunication Engineering

University of Moratuwa
Sri Lanka

December 2015

DECLARATION OF THE CANDIDATE AND SUPERVISOR

I declare that this is my own work and this dissertation does not incorporate any material previously submitted for a Degree or Diploma in any other University or Institute of higher learning without acknowledgement. I herewith confirm to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to University of Moratuwa the non-exclusive right to reproduce and distribute my dissertation, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

Anuranga Wijesinghe  University of Moratuwa, Sri Lanka Date
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

The above candidate has carried out research for the Masters dissertation under my supervision.

Eng. Kithsiri Samarasinghe

Date

ABSTRACT

A Suitable ICT Policy Framework for Sri Lanka - Licensing, Interconnection and Spectrum Management Aspects

World ICT industry is rapidly changing over time and most significant aspect that can be seen is the convergence of telecommunications, broadcasting, IT and content. With this change in technology as well as industry, regulation of them is becoming more and more important in order to pass the maximum benefit to the general users. Regulation depends on policy towards the industry, hence a strong policy stance is vital for any country to reap the real value of ICT. In Sri Lankan context, regulatory convergence has not yet taken place. Also Sri Lanka has no clear strategy on how to use ICT for its economic and social development. Moreover, Sri Lankan ICT policy must be strengthened on addressing universal access and overcoming digital divide.

A literature survey was carried out to identify what is policy, public policy formulation, importance of ICT policy to a country and relationship between policy and regulation. ICT policies and legislations of selected countries were then examined. Next, the expected benefits for the Sri Lankan economy and society as a whole from the ICT sector was looked at. Finally a policy framework was recommended to Sri Lanka to achieve the long term goals. These recommendations were also discussed and got validated from the Regulator.

Sri Lanka targets to achieve economic and social development through promoting ICT industry. In order to achieve that industry must be regulated in a converged manner through a single body, correct level of competition to be maintained and each sector to be regulated at appropriate level. It is recommended that international standard to be followed in spectrum allocation and bandwidths are given for research activities. Local interconnection must be handled through regulatory intervention, while outside connections are also to be aggressively looked at.

Keywords: ICT policy, regulation, policy formulation

ACKNOWLEDGMENTS

First and foremost, I hereby wish to express my sincere gratitude to my supervisor Eng. Kithsiri Samarasinghe for the continuous support, guidance, knowledge shared and direction given to carry out my research work and complete this dissertation.

Then I would like extend a special thanks to Dr. Chandika Wavegedara, who encouraged me to complete my dissertation work. His support and encouragement motivated me to complete this task when I was down and on the verge of giving up. I am truly honoured to have your support.

Next I would like offer my sincere appreciation to Mr. Mohan Jayasekara, Director-Policy, International Relations & License Administration of TRCSL for the input given in terms of regulatory perspective to formulate my dissertation.

My sincere thanks also goes to all the lectures in this MSc program who nurtured us to always have a broader view of subject. I hereby thankfully remember all the staff members of my department at Etisalat Lanka (Pvt) Limited who supported me in many ways in completing this MSc program.

Finally, my humble appreciation goes to my wife, Erandi and my family for the untiring support and tolerating all hardships taken to successfully complete my MSc program and this dissertation.

Anuranga Wijesinghe

TABLE OF CONTENTS

DECLARATION OF THE CANDIDATE AND SUPERVISOR	i
ABSTRACT	ii
ACKNOWLEDGMENTS	iii
TABLE OF CONTENTS	iv
LIST OF FIGURES	vi
LIST OF TABLES	vii
LIST OF ABBREVIATIONS	viii
1. INTRODUCTION	1
1.1 Background	1
1.2 Statement of Research Problem	5
1.3 Objective of Research	6
2. LITERATURE REVIEW – POLICY STUDIES, CURRENT SRI LANKAN ICT POLICY STANCE AND RECAP OF ICT POLICIES IN SELECTED COUNTRIES	7
2.1 Policy Formulation	7
2.1.1 What is policy?	7
2.1.2 Framework for public policy making	7
2.1.3 Phases of policy making process	9
2.2 ICT Policy	10
2.2.1 Convergence	10
2.2.2 ICT policy making	11
2.2.3 Why ICT policy is important	12
2.3 Policy and Regulation	14
2.3.1 Licensing	16
2.3.2 Interconnections	17
2.3.3 Spectrum management	18
2.4 ICT Policy in Sri Lanka	18
2.4.1 Telecommunications Regulatory Commission of Sri Lanka (TRCSL)	19
2.4.2 Proposed amendment to the current Act	19
2.4.3 Information and Communication Technology Agency (ICTA)	20
2.4.4 Ministry of Mass Media and Information	21
2.4.5 Mahinda Chinthana – Vision for the future	22
2.5 ICT Policies of Selected Countries	23

2.5.1	United Kingdom	23
2.5.2	India	24
2.5.3	Malaysia	24
2.5.4	South Korea	27
2.5.5	Singapore	30
3.	ANALYSIS OF PROBLEM	34
3.1	Methodology for Analysis	34
3.2	Shortcomings of Current ICT Policy in Sri Lanka	34
4.	TARGETS OF ICT INDUSTRY IN SRI LANKA	38
4.1	ICT as a Major Sector in Economy	38
4.2	ICT as an Enabling Sector for Other Industries	40
4.3	Extending the Reach of ICT Throughout the Island	41
4.3.1	Coverage	41
4.3.2	Devices	42
4.4	Develop Human Resource for ICT	43
4.5	Develop Content	44
4.6	Introduce More ICT Related Services	44
4.7	Promote Research in ICT	45
5.	PROPOSED ICT POLICY	47
5.1	Licensing	47
5.1.1	Converged Regulation	47
5.1.2	Maintain Correct Level of Competition	49
5.1.3	Degree of Regulation	50
5.1.4	Conditions of Licenses	52
5.2	Spectrum Management	53
5.2.1	Frequency Allocation	53
5.2.2	Spectrum Allocation for Research	54
5.3	Interconnections	55
5.3.1	Regulatory Intervention	55
5.3.2	Connectivity Within and Outside	55
	CONCLUSION	57
	REFERENCE LIST	58



University of Moratuwa, Sri Lanka.
 Promote Research in ICT.
 Electronic Theses & Dissertations
www.lib.mrt.ac.lk

LIST OF FIGURES

Figure 1.1: Data revenue of USA	1
Figure 1.2: Global ICT developments	3
Figure 1.3: Number of users for telecom services in Sri Lanka	4
Figure 2.1: PEST Framework	8
Figure 2.2: Public policy making process	9
Figure 2.3: Phases of public policy making	9
Figure 2.4: Convergence	11
Figure 2.5: Human networking and ICT	13
Figure 2.6: Malaysian ICT Initiatives	25
Figure 2.7: Major areas of e-Korea Vision	28
Figure 2.8: U-Korea Master Plan	30
Figure 2.9: Phases of ICT transformation in Singapore	31
Figure 3.1: Analysis Methodology	34
Figure 4.1: Two components of Reachability	41
Figure 4.2: Content Categories	44



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

LIST OF TABLES

Table 1.1: Data revenue Vs. Voice revenue

2



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

LIST OF ABBREVIATIONS

Abbreviation	Description
2G	2nd Generation
3G	3rd Generation
4G	4th Generation
ADSL	Asymmetric Digital Subscriber Line
BCN	Broadband Convergence Network
BPO	Business Process Outsourcing
CSCP	Civil Service Computerisation Program
DBNO	Digital Broadcast Network Operator
DVD	Digital Video Disk
EBITDA	Earnings Before Interest, Taxes, Depreciation and Amortization
EGO	External Gateway Operator
FDI	Foreign Direct Investments
GDP	Gross Domestic Product
GSMA	Global System for Mobile Association
IaaS	Infrastructure as a Service
ICT	Information and Communications Technology
ICTA	Information and Communication Technology Agency
IPTV	Internet Protocol Television
ISP	Internet Service Provider
IT	Information Technology
ITU	International Telecommunication Union
KPO	Knowledge Process Outsourcing
LAN	Local Area Network
LTE	Long Term Evolution
MSC	Multimedia Super Corridor
NBN	National Broadband Network
NCB	National Computer Board
NITA	National Information Technology Agenda
PaaS	Platform as a Service
PEST	Political, Economic, Social and Technological
QOS	Quality of Service
TRCSL	Telecommunications Regulatory Commission of Sri Lanka
VOIP	Voice over Internet Protocol



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

1. INTRODUCTION

1.1 Background

The last decade of the 20th century saw unprecedented changes in the global Information and Communications Technology (ICT) industry. These changes took place in every aspect of the industry, technological, economical and even social point of view. As a result, this industry is seen as a complete novel thing what it used be in the past.

Telecommunication industry has gone through much technological advancement during last two decades. 3rd and 4th Generation systems were introduced on top of well-known 2nd Generation systems. The dominance of voice communication is diminishing and all operators are relying their profits on data and value added services. According to a report from US consulting group, data revenues have grown exponentially since 2004 (Figure 1.1) [1].

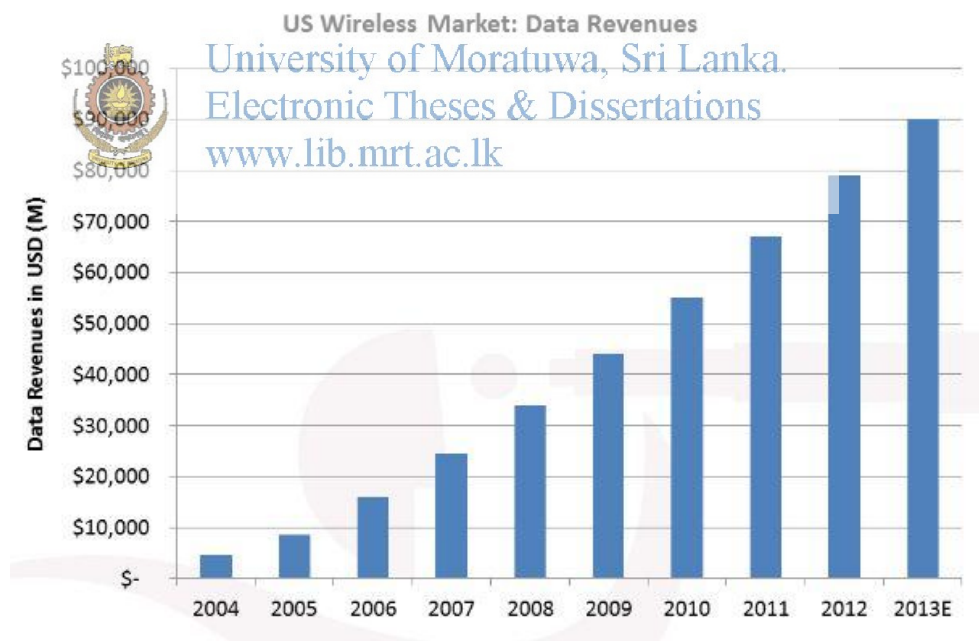


Figure 1.1: Data revenue of USA
Source: <http://www.chetansharma.com/usmarketupdateq42012.htm>

Data communication starts dominating over voice as a result of another major technological revolution which can be seen as convergence of information and

communication technologies. Data revenues are already overtaken voice revenues in most parts of the world (Table 1.1).

Table 1.1: Data revenue Vs. Voice revenue

Country	By year	Data Revenue (USD billions)	Voice Revenue (USD billions)
Japan	2012	48	46.5
Argentina	2013	5.22	5.16
USA	2014	123.9	105.8
UK	2014	14.2	13.9
Kenya	2016	0.828	0.789
Global	2018	559	547

Source: (Global System for Mobile Association: GSMA)

Consequently telecommunication, Information Technology (IT), broadcasting and content industries are merging and operating as a single industry where borders of each industry are slowly disappearing. The user equipment are also aligning with this along with becoming more and more multi-functional. Not only in the user-side, but also in the provider-side this transformation takes place as they are becoming multi-functional, high capacity and miniaturizing.

The economics of the ICT industry has been changed significantly. Earlier days, this service is provided by a government-owned entity where monopolistic characteristics such as slow growth and inefficient operations, were evident. Then those entities were privatised and one by one, private investors were coming into the industry. But still telecommunication service was considered as a luxury. However, now this industry has become extremely competitive where number of players are increasing. Almost every market is nearing saturation and profit margins are shrinking. The recent trend is that few multinational companies are starting to dominate the telecommunication industry and extend their reach, by acquiring operations from every part of the world. The social aspects towards the industry have also being transformed drastically. With the beginning of 1980s in most parts of the world, access to telecommunication services was a luxurious facility which only a few distinguished individuals had simply

because it was not affordable. Such service has become now a basic need of the society that hardly some can live without it. Not only that it has become a basic need, but it has become an important criterion measuring the level of development of a society. Furthermore, the knowledge of handling ICT tools has become a major element of level of literacy. The best example for the social impact of ICT is emergence of concepts such as digital divide. Number of users of ICT services has grown exponentially over the last decade (Figure 1.2) [2].

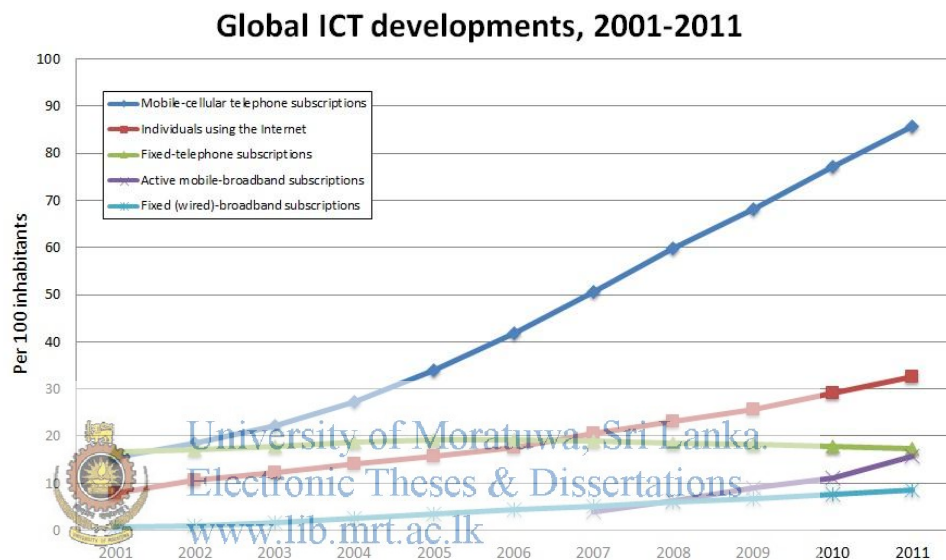
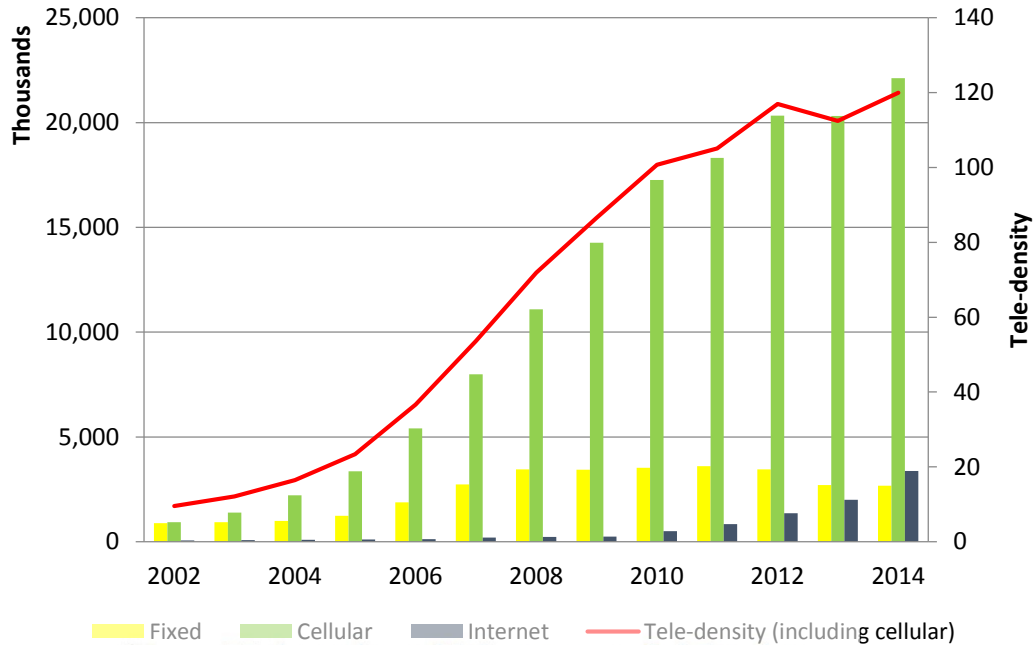


Figure 1.2: Global ICT developments
Source: ITU World Telecommunication/ICT Indicators database

The situation is not different in Sri Lanka. Telecommunication industry actually starts picking up with the dawn of 21st century. The incumbent government telecommunication service provider was privatised and by mid 1990s private investors start spending on the industry. After one decade in to the 21st century, telecommunication industry has become fiercely competitive and subscriber growth is

exponential. Figure 1.3 shows the number of users of telecommunication services in Sri Lanka according to Central Bank Report for 2014 [3].



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations

Figure 1.3: Number of users for telecom services in Sri Lanka
Source: Annual Report 2014, Central Bank of Sri Lanka

Same is true for broadcasting but internet and content is yet to pick up the pace which their counterparts had. Sri Lanka rapidly gets on hold with novel technologies. Most of the modern technologies can be seen introduced to Sri Lanka after few years of initial launch. We were the first South Asian country to witness a 3rd Generation network and one of the first Asian to try a 4th Generation. All the modern sophisticated devices can be seen in Sri Lanka just few months of the introduction. In addition, Sri Lankan society has accepted telecommunications into their lives as a commodity and daily need. It has turn out to be so much connected with lives. Internet and content is still lagging behind, but have started slowly picking up. In 2014, total internet connections grew by 68.4% raising the internet penetration to 16.4%, supported largely by mobile internet connections, which grew by 85.8% [3].

Therefore, the whole ICT sector in Sri Lanka has gone through drastic transformations and still continuing to do so. But the issue is whether Sri Lanka is ready in policy and legal frameworks to accept these transformations.

1.2 Statement of Research Problem

Government has identified ICT as a major contributor to the economic development of Sri Lanka. It can help this role either being as a different sector where earnings will come directly by selling ICT products, or as an enabling sector where support will be given to other sectors to excel in those. It is critical to first correctly identify this strategy in which ICT will be treated. The policy and legal framework formulation should come after this. However in Sri Lankan context, this alignment is hardly seen. The development of economy is not only a government task, but private sector involvement is highly necessary. Hence these two sectors should be aligned to a same goal and heading towards it. The uncertainty due to no policy will confuse the private sector when it comes to development of ICT industry and investments to be made. Therefore it will be a lagging point in the development of this industry.

Furthermore, government believes the benefits of ICT must reach towards farthest corners of the island in order to reap its real benefits. However in policy, it is very unclear how the government is planning to bridge the gap between urban and rural ICT presence and solve the digital divide.

The current trend is that telecommunication, internet, broadcasting and content technologies are converging. This converging environment should be clearly understood in policy and legal framework setting. We have not identified this convergence and Sri Lankan policy or regulatory frameworks do not address it.

Additionally, policy must address how to develop the human capital in ICT domain to use the infrastructure facilities to the maximum. In addition, content must be sufficiently available for the infrastructure to be efficiently used. Most importantly content must be in local languages where communities can easily grab the value. Sri Lankan ICT policy is very weak in content development and regulation. Also it must be go hand in hand with Intellectual Property Rights Laws.

1.3 Objective of Research

In this study, it is expected to identify any shortfalls in Sri Lankan policy stance and legislation. There by attention of policy and legislation setting parties can be directed to areas which need to be addressed in future amendments.

The detailed objectives would be,

1. Analysing current Sri Lankan legislation giving focus to licensing, interconnection and spectrum management and studying Sri Lankan government policies and plans towards the ICT sector.
2. Examining ICT policies and legislations from around the world.
3. Defining the expected benefits for the Sri Lankan economy and society as a whole from the ICT sector
4. The final outcome of the full research will be to recommend a suitable policy framework for Sri Lanka in order to achieve the above identified country's long term goals.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

2. LITERATURE REVIEW – POLICY STUDIES, CURRENT SRI LANKAN ICT POLICY STANCE AND RECAP OF ICT POLICIES IN SELECTED COUNTRIES

2.1 Policy Formulation

2.1.1 What is policy?

Policy is a course of action, adopted and pursued by an entity or a person. In a wider sense, policy could include the vision, goals, principles and plans that guide the activities of many different parties. Policies exist for countries, governments, businesses, organizations, social groups, families and even for individuals [4].

A policy would provide directions to an entity or individual in terms of their goals and help to identify the current status of achieving that goal. It will provide a framework for decisions, making the process coherent. Since there is consistency and identified target, having a policy would make it easier to define the actions towards the goal and most importantly, keep them intact without changing during the course of time. It will always facilitate improvement, because gap between ultimate goal and current status is evident.

Policies can be either written or unwritten. Written policies in general may appear in rules and regulations. Unwritten policies can be reflected in customs and traditions. They will be revealed from the decisions made by and highlighted in expectations, principles as well as understandings.

2.1.2 Framework for public policy making

Public policy would address an entire country, a nation or the society as a whole. Therefore entity responsible for public policy making would be the government at most of times. It helps towards establishing the rules which governs the state and society.

When formulating policy, the first and most important step would be to identify megatrend, in terms of time and space, of the particular sector. Once megatrend is identified, policy could be made to align with it. Policy can even be made against the trend, but it may be difficult and need radical changes.

In order to identify the megatrend, the Political, Economic, Social and Technological (PEST) analysis would be a recommended tool (Figure 2.1).

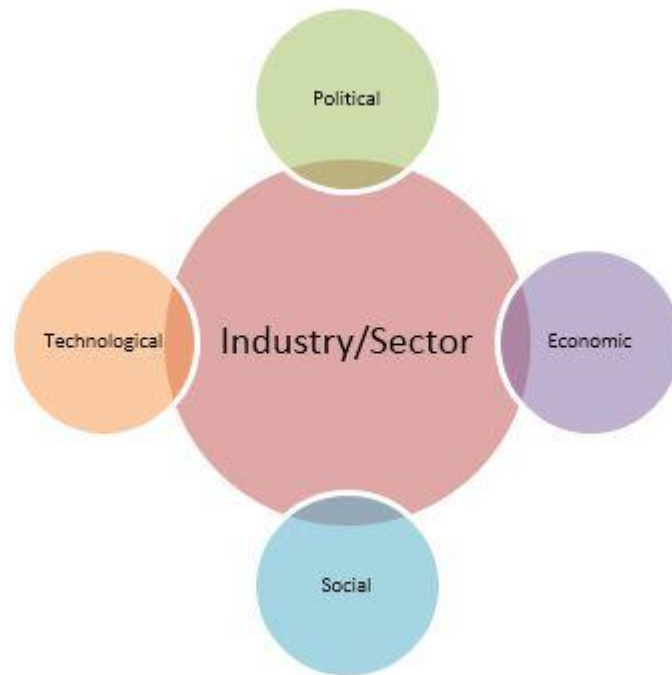


Figure 2.1: PEST Framework



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

When formulating public policy, ideas from various different parties must be collected. A think tank must be formed including representation from every possible part of the society. Representation from whole society is essential to address all the issues fairly and equally as well as to remove bad motives behind. Besides, impact of policy towards each category of society would be best known by members of that society only. The think tank will iron out extremes and formulate the most suitable solution. This process can be illustrated as follows in Figure 2.2.



Figure 2.2: Public policy making process

2.1.3 Phases of policy making process

Public policy making is a cyclical process, which can be illustrated as in Figure 2.3

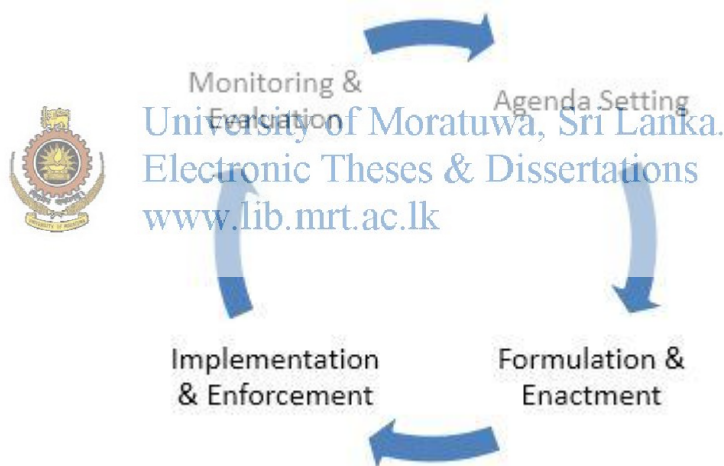


Figure 2.3: Phases of public policy making

Source: Lecture Notes – EN5270 (Telecommunication Policy and Regulatory Aspects)

In the agenda setting phase, first and foremost a chairperson must be appointed to carry out the process forward. Chairperson will identify key stakeholders from various backgrounds and social groups and collect ideas. Key points will be shortlisted from those followed by a series of meetings which will discuss each point by every stakeholder.

For each point identified in previous step, alternate solutions and responses must be evaluated in formulation and enactment stage. By considering implications of each alternative, the most effective solution can be selected. Finally, these must be passed to the relevant agency or branch of government in order to formulate the necessary regulations and legislation.

In the implementation stage, the government body will prepare the action plan. Based on that action plan, enactment of required legislation and regulations can be carried out at suitable time. Once enforced, policy's applications and impacts are monitored and evaluated, which will lead to further adjustments and improvements.

2.2 ICT Policy

Information and communication are integral to human society, which is there since the beginning of human evolution. However, with the technological advancements, the reach and speed of information and communication have increased significantly. The modern Information and Communication Technology can be seen as a convergence of four separate technologies, namely

- Telecommunication
- Broadcasting
- Information Technology
- Content

2.2.1 Convergence

Above four components of ICT cannot operate in isolation from one another in the current global context. The advantages and reach of the internet make it a focal point for the use of new technologies. Its decentralised, widely-distributed, packet-based mode of transporting information makes it an efficient, cheap and flexible means of communication, which facilitates interrelationship with other technologies. As a result, international telephone calls are increasingly made through the internet and television and radio are also broadcast via the internet. Most Local Area Networks (LAN) are connected to the internet. Software, music and video can be rented through the internet.

The internet is accessible through mobile phone, which use it to present content to the user [4].

Not only are new technologies converging in this way, the areas where they are applied are also becoming interrelated. Telephone companies are increasingly using Voice over Internet Protocol (VOIP) to reduce their international communications costs. Consumer commodities too are becoming dependent on the internet. This is especially true of electronic devices and appliances, such as audio and Digital Video Disk (DVD) recorders and players [4].

This convergence happens not only at a technological level but also at the level of industry. A large internet service provider will probably also be linked to a telecommunications infrastructure company, and have subsidiaries that produce software and internet applications. The important media multinationals are buying heavily into internet technology as they see it as the physical and conceptual infrastructure for media in the future. This has led to a situation where telecommunication giants are also multimedia giants with huge investments in internet technologies. (Figure 2.4)

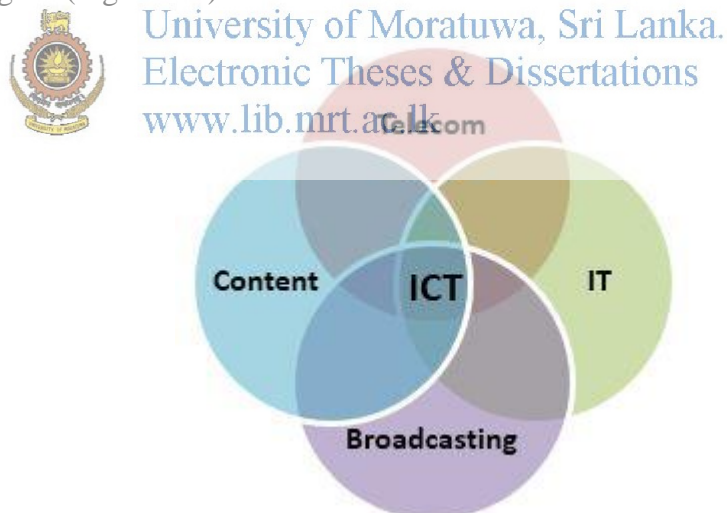


Figure 2.4: Convergence

2.2.2 ICT policy making

If the technology and industry is converging, policies and regulations that govern them must also address the converged technology and industry. There is no point of

regulating each component in isolation. This was the case in the past in almost every country. There were very strong policies and regulations on telecommunications, broadcasting and even in IT and content industry. These policies govern the industries in isolation effectively because they were based on well-established research plus theories and accepted by public. With the technological advancement and convergence happening, these policies failed to address the new demands.

On the other hand, with the emergence of ICT as converged industry, some countries started modifying their sectoral policies such as education, health, employment, etc. to include related ICTs only. These sectoral policies would include some ICT sections that is only applicable to its own sector. Later when those governments saw the convergence of industry, they tried to come up with National ICT policy by summing ICT parts of all these sectoral policies. This approach was also failed because these policies become firmly entrenched within the sector and later attempts to integrate them into a broad all-encompassing ICT policy become difficult [4].

2.2.3 Why ICT policy is important

Since ICTs are so central to modern-day society, ICT policy would affect the society continually in many ways. Mobile or fixed telephone, TV and radio sets are not luxury goods anymore, but has become common household items. Most of the households now have a desktop or laptop computers, and also access to internet either through Asymmetric Digital Subscriber Line (ADSL), dialup or mobile broadband. People start the day by watching TV, listening to radio or looking their emails. While they are getting ready, having meals, travelling, resting, idling and working, they use some kind of ICT device or service. Simply people are actively involved with ICT in every phase of their lives. Therefore, ICT and human race have come to a situation which both cannot be separated from each other. Hence ICT policy will affect every human being in many ways.

With the globalization, the basis of the new world economy has been changed to free trade, unrestricted investment, deregulation and privatisation of state-owned enterprises and infrastructures. At the same time, restrictions on financial markets and world trade are slowly being lifted. ICTs have been a fundamental part of this process.

Without instantaneous and global electronic telecommunications, the world financial market could not exist, nor could companies coordinate their operational and development strategies on a global level. Today's competition between companies depends on such global communications, as does the production of new ideas and research.

Humans are social animals. The idea of human networks has emerged as a result of humans being living in groups and cannot live in isolation. Owing to the advancement of technology, particularly the ICT, this human network has expanded significantly and resulted in concept like globalization and global village. These things are now in a cycle, where human networks caused wide use of ICT and due to ICT, human networks are continuously growing. Therefore, policy decision in ICT will definitely affect this interrelationship of humans (Figure 2.5).

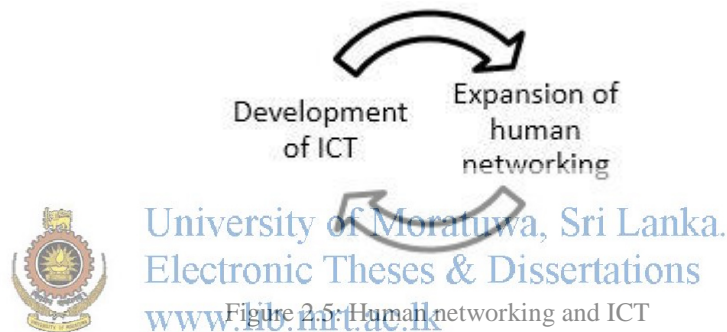


Figure 2.5: Human networking and ICT

The availability and use of information and communication technologies are considered to be a prerequisite for economic and social development in a country. ICTs can allow countries to advance stages of economic growth by being able to modernise their production systems and increase their competitiveness faster. Countries can use ICTs either as their major sector of economy or as an enabler and productiveness driver to other sectors. The ICT policy of the country will make this choice.

While policies must address the extension of the communications infrastructure through telecommunications reform to stimulate private sector growth and create job opportunities, this is a necessary but by no means sufficient condition for an effective ICT contribution to national development goals. ICT policy must also incorporate social goals by building human capacity and creating the conditions for the development of relevant applications and content.

Everyone should have the access to use the telecommunication, internet services and other media. The policy will decide how to promote the access to ICT services. In countries where only a minority have telephones, ensuring affordable access to these is a huge challenge. Much of the response would lie in social solutions such as community or public access centres. In richer countries, basic access to internet is available almost to all. Most of the developed countries had achieved something close to universal service by deploying monopolistic systems. On the other hand, developing countries had failed to do so. This gap in universal service led to debate in developing countries on the pros and cons of monopoly ownership and now most of the countries are relying on competition to achieve this. The decision on

- What sector to privatise and when
- When to introduce competition in each sector
- Ideal time to introduce regulation
- What to regulate and what to leave to market mechanisms

will be the outcome of policy framework.

Ensuring civil liberties is also an important part of ICT policy. Civil liberties include human rights such as freedom of expression, the right to privacy, the right to communicate, intellectual property rights, etc. These rights as applied to broadcast media have been threatened in many countries and now the internet, which began as a space of freedom. This has happened due to some government legislation and emerging restrictions. At the same time, restrictions that are intended to limit media monopolies are being weakened and pushed aside.

2.3 Policy and Regulation

Country's legislation and regulation are primarily based on the policy. Policy sets out the vision for ICT and its links to national development goals. The statutory foundation for the required institutions such as consultative, advisory and regulatory bodies and processes such as licensing and spectrum management will be provided by legislation. Through these, legislation would help to implement policy. Legislation specifies the financial, staffing and reporting regimes under which the regulator operates and defines its functions and degree of independence. Regulatory agencies are responsible

for developing regulations that lead to the implementation of policy and policy objectives.

According to Telecommunications Regulation Handbook published by The World Bank, widely accepted ICT regulatory objectives are as follows [5].

- Promote universal access to basic telecommunications services
- Foster competitive markets to promote:
 - efficient supply of telecommunications services
 - good quality of service
 - advanced services
 - efficient prices
- Where competitive markets do not exist or fail, prevent abuses of market power such as excessive pricing and anti-competitive behaviour by dominant firms
- Create a favourable climate to promote investment to expand telecommunications networks
- Promote public confidence in telecommunications markets through transparent regulatory and licensing processes
- Protect consumer rights, including privacy rights
- Promote increased telecommunications connectivity for all users through efficient interconnection arrangements
- Optimize use of scarce resources, such as the radio spectrum, numbers and rights of way

Therefore, in order to achieve above objectives, the ICT policy should address all those aspects in detail. As such, following can be identified as the areas which an ICT policy should cover.

- Licensing
- Spectrum management
- Interconnection
- Competition policy
- Numbering
- Universal access
- Service traffic

- Quality of Service
- Consumer protection

This study aims to analyse the ICT policy related to first three aspects.

2.3.1 Licensing

A licence authorizes an entity to provide ICT services or operate ICT facilities. It also generally defines the terms and conditions of such authorization and describes the major rights and obligations of an operator. Licences for new entrants in telecommunications, broadcasting and ISP markets are frequently granted by means of a competitive licensing process, which involves the selection of one or more operators from a group of applicants. In other cases, general authorizations are issued. These authorize any entity that complies with the basic terms and conditions of the authorization to provide an ICT service such as content, without the need for an individual licence.

Licensing is a relatively recent development in many telecommunications and broadcasting markets. Historically, state-owned incumbent operators provided these services on a monopoly basis in most countries. They were treated as a branch of the public administration, along with postal services, road transportation and other government services. Licences are important with the current technological and economic conditions, especially in emerging economies. Licences provide certainty for investors and lenders, which help to build the confidence that is required to invest huge sums to install or upgrade ICT infrastructure in such economies. As a result, incumbent operators were privatized and in the process, licenses were introduced to the markets.

Following can be identified as common objectives of licensing an ICT provider by a government [6].

- Regulating provision of an essential public service
- Expansion of networks and services and other universal service objectives
- Privatization of incumbent operator and driving it in correct direction after
- Regulating market structure
- Establishing a framework for healthy competition

- Allocation of scarce resources such as spectrum, numbering plan
- Generating government revenues
- Consumer protection
- Ensuring regulatory certainty and attracting more investors

Hence ICT policy on licensing should consider all these aspects and be formulated accordingly to achieve country's short-term and long-term goals.

2.3.2 Interconnections

With the liberalization of telecommunications and Internet Service Provider (ISP) markets over the last few decades, effective interconnection arrangements have become important to the operations of an increasingly wide range of services. These services include local, long distance and international fixed, mobile and satellite services, providing everything from basic voice telephony to high speed internet connectivity to internet multimedia services. With the emergence of new concepts like Digital Broadcast Network Operator (DBNO), the significance of interconnections has grown further more. Competition is the key to the growth and innovation of today's ICT sector. Interconnection is a critical factor for the viability of healthy competition. Historically, interconnections were negotiated with each other to set the terms of interconnection without regulatory intervention. The emergence of competition has changed this. Strong established players have little incentive to make things easy for their new competitors and most of the bargaining power in negotiations lies with them. Strategic anti-competitive behaviour on interconnection matters by them has retarded or prevented competition in many ICT markets around the world.

Besides, interconnection is an important consumer issue. Telecommunications and ISP users cannot communicate with each other or connect with services they demand unless necessary interconnection arrangements are in place. Without efficient interconnection arrangements, services such as direct international dialing, internet-delivered services, automated teller machines and e-commerce would not be possible.

Hence, there is a consensus among policy makers that decisive and informed guidance by regulators is required to pave the way for effective interconnection arrangements and by doing so enabling healthy competition and protecting consumer rights.

2.3.3 Spectrum management

The radio spectrum supports a wide range of business, personal, industrial, scientific, medical research and cultural activities, both public and private. Telecommunications and broadcasting are foremost among those activities and together with other radio services, are increasingly important to economic and social development.

In the past, use of radio spectrum was highly regulated and mostly used in defence, broadcasting and aeronautical services. In the past decade many new services were innovated with new technologies which require radio spectrum to communicate. Also there have been significant innovations in the theory of spectrum management along with gradual changes in practice of spectrum management and regulation. Despite changes, it is still visible these past and current regulatory practices originally intended to promote the public interest, have in fact delayed the introduction and growth of a variety of beneficial technologies and services. In some cases it has increased the cost of the same through an artificial scarcity. In addition to these delays, the demand for spectrum has grown significantly highlighting the need for efficient use of all available spectrum in order to avoid scarcity [7].

The main objective of setting a policy for spectrum management is to efficiently use the scarce radio spectrum, considering the return value of its usage and international allocation of spectrum for services. In technical sense, spectrum should be allocated for the service which has highest spectral efficiency. However, when considering national security, social and economic aspects, there can be deviations from this. It is the responsibility of policy makers to find the correct blend among all of these.

2.4 ICT Policy in Sri Lanka

Several authorities are involved in Policy formulation and regulation of Sri Lankan ICT industry.

2.4.1 Telecommunications Regulatory Commission of Sri Lanka (TRCSL)

In 1991 a position called Director-General of Telecommunications was formed under the Sri Lanka Telecommunications Act No. 25 of 1991, in the process of privatizing then Department of Telecommunications and establishing the Sri Lanka Telecom. The TRCSL was formed under Sri Lanka Telecommunications (Amendment) Act No. 27 of 1996. The primary objective of TRCSL is to promote sustained development in the telecommunication industry by shaping the regulatory process, protecting public interest and being responsive to challenges in an increasingly competitive market. It will also ensure that competition in the market is open, fair and effective [8].

TRCSL governs and regulates all telecommunication services within Sri Lanka. Particularly it issues licenses for telecommunication operators and ISPs. Furthermore it has the sole authority to govern and manage the scarce resources such as radio spectrum, numbering and rights of way within Sri Lanka. It authorizes the user and operator equipment imports related to telecommunications and spectrum usage. Pricing of telecommunication services, interconnections and consumer protection are also come under responsibilities of TRCSL [9].

TRCSL formulated and published a Ten Year Development Plan targeting the subject area of Commission covering the period 2006-2016. In 2008, a proposed amendment to the current Act No. 27 of 1996 was started to discuss among officials and academics.

2.4.2 Proposed amendment to the current Act

A good sign shown in this proposed amendment at the very beginning is in constitution of the Commission. Previously, the appointed members of the Commission should be “in the fields of Law, Finance and Management” [10]. But with the new amendment, the Commission will comprise of members “in the fields of ICT and Telecommunications Engineering, Law and Finance” [11]. This is a sign that government has identified the fact of technology convergence and need of consolidated regulatory framework instead of independent framework.

Universal access is an area which special attention was given in the amendment. It is proposed to include conditions related to universal access to the licenses given to telecom operators. Besides, it is identified “to develop the telecommunication

infrastructure and telecommunication services in Sri Lanka” as a primary function of the commission and to provide financial assistance where required [11]. This is in line with the global survey of national efforts in broadband deployment as identified by James Savage in 'International Public Programs to Provide Broadband Access to the Internet'. According to that study, there are three distinct roles that governments play [12].

1. Light touch approach - Minimal government intervention, focusing on transparent regulatory frameworks to encourage private sector activity and competition.
2. Cooperative approach - Government activity in rural areas while private sector takes the lead in providing services in business centres, cities and urban areas.
3. Comprehensive national plans - All-inclusive national plan, which calls for a comprehensive national ICT infrastructure and skills development requiring government and industry-wide coordination.

It can be seen that Sri Lanka is looking for the second option above. In addition, this amendment touched the content side a little bit by including conditions to the license to regulate certain content types as instructed by the Commission.



University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

A significant attention is given for interconnections among operators in the proposed amendment. It is understood since proper interconnection regime is vital for development and competition of the industry and current Act does not cover that area. The commission is to overlook the whole interconnection arrangements between operators and they should all be fair, non-discriminatory and priced based on cost. Spectrum management is also addressed in larger extent in proposed amendment. Commission is to categorise the spectrum and define usage of each band of spectrum. Also it will look at increasing the efficiency of usage and will work new areas and experiments. This means that academic institutions may get spectrum bands for their research studies.

2.4.3 Information and Communication Technology Agency (ICTA)

Governed under Ministry of Telecommunication and Information Technology, ICTA of Sri Lanka is the single apex body involved in ICT policy and direction for the nation. It is the implementing organization of the e-Sri Lanka Initiative. ICTA was formed under Information and Communication Technology Act No. 27 of 2003 as amended by Act No. 33 of 2008 with a broad view of “to provide for the setting out of a national policy on information and communication technology and for the preparation of an action plan” [13]. Currently ICTA is involved in following activities [13].

- Aggressively build the necessary connectivity infrastructure throughout the country to connect villages and towns to the world information infrastructure
- Create the enabling environment including the enactment of regulatory reform together with the acceleration of enabling laws for e-government and e-commerce and promote public-private partnerships
- Develop human resources at multiple levels to support national development
- Modernize the public sector and deliver citizen services through e-government constructs
- Promote Sri Lanka as an ICT destination renowned for producing best-of-breed in niche global markets through the use and adoption of technology and support public – private partnerships in ICT service provision
- Bridge the digital divide with applications aimed at poverty reduction and social development

2.4.4 Ministry of Mass Media and Information

Ministry of Mass Media and Information is responsible of governing and regulating television and radio broadcasting services in Sri Lanka. Ceylon Broadcasting Corporation Act No. 37 of 1966 as amended by Act No. 48 of 1988 and Sri Lanka Rupavahini Corporation Act No. 06 of 1982 as amended by Act No. 43 of 1988 are the two major statutes in the area of radio and television broadcasting in Sri Lanka. According to these two legislations, the Minister of Mass Media and Information has the authority to issue licenses for radio and television broadcasting to private firms or individuals [14] [15].

Broadcasting content is also responsibility of both institutions according to the legislation. They are responsible of “supervision and control” over content produced by others also, but not clear how it is being implemented.

Besides it regulates all news related websites through Sri Lanka Press Council. Ministry is also responsible for distribution of official news to the Press including the arrangement of Press Conferences, general dissemination of information on Sri Lanka and storage and dispatch of Government publications.

2.4.5 Mahinda Chinthana – Vision for the future

The vision of government is to develop Sri Lanka’s telecommunication infrastructure by 2020 for citizens to “be empowered with world-class telecom infrastructure, to make available its services when and where needed”. It is expected to;

- encourage public and private sector investments to enhance the infrastructure
- expand the capability of users for quick adaptation to digital technology
- create partnerships with the private sector to improve information and knowledge sharing
- upgrade the telecommunications services to meet the expectations and requirements of government, business communities, international communities and general public
- minimize the regional disparity of telecommunication facilities
- facilitate industries which use modern techniques of telecommunication

A “Government Net”, an online service centre working throughout the day, is proposed which will improve the access to government information and decisions in order for benefit of public and private sector. Human capital development is another target. Private sector will be encouraged to set up Information and Communication Technology institutes for local and foreign students in view of this. Along with that, Business Process Outsourcing (BPO) and Knowledge Process Outsourcing (KPO) industries will also be encouraged. There is a plan to promote satellite communication within Sri Lanka for transmission facilities as well as for coverage in rural areas.

Digital television broadcasting and broadband access are two things which government is looking at to increase the interactivity of general public with ICTs.

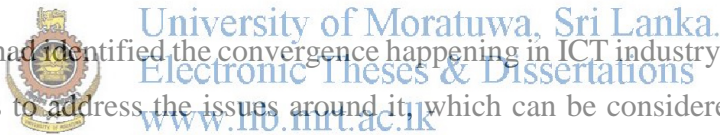
Government is also looking at developing ICT as a support industry to other sectors. It will be used to improve the opportunities of farmers' income in agriculture and to improve the productivity and efficiency in apparel industry.

A greater focus will be given for ICT in education sector. ICT will be promoted to use not only in academic activities but also in administrative activities in educational institutes and necessary infrastructure will be provided by public-private partnerships. Whole curriculum of primary, secondary and higher education will be changed giving higher emphasis on ICT related subjects. Research related to ICT will also be promoted [16].

2.5 ICT Policies of Selected Countries

2.5.1 United Kingdom

Communications Act 2003

 This act had identified the convergence happening in ICT industry and taken necessary measures to address the issues around it which can be considered as the main focal point of Communications Act 2003. As such, the Office of Communications (Ofcom), which is the new regulatory body formed under this act, will replace five different bodies regulating television, radio, telephony and allocation of the radio spectrum. The two main bodies involved in the merger – the Independent Television Commission, which oversaw commercial public service television, and Oftel which oversaw telephony – emerged out of very different and largely incompatible cultures of regulation.

Formulating this bill, it is assumed that “deregulation brings benefits for consumers and for businesses” when it comes to licensing aspects. As a result, the telecommunications licensing regime was replaced by a general authorisation for companies to provide telecommunications services subject to general conditions of entitlement, while BT retained its universal service obligation [17].

It also addressed the content side as well. Broadcasters were required to make a proportion of television programmes outside the London area and required to carry a “suitable quantity and range of programmes” dealing with religion and other beliefs, as part of their public service broadcasting [17].

2.5.2 India

Communications Convergence Bill 2000

Government of India introduced the above bill with the objective of establishing a new converged regulatory framework to promote and develop the communications sector including broadcasting, telecommunications and multimedia in an environment of increasing convergence of technologies, services and service providers.

The Convergence Bill proposes to repeal and replace 4 existing sector laws, which was related to telecommunications, broadcasting and telegraph. The main objectives of the Convergence Bill are as follows [18].

- To facilitate development of a national communications infrastructure, in order to provide a wide choice of services to consumers.
- To establish a regulatory framework that addresses the convergence of technologies, and defines the powers and roles of a single regulatory and licensing authority for broadcasting, telecommunications and multimedia.
- To establish a basis for codes and standards for broadcasting content.

The Convergence Bill proposes to achieve these objectives by establishing a new regulatory body to be known as the Communications Commission of India (CCI). It will replace the previous regulatory body, and would become the sole regulator of the broadcasting, telecommunications and multimedia sectors [18].

2.5.3 Malaysia

Malaysian government had continuously changed its approach on Malaysian economy in order to ensure a continuous growth. In 1950s, the economy is solely based on agriculture and then during 1980s, government changed its focus on manufacturing

industry. As a result, contribution of agriculture shrank from 29% in 1970 to 8.1% in 2002, whereas manufacturing grew from 13.9% to 30.1% for the same period. However, Malaysian government realised that if the country to sustain the growth which it had, focus on manufacturing only would not be sufficient. Instead, they decided to move into a “K-Economy”, where ICT is the key driver [19].

In their “Vision 2020” plan, Malaysia decided to use ICT in a dual role [19], namely

- ICT as a new sector of growth to achieve development goals and value creation
- ICT as a strategic enabler in moving Malaysia towards Knowledge Society and Knowledge Economy

In order to facilitate the above two roles, they launched two initiatives which are shown in Figure 2.6.



Figure 2.6: Malaysian ICT Initiatives

Multimedia Super Corridor (MSC)

MSC Malaysia is designed to attract world-class technology companies while grooming the Malaysian local ICT industry. It is a bold attempt at developing a dynamic industrial cluster for producing innovative ICT-based multimedia products and services. Physically, it is an area 15 kilometres wide and 50 kilometres long, that starts from the Kuala Lumpur City Centre down south to the Kuala Lumpur International Airport [19].

MSC is formulated around 7 key sectors, which are known as Flagship Applications which drive the project’s development [20].

- i. Electronic government
- ii. Smart schools
- iii. Multipurpose cards
- iv. Tele-health
- v. R&D
- vi. Worldwide manufacturing web
- vii. Borderless marketing

Within this MSC, an organization would receive financial benefits such as tax reliefs, access to world-class physical and information infrastructure, and access to unrestricted employment of local and foreign knowledge workers. Furthermore, it is provided with high capacity backbone network with globally-competitive tele-infrastructure pricing. Also a MSC company is protected with series of legislations including cyberlaws and intellectual property rights. Some landmark legislations passed were [20];

- Digital Signature Act 1997
- Communications & Multimedia Act 1998
- Malaysian Communications & Multimedia Commission Act 1998
- Copyright (Amendment) Act 1997
- Telemedicine Act 1997
- Computer Crimes Act 1997
- Electronic Commerce Act 2006
- Electronic Government Activities Act 2007

National IT Agenda (NITA)

NITA outlined how balanced ICT development ought to be driven. It adopted a ‘people-centred’ approach to development. NITA focuses on the balanced development of people, infrastructure, content and applications to create value, to provide equity and access to all Malaysians, and to qualitatively transform the society into a values-based knowledge society by the year 2020 [19].

NITA is operationalized using 5 strategic policy thrusts.

- E-Governance: delivery of public services
- E-Social: evolution of inclusive society
- E-Economy: value creation for a new economy
- E-Learning: a culture of learning, unlearning and relearning
- E-Sovereignty: national sovereignty in a borderless world

2.5.4 South Korea

South Korean government, in their journey to become a developed economy, identified that they were too late to engage in ‘Industrialization’. Hence they looked for an alternative and decided to be ahead in ‘Digitalization’. With this vision in mind, government launched series of policy initiatives to reach their economic target.

- Informatization Promotion Plan (1996)
- Cyber Korea 21 (1999)
- e-Korea Vision 2006 (2002)
- Broadband IT Korea Vision 2007 (2003)
- U-Korea Master Plan (2006)



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

These policies were continuously supported by establishment of key government institutions and formulation of legislations.

- Foundation of Informatization Promotion Fund in 1993
- Foundation of Ministry of Information and Communication – 1994
- Basic Law on Informatization Promotion – 1995
- Informatization promotion Committee – 1996
- Informatization strategy council – 1998

In order to be ahead in digitalization, South Korea invested heavily on developing ICT infrastructure. As a result, they build a high capacity backbone infrastructure which connects almost 70% of households by 2001. By then, their broadband internet penetration was 17%, way higher than developed nations such as Canada (8.4%), USA (4.5%) and Japan (2.2%). They wanted universal access to broadband services and to promote that, South Korea commercialized CDMA technology as early as 1996 [21].

Cyber Korea 21 Initiative

Vision of Cyber Korea 21 was to “Build a Creative, Knowledge-Based Nation”. In order to realize this vision, they had set the following objectives [22].

- Early Establishment of an Information Infrastructure
- Increasing productivity and transparency of all economic agents such as the government, businesses and individuals through the utilization of a more advanced broadband telecommunications network and IT
- Promoting new businesses through the utilization of an information infrastructure and creating new jobs by facilitating the information and communications industry
- Designating competitive telecommunications products and services as key export products and thereby providing focused financial assistance for developing relevant technologies

e-Korea Vision 2006

To become “The Global Leader” in ICT, e-Korea Vision 2006 launched a program which consists of three major areas (Figure 2.7) [23].

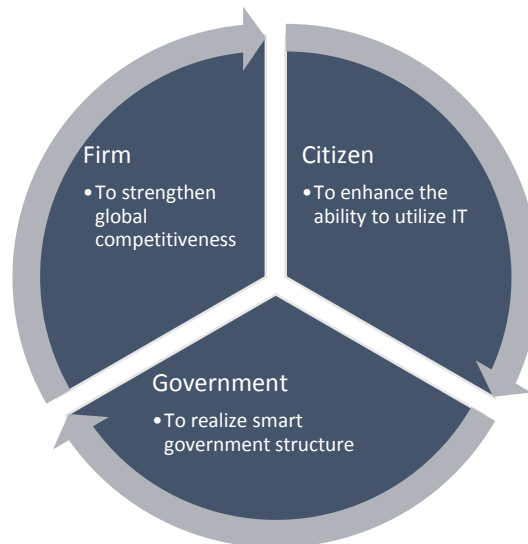


Figure 2.7: Major areas of e-Korea Vision
Source: Ministry of Information and Communication-Republic of Korea

The government was targeting to achieve the following.

- To maximize the ability of all citizens to utilize information and communication technologies in order to actively participate in the information society
- To strengthen global competitiveness of the economy by promoting informatization in all industries
- To realize a smart government structure with high transparency and productivity through informatization efforts
- To facilitate continued economic growth by promoting the IT industry and advancing the information infrastructure
- To become a leader in the global information society by taking a major role in international cooperation

Broadband IT Korea Vision 2007

This was an extension to the previous plan, with revised set of objectives continued from previous [24]. They were

- Developing new technologies for IT growth and constructing Broadband Convergence Network (BCN): 5Mbps - 100Mbps network integrating communications, broadcasting and the internet, which can provide broadband multimedia services anytime and anywhere
- Achieving the most open e-Government in the world
- Creating a digital welfare society and further promoting the public's capabilities to use information
- Strengthening personal data protection measures

U-Korea Master Plan

U-Korea was created as a response to further changing policy needs in the mid 2000s. New Government priorities at this time included, among others, achieving balanced regional growth, addressing growing concerns over low economic growth and high

unemployment among young people, and taking into account individual needs and increased diversity in society. This plans to make Korea the first ubiquitous society using the best u-infrastructure with the highest bandwidth [24].

This policy is based on 4Us;

- Universal acceptance in society
- Services usable by all
- Unisonous (harmonious) use of technologies and services
- Continual upgrading and creation of services

The Government’s objectives for U-Korea will be reached through advancement in FIRST five areas and optimization of BEST four engines as depicted in Figure 2.8.

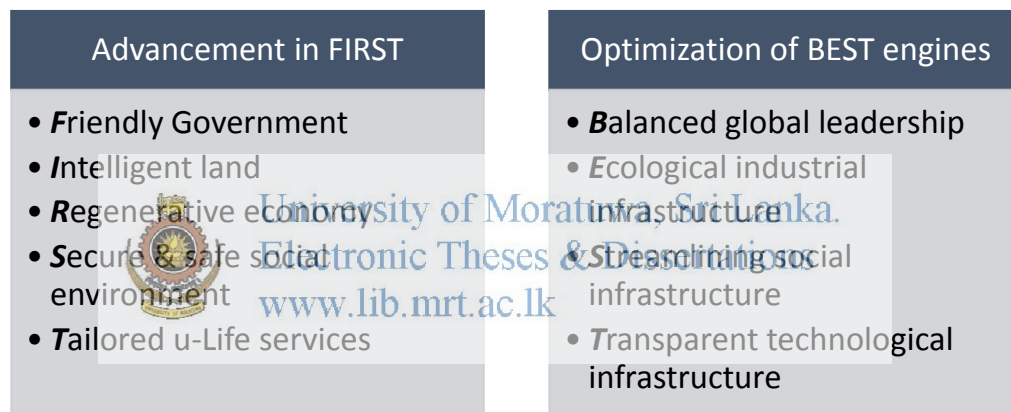


Figure 2.8: U-Korea Master Plan

2.5.5 Singapore

Singapore government has played an active role in facilitating economic development, which resulted in Gross Domestic Product (GDP) per capita growth of USD 1300 in 1960s to USD 38,000 currently. This phenomenal growth has been largely due to continuously evolving industry policy and a strong bias towards technology. Hence, it made Singapore second in Asia in terms of ICT diffusion and adaptation, only behind Japan by 2000 [25].

Since its independence, Singapore economy has changed from labour-surplus, manufacturing-intensive economy to highly-skilled, technology-intensive economy.

This is supported by government's continuous change of policy towards ICT (Figure 2.9).

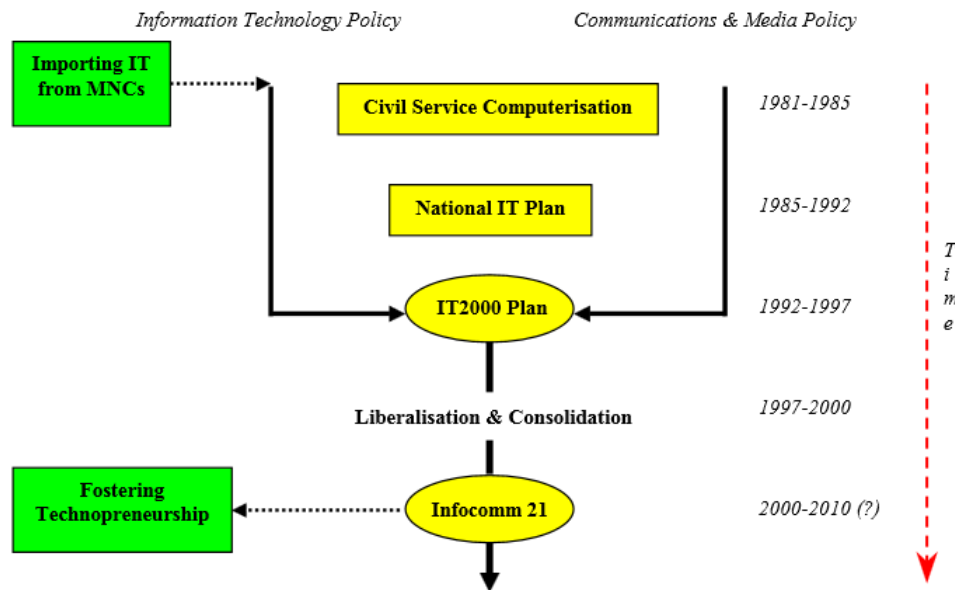


Figure 2.9: Phases of ICT transformation in Singapore
 Source: Singapore's ICT Policy for the New Millenium: Implications for SMEs

In early stage, there were two distinct areas, IT, and Communications & Media. In 1982, Civil Service Computerisation Program (CSCP) was launched to;

- Improve productivity within various ministries and organizations of the state
- Link and co-ordinate workings between the agencies of the civil service

On the other hand, government heavily promoted Foreign Direct Investments (FDI) of Multi-National Corporations, in order for Singapore to get the advantage through learning from the industrialized nations without needing explicit research and development facilities or advanced human capital.

National IT Plan

In 1985, through National Computer Board (NCB) government launched the National IT Plan. In this, their strategy was to [25];

- Development of IT professionals and experts
- Improvements to the information communication infrastructure
- Promotion of the ICT industry

- Co-ordination and collaboration between various ICT-promoting organizations
- Establishing a culture that welcomes ICT
- Encouraging creativity and entrepreneurship
- Increasing ICT application in workplaces

IT2000 Vision

In 1992, Singapore launched IT2000 Vision in the view of becoming an “Intelligent Island” [25]. The most significant milestone is that government consolidated the two distinct paths into one converged single policy path, which was one of the early adaptations of convergence in the world. Its goals were;

- Intensified development of ICT-related manpower
- Improved quality of life through ICT
- Improved personal and community communications through ICT
- Using the National Information Infrastructure to establish a competitive advantage both within and outside the island



University of Moratuwa Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Infocomm 21

This initiative was launched in 2000 for the next decade. The vision of Infocomm 21 was to transform Singapore into a dynamic and vibrant global ICT Capital. It is driven based on 3 principals [26].

1. Market should be fully liberalised
2. Private sector is the key to the growth, where government will only act as a facilitator
3. Should always align with the global business perspective.

The most significant milestone of Infocomm 21 was the full liberalisation of ICT industry, which took place on 1 April 2000. To enhance attractiveness of Singapore for global industry players as an ICT hub, a strong foundation must be laid with world-class infrastructure providing affordably and with high-quality. Singapore chose full liberalisation as the way to achieve it [27].

Another objective of this initiative was to develop ICT as a major sector of growth in Singapore economy. 3 strategies were identified to drive this [27].

- Developing content industry through lowering access costs and providing support through infrastructure development
- Build capabilities that are needed for the new Internet economy and encourage innovation
- Foster strategic partnerships and alliances overseas to help industry to regionalise and globalise



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

3. ANALYSIS OF PROBLEM

3.1 Methodology for Analysis

Methodology for analysis is illustrated in Figure 3.1.

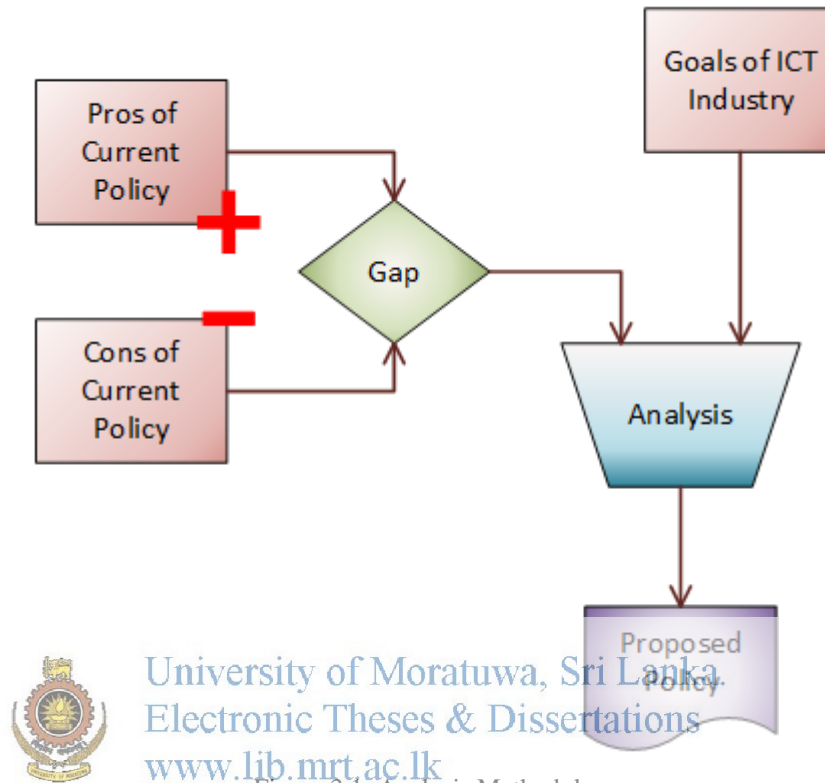


Figure 3.1: Analysis Methodology

Strengths and weaknesses of current policy is first identified. This identified gap is analysed with goals of ICT industry in order to come up with the required policy changes for the industry. The proposed policy aspects were validated through the inputs of the regulator, TRCSL.

3.2 Shortcomings of Current ICT Policy in Sri Lanka

Before policy making, it is required to know your current position and position which you are targeting to go. Once those two are known, policy will tell which path to take to reach the destination. Sri Lanka is currently a low-middle income country. In the medium term, government expect to grow towards high-middle income category. In the long run, Sri Lanka wants to be recognized as a major economy in South Asia with

advancement in science and technology. At least government is clear about its destination. But it is not clear how the ICT would help to reach its destination.

It is believed that ICT has a major role to play in the economic development of Sri Lanka. This role can be either,

- as a different sector where earnings will come directly by selling ICT products, or,
- as an enabling sector where support will be given to other sectors to excel in those or,
- a blend of above two approaches.

It is critical to first correctly identify the strategy in which ICT will be treated. The policy and legal framework formulation should come after this and they should be formulated in a way that ICT industry is driven according to the selected strategy. Government has a proposal of making Sri Lanka a “knowledge hub” in Asia, in which ICT have a major role to play. In addition, it is targeting to make ICT a major export commodity of Sri Lanka and generate more knowledge workers in ICT sector. As a result, it can be seen that we have chosen a blend of above two strategies. Then, our policy and legal frameworks should be aligned with this selection of strategy and should support and enable the smooth execution of strategy. However in Sri Lankan context, this alignment is hardly seen.

The uncertain selection of strategy and unavailability of policy will lead another chaos in the industry. The development of economy is not only a government task, but private sector involvement is highly necessary. But these two sectors should be aligned to a same goal and heading towards it. The uncertainty due to no policy will confuse the private sector when it comes to development of ICT industry. They would not know the amount of investments to do and in which areas to invest. Therefore it will be a lagging point in the development of this industry.

Government of Sri Lanka has correctly identified the importance of ICT towards country’s development, though there is an uncertainty as discussed above. Furthermore, government believes the benefits of ICT must reach towards farthest corners of the island in order to reap its real benefits. However in policy, it is very

unclear how the government is planning to bridge the gap between urban and rural ICT presence and solve the digital divide.

The current trend is that telecommunication, internet, broadcasting and content technologies are converging. The borders of each technology are slowly diminishing and merging into one. As a result it is commonly addressed as information and communication technology. This converging environment should be clearly understood in policy and legal framework setting. If policy and legal frameworks are also not converged along with the technology, there will be problems in the years to come. Because, there will be definitely overlaps and gaps when each of above technologies are regulated separately. This is what has happened exactly in Sri Lanka. We have not identified this convergence and Sri Lankan policy or regulatory frameworks do not address it. In fact, telecommunications, broadcasting and internet are coming under control of different authorities and responsibility of controlling content is vague. This is a serious issue and needs to deal with immediately if we are looking for a rich growth of the sector.

The best example of vague regulatory framework can be seen in television and radio broadcasting. They must obtain their licenses to broadcast from Ministry of Mass Media under the direction of either Sri Lanka Broadcasting Corporation or Sri Lanka Rupavahini Corporation. Once they have that license, then they must next get a bandwidth of spectrum from Telecommunication Regulatory Commission. And there is a risk of not getting a frequency band due to scarcity.

Another phenomenon that is visible in ICT industry is that one corporate entity moving into many industries. For example, initially a telecom company may move into broadcasting, content production and media. This had happen in advanced economies and also starting to happen in Sri Lanka as well. Hence it is better to govern whole ICT industry under one regulator rather than several.

Development of ICT infrastructure is not sufficient to achieve its full benefits. The users of that infrastructure must be appropriately educated to use the infrastructure facilities to the maximum. Policy must address how to develop the human capital. It is a good sign that Sri Lanka has already taken initial steps to develop the human capital and enhance ICT literacy among general public. Few such initiatives taken are

introduction of ICT as a subject to school curriculum and new courses being introduced to university curriculum in recent past.

In addition, content must be sufficiently available for the infrastructure to be efficiently used. Content can be applications, data, information, and many more. Most importantly content must be in local languages where communities can easily grab the value. Sri Lankan ICT policy is very weak in content development and regulation. Also it must be go hand in hand with Intellectual Property Rights Laws.

As discussed earlier, Sri Lankan ICT industry has gone through drastic transformations over the last few years. In addition, the competition is getting tougher and tougher day by day and players are willing to do all sorts of things to survive. Sometimes, these activities are intended to kill the healthy competition which can be harmful to the industry as well as society in the long run. The Sri Lanka legislation is older than a decade now and the market conditions are now totally different from then. The regulatory provisions are sometimes not sufficient to battle such activities. Furthermore, telecommunication and broadcasting does not have a policy which a new legislation should base upon. Therefore, the requirement of proper ICT policy framework is crucial in that aspect as well.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

4. TARGETS OF ICT INDUSTRY IN SRI LANKA

Principal objective of any country by developing an industry is to get a boost in economic growth and ultimately improve the standard of living. This is no different for what Sri Lanka expects from ICT industry. With the advancement in sector, it is expected to produce significant returns to Sri Lankan economy. Hence the proposed policy should drive the industry towards this principal objective. Therefore, the suggested policy would be built around the following factors and would help to promote the same.

- ICT as a major sector in economy
- ICT as an enabling factor for other sectors
- Extend the reach of ICT to every part of the island
- Develop Human resource for ICT
- Promote research in ICT
- Develop content
- Introduce more ICT related services

4.1 ICT as a Major Sector in Economy



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

At present ICT industry in Sri Lanka is promoted as a separate sector of economy. As a separate sector in the economy, software and application development, web development, content development and KPO/BPO are highly promoted as strengths of Sri Lankan ICT industry.

Currently Sri Lankan ICT industry is well recognized in the international market as a destination of choice. Sri Lanka is ranked among the Top 50 Global Outsourcing destinations by AT Kearney and ranked among Top 20 Emerging Cities by Global Services Magazine. Currently, over 60,000 are employed in the ICT industry in Colombo and the workforce is growing at over 20% year-on-year. In 2013, ICT sector generated USD 719 million as export income and contributed to 6.47% of total exports [28].

With the advancement of this sector, it is expected to increase the employment opportunities for Sri Lankan knowledge workers while bringing FDIs and export

revenue into the island. In 2014, IT BPO sector received USD 24.7 million worth of FDIs, while USD 152.5 million by telecommunication sector. This is 11.6% of total FDIs during the year [29].

In order to achieve intended benefits, ground work must first be completed.

- Major requirement to be fulfilled is developing the human capital. There should be sufficiently large labour pool for the potential companies to select from and that labour pool must be equipped with required knowledge and skills. Hence Sri Lankan educational institutes must be encouraged to produce professionals with wide range of knowledge on ICT, language skills especially English and other soft skills such as presentation, leadership, team working, etc. They must be continuously exposed to new technologies, therefore, education curriculum must be regularly revised and updated.
- To promote the island in ICT sector, Sri Lanka must be equipped with necessary infrastructure. This can be datacenters, processing power and required platforms. Having infrastructure will be helpful for Sri Lankan ICT companies to carry out their work on them as well as it will be an opportunity to promote IaaS (Infrastructure as a Service) and PaaS (Platform as a Service).
- Connectivity is also essential in promoting ICT as a separate sector in the economy. Internal connectivity must be extended to link all the major industrial parks as well as workers' accommodation. Externally, Sri Lanka must easily, inexpensively and reliably accessible from any part of the world. It should be furnished with sufficient bandwidth and low latency while armed with new and future proof technologies.
- Government intervention for ICT industry is a must to boost investor confidence and bring more FDIs. These interventions may come as incentives, tax holidays, ensuring friendly business culture, sufficiently competitive business environment and loosening regulatory controls for startup businesses. Accordingly, Sri Lanka has moved from 113th place in 2015 to 105th place in 2016 in World Bank's "Doing Business 2016 Index", as a result of few measures taken by the government already [30], which is a positive sign.

- It will not be enough to depend on outside world for new concepts and technologies in the long run. Hence it is essential to promote innovation and invention culture among Sri Lankan academics to strengthen our position in ICT industry.

4.2 ICT as an Enabling Sector for Other Industries

ICT is also promoted as an enabling sector for other industries in Sri Lanka at present. It can be used to improve productivity, cost effectiveness and competitiveness of other industries.

In this information era, data is considered as one of the most valuable assets an organization can have. Accessibility to and processing of these rich data is a vital success factor for all industries and ICT is the key enabler in this regard. ICT can help companies to collect, process, store and share the data in an efficient manner.

Connectivity is another significant aspect for doing business in current dynamic environment. The right connectivity tools enable the business to be productive, competitive and efficient. It will enhance the reach of the businesses and will open up the markets all around the globe, which otherwise be unimaginable. Having strong, fast, future-proof connectivity mechanisms will be an incentive for attracting more foreign investments into the country, as it will ensure low cost of operation and easy management.

As an enabler, ICT can provide lot of tools to other industries for them to simplify operations. These tools can be in the categories of below and not limited to;

- Communication – email, teleconferencing, etc.
- Advertising – mass media, internet, etc.
- Market intelligence – e-surveys, SMS, etc.
- IT infrastructure – cloud computing
- Financial – e-banking, e-money, etc.

In this case also, as discussed in Section 4.1 above, human resource, infrastructure, internal and external connectivity plus government intervention is highly required to set the stage up.

4.3 Extending the Reach of ICT Throughout the Island

In order to reap real benefits of ICT industry and utilize it to its maximum potential for the advancement of country, it must be reachable to every citizen. The reachability is achieved by fulfilling two criterion (Figure 4.1).

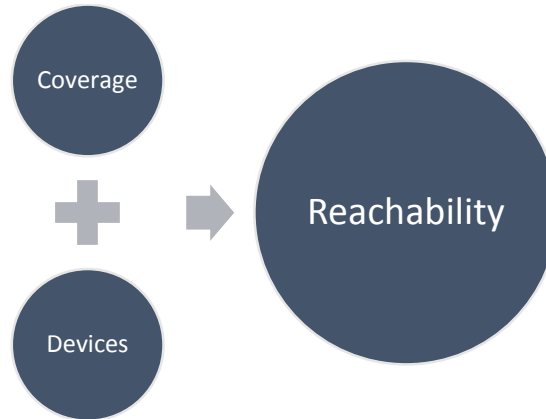


Figure 4.1: Two components of Reachability

4.3.1 Coverage

Coverage of an ICT service in particular, is the availability of that service to be accessible by the user for the intended usage with expected quality by the user. For any ICT service, mobile or fixed telecommunication, radio or television, data and information, coverage is the first and foremost important aspect.

Providing coverage is usually the responsibility of the service provider. It has become their first priority because coverage defines the accessible market for a particular service. Various mediums are used to provide service coverage, such as radio spectrum, electric wires and fiber optic cables, depending on the technological standards used.

Another important aspect in coverage is that it must be available both locally as well as internationally since in current context, world is becoming smaller and nobody wants to be left alone. It has become a challenge for the companies to extend their coverage both locally and internationally with today's demanding consumer expectations in a cost effective and high quality manner.

When coverage is provided, it must be adhered to certain quality standards as well. Coverage alone will not be sufficient if services are not usable with an acceptable quality. Hence quality is an aspect which goes hand in hand with coverage and also which operators must look into very seriously.

Although coverage is a responsibility of service provider, they may tend to focus more on areas where their return is high. As a result, urban areas with higher population are easily covered and very remote areas are left out. This will cause digital divide, which may create social problems in the long run. Hence government intervention is required in such scenarios.

Sri Lanka has 5 mobile operators, 3 fixed line operators, 4 data communication operators, 9 internet service providers, 4 Direct-to-Home Satellite Broadcasting Operators, 20 FM radio broadcasting operators and 14 television broadcasting operators. Radio and television broadcasting has already covered the island. According to coverage maps published by operators, 2G voice coverage has reached to all most all parts of Sri Lanka. 3G and 4G data coverage is still in the increase as there are much to be covered. According to published reports, Sri Lanka Telecom, Dialog and Mobitel, all three operators have invested heavily during 2014 to expand their 3G, 4G and fiber optic networks throughout the island.



University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

International coverage of Sri Lanka is strong and future-ready with connectivity from undersea optical fiber links, SEA-ME-WE 3, SEA-ME-WE 4, Bharat-Lanka (between India and Sri Lanka) and Dhiraagu (between Maldives and Sri Lanka) under the management of Sri Lanka Telecom [31] and FLAG under the management of Lankabell. Sri Lanka Telecom involved in the capacity upgrade of SEA-ME-WE 4 cable upto 100Gbps during 2014 and currently in the process of commissioning SEA-ME-WE 5 undersea fiber cable with a speed of 24Tbps, which is to be completed in 2016 [31].

4.3.2 Devices

In order to receive the intended ICT services, users must be equipped with proper devices. To communicate, to browse, process, read information, to watch and listen to

broadcastings, to carry data, one must need an appropriate device, whether it is a phone, tab, television or radio set, music player, USB device, DVD player, etc.

In extending the ICT reach to every part of the island, such devices availability is also essential. Following factors need to be considered in relation to device availability.

- Support of new technologies
- Affordability to general public
- User friendliness, even to a person with low literacy
- Suitability to Sri Lankan environment

4.4 Develop Human Resource for ICT

Development of human resource for ICT should be promoted in two facets.

- Strengthening general public
- Developing ICT work force

General public must be strengthened with ICT knowledge in order for them to realize the benefits and contribute to national development. In strengthening, their knowledge levels must be increased and appropriate content must be produced to suit the different categories of social and education levels. There must be incentives for the usage of ICT services initially to break the barrier. Gradually, complexity can be increased when the public starting to get familiarized with the services.

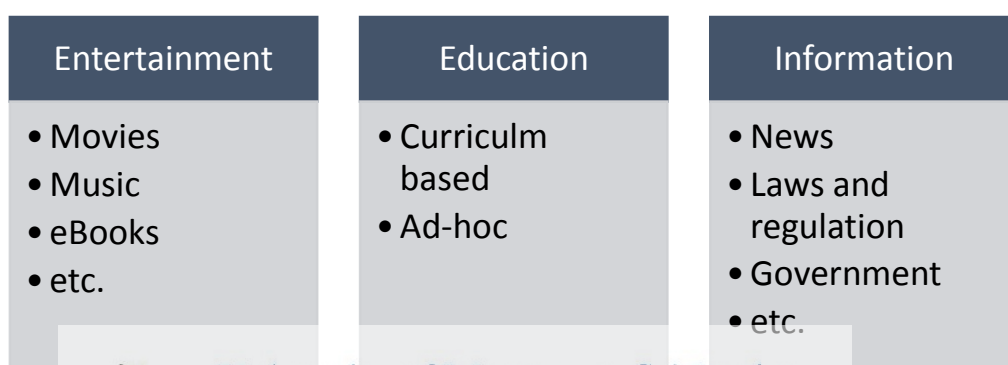
Another aspect is to increase the opportunities available to use ICT services in day-to-day life. This can be facilitated by introducing more and more services in governmental and private sector, in addition to making the services accessible by enhancing the coverage. Government initiated “The Nenasala” project is a good example of initiative taken to raise the IT literacy of the people of Sri Lanka. The primary aim of this project is to empower the rural community with ICT. [32]

Strong ICT workforce is an essential item to promote ICT industry in a country. As discussed in 4.1 and 4.2, this workforce may be used to promote ICT as a separate sector or an enabling sector. Furthermore research staff in ICT sector in Sri Lankan universities must be increased. ICT was included as a subject in G.C.E. Advanced Level from 2002 onwards and in G.C.E. Ordinary Level from 2007 onwards [33]. This

can be considered as a remarkable milestone in developing the next generation ICT workforce. Moreover, for the academic year 2013/2014, there are 14 courses of study on offer directly related to ICT in Sri Lankan government universities, one course being newly introduced for this academic year [34].

4.5 Develop Content

Availability of content to be used by users of ICT is a critical factor to success of this industry. Development of content can be in many different facets (Figure 4.2).



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

Figure 4.2: Content Categories

Most important aspect of content development would be the relevance of the content to the general user. Furthermore, content should be available in local language of the user in every possible occasion. Only if these two criterion are met, the public will start using content.

Along with the content development, public must be educated to use the content for their day-to-day life, uplifting of their incomes, social status and eventually to the betterment of society. On this regard, government has a major responsibility in setting the necessary guidelines for content development and providing basic infrastructure for content usage as well as training needs.

4.6 Introduce More ICT Related Services

Along with the content, availability of more ICT services will also help to stimulate the usage of ICT in a country. In day-to-day life, people and entities are involved in

obtaining and offering services to each other to fulfill their duties and responsibilities. Most of the services require physical presence of both parties. This is where ICT come in handy, because these services can be converted to be provided using ICT without physical presence. This will greatly improve the efficiency, effectiveness and productivity, which will be attractive for people to use more. Hence, it will alone make ICT services more popular.

But to make services more popular, they have to be user friendly, easy to understand and easy to adopt. Same time, they have to be made in local languages. Both parties, the provider and receiver must be educated with the service as well as how to use it. Accessibility to such services must also be looked at. Devices, connectivity, locations to access and required infrastructure must also be provided.

Most private companies in Sri Lanka have moved to ICT to offer their services. Banks are in the forefront in this exercise, as every bank now has an online banking portal. Also mobile phone based e-money services are offered by two mobile operators in country. During 2nd quarter of 2015, 3.6 million transactions were carried out in Sri Lankan banking system using ICT related services worth of Rs. 293 billion [35].

Sri Lankan government also offer some public services using ICT, and emphasis is in the rising with e-Sri Lanka initiative. The number of government organizations which provides services through ICT has increased to 553 during 2014. Several government services were developed to offer through ICT during the year such as the online revenue license service in the Southern Province, service for enabling members to view their Employees' Trust Fund balances and claim application status and issuing the Certificate of Origin from the Department of Commerce. Besides, in 2014, 264 new "Nenasala" centers were established island wide, increasing the total number to 1,005, thus providing increased opportunities to the rural community to access these ICT services [36].

4.7 Promote Research in ICT

Sri Lanka entirely depends on the foreign technology for ICT at present. If as a nation, Sri Lanka looks to excel in ICT, this dependence must be avoided in long run. It can only be achieved through promoting a research culture.

ICT research can focus on inventions of new technologies, concepts or equipment. It can also be centered on innovating already identified technologies or concepts. These research activities can spread among all the areas discussed above from 4.1 to 4.7.

Through ICT research, the dependence on FDIs can also be minimized, while efficiency and productivity of workforce can be enhanced. New opportunities can be opened for the under-developed segments of the society in order to help them to elevate from where they are. Increasing the value of ICT sector exports must be looked at along with developing the human capital.

In order to promote research, following pre-requisites can be identified to be fulfilled.

- Infrastructure and facilities for research among Sri Lankan universities must be improved. This can be labs, equipment, testing platforms, special spectrum assignments, connectivity and testing zones.
- Sufficient human resource must be available for research work. While developing new academics from the Sri Lankan student community, ways and means must be looked at to minimize brain drain and if possible to reverse it.
- Government intervention is really necessary to provide incentives and funding required for research. Besides, research work must be directed towards the nationally an identified priority list.



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

5. PROPOSED ICT POLICY

Sri Lanka is looking for high prospects from ICT industry in the future, to develop the economy and improve the standard of living of its citizens. Henceforth, industry must be prepared to take that challenge and some ground work must be arranged to industry to take the charge on. On this regard, general public must be made ready and organizations to be equipped with necessary measures. Here government has a major role to play in order to provide the required infrastructure. One of the components of this infrastructure is a strong, balanced, well-thought policy.

The proposed ICT policy is to achieve objectives which are discussed in detail in Chapter 4 above. These objectives are interrelated, because none can exist on its own. Thus actions to be taken will also be interrelated to achieve those objectives. Therefore, the proposed ICT policy should cover all the areas which were discussed in Section 2.3 above.

However, scope of this study is limited to only three selected areas from the above list. Hence, in this section proposed policy actions will be discussed in detail for the areas of licensing, spectrum management and interconnections.

5.1 Licensing



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

5.1.1 Converged Regulation

As discussed in Section 2.2.1, the current trend is that telecommunication, internet, broadcasting and content technologies are converging. The technologies are becoming more and more interrelated and merging into one. This converging environment should be clearly understood in policy and legal framework setting.

Henceforth, it is proposed to regulate the whole ICT industry through a single regulatory body in a converged manner. Instead of having different organizations responsible for regulation and policy setting in Sri Lanka such as TRCSL, ICTA and Ministry of Mass Media, single statutory body to be formed through an enactment of legislation in parliament.

With single body in place, there will be no misalignments, no misunderstandings and government expectations and goal for ICT industry will be clear and direct. This

currently is not the case in Sri Lanka. Proposed body will be responsible of policy setting, legislation, regulation and enforcement in whole ICT industry.

Licenses are proposed to issue for ICT services in a converged manner. New body can evaluate requirements for a particular service to be offered and based on requirement, single license can be issued. For example, a telecommunication service provider would need radio bandwidth for coverage, bandwidth for microwave communication, rights of way for fiber/copper cable laying, provision for Internet services and External Gateway Operator (EGO) services. A single license can be offered mentioning the authorizations. This would be administratively easy for both the issuer and holder as well as a reason to lift the investor confidence.

With the single regulator issuing a single license, there is no need of going after several authorities to start an ICT related business in Sri Lanka. Previously, to start a broadcasting service, spectrum license to be obtained from TRCSL and TV or radio license from Ministry of Mass Media. There is a risk of getting only one and other being rejected. But with proposed setup, such issues will not be there. It will also be a boost for ease of doing business index.

Different countries respond differently to this converged regulatory requirement. Hence Sri Lanka also has to address this situation appropriately. One approach is introducing an equal or technology-neutral regulatory treatment of different information and communications infrastructure. For example, the European Union, India, and Kenya adopted this approach. Governments such as Malaysia, Singapore, and the United Kingdom, are modifying the structure of regulatory authorities by providing them with the authority to regulate the telecommunications, broadcasting, and information technology sectors. Also addressing convergence situation in regulation has provided remarkable results in terms of industry growth. For example, South Korean government created a converged regulator in 2008, because they cannot introduce Internet Protocol Television (IPTV) with previous regulations. With this change, by the end of 2010, Korea's IPTV market was the fourth largest in the world with about 3.65 million subscribers and was also the fastest growing IPTV market with an increase of 54% between 2009 and 2010 [37].

In summary;

1. Single regulatory body to be established for whole ICT industry

2. Licenses for ICT services to be issued in converged manner through the above single regulatory body

5.1.2 Maintain Correct Level of Competition

Correct level of competition is a major factor for a successful industry in any economy. Too much competition will create unnecessary price wars and would hamper the growth of industry in long run because profit levels are lower for companies to invest in novel technologies. Less competition will create monopolistic situation where consumers are overcharged and would also be low futuristic growth because there is no real need by the companies. Hence it is a primary responsibility of the regulator to maintain a healthy competition where both consumer and supplier are protected for the betterment of society.

The level of competition to be maintained will be different for different industries and services. One factor is the amount of investment required for a particular service and addressable market available to return that investment. For example, huge amount of investment is required to build a telecommunication network. But while giving an affordable service to consumers, to generate a sufficient return available market size in Sri Lanka is not enough for 5 players. If Then profits available for the operators will be less to invest in future technologies, obstructing the growth of industry.

Another aspect is quality of service offered. When there is no competition, quality of service is bad because there is no requirement for the company to bind the consumers. This was the case for fixed line operation before the privatization of Sri Lanka Telecom. Still it is not much different, because they are the only operator with wired fixed line in the island. When there is too much players, quality of service tend to worsen also. For example, some programs presented by some television and radio broadcasters are utterly useless and sometimes detrimental. It is due to lack of resources in relation to market size, in terms of funds, people and technology to produce quality programs.

Moreover, availability of resources will affect the number of players. One aspect can be availability of knowledge workers. If Sri Lanka cannot produce required number of ICT professionals to serve in available KPO/BPO companies, then service offered by

those firms will be not competitive in international markets. It will be better to have less number of firms with high quality output than more firms with low quality output. Also available spectrum, numbering plan and rights way will limit the number of players that a country can handle.

Considering all these factors, regulator must define in its policy the number of maximum licenses that it will going to offer in category of service. Then investors would know that their investments are safe and would generate sufficient rate of return while customers would know that they will receive a quality service for the charge they pay. This will be strong foundation for the Sri Lankan ICT industry to prosper.

According to GSMA, between 2008 and 2013, Earnings Before Interest, Taxes, Depreciation and Amortization (EBITDA) of mobile operators have fallen by 350 basis points due to increased competition. There are some signs of stabilization of this trend in 2014 and one reason for stabilization is consolidation [38].

Consolidation can be identified as the current trend of most advanced telecom markets today. USA is leading the global trend of consolidation with four operator market, followed by European Union where most countries would see a three operator landscapes. This is happening through a series of mergers and acquisitions, where during first 6 months of 2014, 79 such deals were announced worth up to USD 230 billion [39].

In summary;

1. Number of licenses to be issued in each sector must be decided and defined by the regulator

5.1.3 Degree of Regulation

The degree of regulation of any service can be between the extremes of fully regulated and fully liberalized. This degree of regulation of particular industry/service can be determined based on several factors.

- Maturity level in terms of development and technology
- Level of competition
- Significance to economy
- Impact to society

Usual understanding is if industry is mature enough in terms of technology, reachability, development, etc. it should be allowed to operate freely without regulation because free market is believed to be better compared to regulated environment. When number of market players are high and competition is severe, regulation is must to have in order to protect the industry and investments of firms, because some anti-competitive behaviours of strong players may completely destroy small players. When the industry is so important to the economy as well as impact is high to the public in terms of cultural and social aspects, regulator must step in.

Sri Lankan telecommunication industry is highly competitive. Although it is rich with new technology introduction, the reach of newest technologies to every part of the island is not sufficient. Hence it is understood that telecommunication industry is still not ready to operate freely and regulation is required. Especially pricing, quality of service, reachability and consumer protection require regulatory intervention to drive the industry in the correct heading. The price war taken place with the introduction of 5th mobile player was detrimental to the future growth of industry. Although consumers enjoy low prices, it is not good in the long run because firms are running with very low profit levels which can affect future investments. Quality of service and consumer protection must be under surveillance and should be interfered if required, but not critical as pricing. The directive of TRCSL to obtain monthly Quality of Service (QOS) reports is a good initiative in this regard.

Broadcasting is also highly competitive. But regulation is required in broadcasting because, its impact to the public is very high. The programs and news items are proposed to be tightly regulated. Regulatory intervention is required to develop the industry in technology front, where move into digital and high-definition broadcasting must be driven by regulator.

Content industry in Sri Lanka is at very primitive stage. Hence it is proposed to ease the regulation and let the industry grow. However, content developed has a direct social and cultural impact, strict surveillance must be maintained. It is proposed to direct government involvement and incentives in content development, because spearheading is required to direct it in the correct path.

Establishment of Data centers is also viewed as a necessity for the development of ICT industry in Sri Lanka. Since Data center business is at its initial stage, it is recommended to ease the regulation and let the business grow by providing incentives to the possible investors. However, this industry must be closely monitored to ensure that every Data center established is adhered to international standards for Data centers such as TIA 942, EN 50600 and ISO.

In summary;

1. Telecommunication sector must be regulated in terms of quality of service, consumer protection and pricing
2. Broadcasting sector must be tightly regulated
3. Regulation of content industry must be eased off
4. Data center industry is to be loosely regulated while ensuring strict standards for design, implementation and operation

5.1.4 Conditions of Licenses

Conditions of licenses for ICT services can be used to align the industry to country's broad objectives. Issued licenses should be subjected to those conditions and if conditions are violated or not met within a certain time period, regulator must have the authority to revoke the license.

These conditions can be effectively used by the government to drive the industry into intended direction, particularly to meet universal service obligations and create IT enabled services, which in turn will create;

- New job opportunities – e.g. Expansion of IT industry has created more than 10 million direct and indirect jobs during last 15 years in India [40].
- Economic growth – e.g. Analyzed data for 24 Latin American and Caribbean countries from 2004-2008 found that a 1% increase in broadband penetration resulted in a 0.0178% increase in GDP [41].
- Increased productivity – e.g. IT industry in USA was responsible for two-thirds of total factor productivity growth between 1995 and 2002 and for nearly all of the growth in labor productivity in that period [40].

It is proposed to include following conditions in licenses as general terms and some terms may be specific to an industry.

- Minimum amount of investment every year must be made in underdeveloped areas designated by government to develop the service levels of those areas with good quality of service
- Certain portion of revenue from those areas to be re-invested in same area to develop ICT services in the area in a manner which improve the livelihood
- Certain portion of revenue to be allocated to research and development or education of Sri Lanka in the means of grants, scholarships, etc. Collaborations with universities and higher education institutes to be promoted.
- Certain portion of profits to be allocated to human capital development within the organization
- Majority of services and content developed must be in local languages

5.2 Spectrum Management

5.2.1 Frequency Allocation

Frequency allocation for different services should be in line with Radio Regulations Articles issued by International Telecommunication Union (ITU). While meeting the set standards, regulatory body must look at the ways and means of allocating sufficient bandwidths for new technologies and novel services.

Frequency allocation must always be according to the international standards. In that also, Sri Lanka should select the most popular option among the region. Because in that way, equipment and device availability will be high at affordable prices. This would be a key factor for technological spread in the country. For example, it is better to go for Long Term Evolution (LTE) bands which India and China is using.

Furthermore, old frequency allocations must be cleared for new technologies and it should be spearheaded by government. Public sector of United Kingdom were using nearly half the spectrum below 15GHz, Ministry of Defense being the largest. Hence in 2008 the Ofcom, UK regulator, issued a decision for public sector to efficiently use the spectrum and also to sell the unused spectrum to private sector [42]. For some time, there are discussions going on for digitalization of television and radio broadcasting to

free up the spectrum. But nothing material has happened. Hence it is proposed to carry out such activities with clear time targets and government to intervene and provide any necessary infrastructure and funding.

Frequency allocation for organizations should be carried out through a competitive bidding process. Transparency is a key factor which affects the investor confidence, thus crucial. Frequency allocation should be bound together with a license for a particular ICT service. Neither license nor frequency allocation should be issued separately, but issued as a one. Besides, it should come with an expiry date by which service must be launched within a reasonable period of time. Also spectrum trading, the latest development in spectrum regulation, can be allowed subject to approval of regulator. This approach is becoming more popular. For example, by the year 2010 in United Kingdom 71% of spectrum issuances were through this approach, whereas only 22% were through traditional approach [41].

In summary;

1. Frequency allocation must always be according to the international standards and in par with most popular option in the region
2. Regulator to take lead in spectrum reforming
3. Spectrum allocation should always be done with transparency



University of Moratuwa, Sri Lanka.
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

5.2.2 Spectrum Allocation for Research

A special allocation must be done for research and academic work. This has been a lagging factor in Sri Lanka since long time. It could either be a separate bandwidths from each region of spectrum, or a designated area where commercial networks do not interfere. A test environment to be created for each applications (e.g. 3G mobile, microwave communication, aeronautical communication, etc.) and research must be facilitated for new concepts and innovative services.

Japan in their Frequency Open Policy in 2003, promoted research and development in spectrum and allocate special bands for such activities. They identified that in order to use available spectrum effectively and develop new applications for spectrum, research is a must. Released frequency bands after moving into digital TV were allocated for such activities [43].

5.3 Interconnections

5.3.1 Regulatory Intervention

In order to ensure an efficient, transparent and impartial interconnection regime within Sri Lanka, regulatory intervention is proposed. Following general conditions to be adhered.

- Every operator must facilitate interconnections to any other party with a justifiable request
- Capacity should be allowed without any intentional bottlenecks and increased as requested and according to usage within reasonable time periods
- Charges should be cost-based

Always two parties are encouraged to negotiate on interconnection arrangements. Regulatory intervention is to be seek only in unfair situations.

5.3.2 Connectivity Within and Outside

Current ICT industry is fully dependent on connectivity within and outside country. A strong, reliable, fast connectivity is required to excel in the objectives of ICT industry in Sri Lanka as discussed in Chapter 4.

A strong network must be built within Sri Lanka to prepare for the upcoming information era. The National Broadband Network (NBN) project offered to Sri Lanka Telecom is the first milestone of this. However, there should be heavy regulatory intervention and governmental participation if intended benefits are to be achieved. Only with private sector involvement, reachability and quality of service will not be offered to underdeveloped areas. In such cases, government participation would be required. Also services of NBN should be open and fair to all the potential users. Here also regulatory intervention is proposed.

At the same time, duplication of resources must be eliminated. Currently number of government enterprises maintain their own fiber networks, such as Sri Lanka Railway, Ceylon Electricity Board and Road Development Authority. This is a waste of public funds. Hence all these resources must be brought under one ownership and operation.

If Sri Lanka Telecom cannot provide island-wide fiber coverage alone, then another one or two providers can be given the chance, but dividing the island into regions and only one operator per region basis.

With the increased popularity of VOIP services and convergence, interconnection methodologies must be relooked at. In these scenarios, interconnections are required between different services and platforms, making it even more complex. It is no longer be on one-to-one basis; but connecting to a hub or a carrier. This concept, along with the geographical location of Sri Lanka, provides a unique opportunity to emerge in carrier and hubbing business. Hence it is required to arrange the necessary infrastructure by the government, physical as well as legal.

It is proposed to comply and align the Sri Lankan legislation with the World Trade Organization Regulation Reference Paper “Agreement on Basic Telecommunications”, the Annex to the Fourth Protocol to the GATS (General Agreement on Trade in Services) Agreement. Thereby business negotiations would be much easier.

It is proposed a direct government involvement in linking and development of submarine cables and landing stations in Sri Lanka. Up to now, all the links with submarine cables are initiated and managed by private entities. It is not good in meeting national agendas. Hence future projects must be looked at and managed by government. Also without fully depending on submarine cables, other means such as satellite connections must be looked at.

In summary;

1. Regulatory intervention is required to extend NBN to underdeveloped areas
2. Duplication of resources to be eliminated by taking all laid fiber under one ownership
3. If one operator cannot cover whole island, NBN license can be given to another entity but there should be one operator per region
4. Sri Lanka is to be promoted for hubbing and carrier services and regulator to provide necessary infrastructure
5. Sri Lankan legislation to be aligned with WTO GATS

CONCLUSION

World ICT industry is rapidly changing over time and most significant aspect that can be seen is the convergence of telecommunications, broadcasting, IT and content. With this change in technology as well as industry, regulation of them is becoming more and more important in order to pass the maximum benefit to the general users. Regulation depends on policy towards the industry, hence a strong policy stance is vital for any country to reap the real value of ICT.

The aim of this study is to recommend a suitable policy framework for Sri Lanka in order to excel in the ICT industry by using the huge potential of our human capital. To achieve that our policy and legal frameworks should be aligned not only with country's development goals but also with technological advancements.

Sri Lanka expects economic and social growth by promoting ICT industry. This can be achieved through developing human capital, developing content, introducing more services and promoting research and development.

In order to achieve the intended benefits from ICT industry, it is proposed to establish a single regulatory body and industry to be regulated in a converged manner. Degree of competition and regulation must be defined. Frequency allocation should be in par with international standard and should follow the regional trend. Interconnections must be promoted and developed with the intervention of regulator and carrier services must be promoted.



University of Moratuwa, Sri Lanka
Electronic Theses & Dissertations
www.lib.mrt.ac.lk

REFERENCE LIST

- [1] C. Sharma, "US Mobile Data Market Update Q4 2012 and 2012," [Online]. Available: <http://www.chetansharma.com/usmarketupdateq42012.htm>.
- [2] International Telecommunication Union, "World Telecommunication/ICT Indicators database," International Telecommunication Union, 2011. [Online]. Available: <http://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx>.
- [3] Central Bank of Sri Lanka, *Annual Report 2014*, 2014, p. Table 33:STATISTICAL APPENDIX.
- [4] C. Nicol, *ICT Policy: A Beginner's Handbook*, Association for Progressive Communications, 2003, pp. 9-11.
- [5] H. Intven and M. Tetrault, Eds., *Telecommunications Regulation Handbook*, The World Bank, 2000, pp. 1.1-1.26.
- [6] H. Intven and M. Tetrault, Eds., *Telecommunications Regulation Handbook*, The World Bank, 2000, pp. 2.1-2.30.
- [7] International Telecommunication Union, *Radio Spectrum Management*, International Telecommunication Union, 2013.
- [8] "Telecommunications Regulatory Commission of Sri Lanka," Telecommunications Regulatory Commission of Sri Lanka, [Online]. Available: <http://www.trc.gov.lk>. [Accessed 2014].
- [9] *Sri Lanka Telecommunications Act, No. 25 of 1991*, 1991.
- [10] *Sri Lanka Telecommunications (Amendment) Act, No. 27 of 1996*, 1996.
- [11] Telecommunications Regulatory Commission of Sri Lanka, *An Act to Amend The Sri Lanka Telecommunications Act No.25 of 1991*, 2009.
- [12] E. C. Lallana, *An Overview of ICT Policies and e-Strategies of Select Asian Economies*, Elsevier, 2004.
- [13] "Information and Communication Technology Agency of Sri Lanka," Information and Communication Technology Agency of Sri Lanka, [Online]. Available: <http://www.icta.lk>. [Accessed 2014].
- [14] *Sri Lanka Broadcasting Corporation (Amendment) Act No. 48 of 1988*, 1988.
- [15] *Sri Lanka Rupavahini Corporation (Amendment) Act No. 43 of 1988*, 1988.

- [16] Department of National Planning, Ministry of Finance and Planning, *Sri Lanka The Emerging Wonder of Asia, Mahinda Chintana-Vision for the Future*, Ministry of Finance and Planning, 2010.
- [17] S. Barnett, "The 2003 Communications Act," [Online]. Available: <http://mediaed.org.uk/media-literacy/resources-2/the-2003-communications-act>. [Accessed 2013].
- [18] ICT Regulation Toolkit, "India's Communications Convergence Bill," [Online]. Available: <http://www.ictregulationtoolkit.org/en/toolkit/notes/PracticeNote/1222>. [Accessed 2013].
- [19] A. Shariffadeen, *National ICT Policy Planning and Strategic Intervention in Malaysia*, Casablanca, Morocco, 2004.
- [20] G. Abas, *ICT in Malaysia: Policy, Regulation & Industry*, Tokyo, 2001.
- [21] K. Chang, *e-Korea - Korea's ICT Policy & Key Success Factors*, Algeria, 2002.
- [22] Ministry of Information and Communication-Republic of Korea, "CYBER KOREA 21-An Informatization Vision for Constructing a Creative, Knowledge Based Nation," 1999.
- [23] Ministry of Information and Communication-Republic of Korea, "e-Korea Vision 2006," 2002.
- [24] Ovum Consulting, "Broadband Policy Development in the Republic of Korea," 2009.
- [25] J. J. Lim, "Singapore's ICT Policy for the new Millenium: Implications for SMEs".
- [26] IDA Singapore, *Infocomm 21 Leadership Dialogue*, 2000.
- [27] "Infocomm 21 - Singapore's Vision of the Digital Future," IDA Singapore, 5 June 2000. [Online]. Available: <https://www.ida.gov.sg/About-Us/Newsroom/Speeches/2000/20061219103237>. [Accessed December 2015].
- [28] Sri Lanka Export Development Board, "ICT/BPO Services," [Online]. Available: <http://www.srilankabusiness.com/ict-bpo/>. [Accessed 2015].
- [29] Central Bank of Sri Lanka, *Annual Report 2014*, 2014, p. Table 26: STATISTICAL APPENDIX.
- [30] Lanka Business Online, "Sri Lanka ranked 107 in ease of doing business index 2016," 28 October 2015. [Online]. Available: <http://www.lankabusinessonline.com/sri-lanka-ranked-107-in-ease-of-doing-business-index-2016/>. [Accessed 2015].
- [31] Sri Lanka Telecom PLC, "Annual Report 2014".
- [32] Information and Communication Technology Agency, "Nenasala," [Online]. Available: <http://www.nenasala.lk/>. [Accessed 2015].

- [33] C. D. Silva, "ICT Curriculum in Sri Lankan Schools: A Critical Review," in *ICL2009*, 2009.
- [34] University Grants Commission, *Admission to the Undergraduate Courses of the Universities in Sri Lanka*, 2015.
- [35] Central Bank of Sri Lanka, "Payments Bulletin - Second Quarter 2015," pp. 20-22.
- [36] Central Bank of Sri Lanka, *Annual Report 2014*, 2014, p. 62.
- [37] International Telecommunication Union, "ICT Regulation Toolkit - Impact of Convergence," [Online]. Available: <http://www.ictregulationtoolkit.org/6.4>. [Accessed December 2015].
- [38] Global System for Mobile Association, "The Mobile Economy 2015".
- [39] Capgemini, "Communications Industry: One the verge of massive consolidation," 2014.
- [40] International Telecommunication Union, "ICT Regulation Toolkit - Context," [Online]. Available: <http://www.ictregulationtoolkit.org/1.1>. [Accessed December 2015].
- [41] International Telecommunication Union, "ICT Regulation Toolkit - Spectrum Management Overview," [Online]. Available: <http://www.ictregulationtoolkit.org/5.1>. [Accessed December 2015].
- [42] International Telecommunication Union, "ICT Regulation Toolkit - Radio Spectrum," [Online]. Available: <http://www.ictregulationtoolkit.org/1.6>. [Accessed December 2015].
- [43] S. Shirakabe, "Mobile Communications in Japan," Ministry of Internal Affairs and Communications, 2009.

