

Exploring Sustainability Management for the Telecommunication Industry: A Case Study of the Sri Lankan Mobile Telecommunication Industry

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Abstract— Sustainability management has gained significance in almost all the industries worldwide. Organizations embrace the concept of sustainability due to a wide range of reasons, varying from customer pressure to profit maximization. The telecommunication industry plays a vital role of a country. It is a major contributor of the economy and plays a major role in society, as it facilitates the communication among and between people and organisations. Therefore the sustainability of the industry is of great importance. The Sri Lankan mobile telecommunication industry which consists of five organisations is one of the most important sectors which directly and indirectly contributes to the economy of the country and utilizes a huge amount of resources. On the other hand it is vital for the communication link of society as well as industry. Overall it's an industry of utmost importance to the country. Therefore, this study analyses the sustainability of the Sri Lankan telecommunication industry by developing an integrated sustainability index analysing the industry sustainability and organisational sustainability. The objectives of the study are to develop an integrated sustainability management index, to assess the sustainability of the industry with respect to economic, social and environmental sustainability and to compare the organisational sustainability as it is important for the survival of the industry itself and to the economy. This research was conducted as a case study of the Sri Lankan mobile telecommunication industry. Development of sustainability management index was identified through an extensive literature survey and based on those the sustainability management index was developed. A questionnaire was developed consisting of the sub-dimensions of the index and a rating scale of 1-10 to capture responses. A primary data collection was done from all the five organisations. The developed index was used to analyse the data. Through the index the sustainability of the industry and each organisation was analysed and compared with respect to each other. The

overall sustainability of the industry is satisfactory, but there is much space for sustainability development in most of the categories. Specifically the environmental sustainability is still lacking behind apart from the practice of e-billing (reduced paper consumption) and facility sharing.

Keywords—Telecommunication industry, Telecommunication sustainable management index, Sustainability

I. INTRODUCTION

A. Introduction

Sustainability management has gained significance in almost all the industries worldwide. Organizations embrace the concept of sustainability due to a wide range of reasons, varying from customer pressure to profit maximization. Unsustainable development that has continued for the past century resulted in a variety of issues which include climate change, global warming and rapid resource depletion (Ghauri, 2013).

The telecommunication industry plays a vital role of a country. It is a major contributor of the economy and plays a major role in society, as it facilitates the communication among and between people and organisations. Therefore the sustainability of the industry is of great importance. The importance of sustainability in the telecommunication industry is highlighted by the International telecom union by stating that there is a direct correlation between a national economy's telecommunication penetration and the rate of growth of GDP (Indian Chamber of Commerce, 2013). The telecommunication sector not only contributes to the economic growth but is also an important platform for sustainable development by offering innovative solutions to overcome environmental and social challenges.

On the other hand, sustainability is also a business opportunity which can be capitalized by organizations (Magyar Telekom, 2004). Further, sustainability rankings such as carbon disclosure project, Dow Jones Sustainability Index and Green Rankings signify the importance that sustainability has gained.

The Sri Lankan telecommunication industry is one of the most important sectors which directly and indirectly contributes to the economy of the country and utilizes a huge amount of resources. On the other hand it is one of the most important sectors which directly and indirectly contributes to the economic growth of the country. In 2010 it generated the highest Foreign Direct Investment (FDI) of the country. Therefore as a vital industry of the country it is necessary to assess the sustainability of the industry, but no research has been conducted in Sri Lanka about this. This study analyses the sustainability of the Sri Lankan telecommunication industry by developing an integrated sustainability index and analysing the industry sustainability and organisational sustainability.

The objectives of the study are to develop an integrated sustainability management index, to assess the sustainability of the industry with respect to economic, social and environmental sustainability and to compare the organisational sustainability.

This research was conducted as a case study of the Sri Lankan mobile telecommunication industry.

B. The Sri Lankan Telecommunication Industry

The telecommunication sector in Sri Lanka is one of the most dynamic sectors, contributing both directly and indirectly to investment, innovation, employment, productivity and overall economic growth (Brahmanage & Weerasekera, 2011). It consists of fixed, mobile and broadband sub sectors.

As depicted in Table 1, out of those the mobile sector is the fastest growing and most popular sub sector with 21,394,262 subscribers and 104.4 mobile subscriptions per 100 people by 2014. The services provided by the operators span a wide range of applications which have become a part of daily life of individuals. These are related to many sectors which include health, entertainment, ticket bookings, news alerts, banking, religious services, networking with people, traveling and insurance. The Sri Lankan mobile telecommunication industry consists of five organisations; Mobitel (Pvt) Ltd,

Dialog Axiata Plc, Etisalat Lanka (Pvt) Ltd, Hutchison Telecommunications Lanka (Pvt) Ltd and Bharti Airtel Lanka. Mobitel (Pvt) Ltd commenced operations in 1993 and became a fully-owned subsidiary of Sri Lanka Telecom in 2002 (Mobitel-Overview). Dialog Axiata Plc was incorporated as a private limited liability company in 1993 and subsequently converted to a public limited liability company in 2005 (Dialog-Corporate Information) Etisalat which commenced operations in Sri Lanka in 2010 is fully owned and operated by the Emirates Telecommunication Corporation in UAE. The company was previously Sri Lanka's first cellular network, then known as Celltel which commenced in 1989 and changed its brand name to "Tigo" in 2007 (Etisalat-About Us). Hutchison Telecommunications Lanka (Pvt) Ltd. commenced operations in Sri Lanka in 2004 and is a member of Hutchison Asia Telecom (Hutch-About Hutch). Bharti Airtel Lanka is a subsidiary of Bharti Airtel Limited and commenced operations in Sri Lanka in 2009, as the fifth entrant to the market. Here after virtual names will be used in the research for protection of identity.

Table 1: Statistical Overview of the Telecommunication Sector as at end of March 2014

Category	Amount
Number of System Licenses	43
Total number of Fixed phones	2,695,636
Teledensity (Fixed Phones per 100 inhabitants)	13.2
Number of Cellular Mobile Subscribers	21,394,262
Mobile Subscription per 100 people	104.4
Internet & Email Subscribers - Fixed	539,631*
Internet & Email Broadband Subscribers (Mobile)	1,777,955*
Internet & Email Narrowband Subscribers (Mobile)	2,987,899*
Number of Public Pay Phone Booths	6,284*

Source: (Telecommunications Regulatory Commission of Sri Lanka, 2014)

II. METHODOLOGY AND EXPERIMENTAL DESIGN

A. Methodology

This research is conducted as a case study of the Sri Lankan telecommunication sector and all five operators in the sector have been considered. Therefore responses were gathered from all five operators (Kang, Ryu, & Kim, 2010) stating that sustainability management for telecommunication services is a very complex practice, and that case study is an appropriate approach that

allows the researcher to gain insight in a comprehensive manner. Initially an extensive literature review was conducted to identify different measurement models of sustainability. Thereafter a questionnaire was designed to include the relevant indicators of sustainability. The questionnaire was then sent to the organizations to gather data. The rating scale consisting of 10 points (1-10 scale) was used to capture the responses. The rating scale method has been adopted by Kang, Ryu, & Kim, 2010, in their case study to develop a sustainability index for the Korean Telecommunication industry. Singh R. K., too has similarly used a rating scale of 5 points.

B. Different models of sustainability

According to Ascom AG which is an international mobile solution provider, being sustainable as a company is “delivering value-added products and services in an environmentally friendly, secure, reliable and efficient manner”(Ghauri, 2013). The concept of sustainability is divided into three aspects given as economic, environmental and social sustainability, further it is stated that these aspects are related to each other up to a certain extent (Ghauri, 2013).

There are several frameworks discussed in related studies. The ‘Triple Bottom Line’ (TBL) framework is based on the three pillar of sustainability. It is “an accounting framework that incorporates three dimensions of performance: social, environmental and financial. This differs from traditional reporting frameworks as it includes ecological (or environmental) and social measures.” (Ghauri, 2013).

The implementation of triple bottom line however, is tricky because there is no prescribed or universally accepted standard to measure the three components. The variables generally considered under the TBL framework are shown in Table 2.

Similarly (Azapagic & Perdan, 2000) has discussed about indicators of sustainable development for industry proposing a general framework which consists of three categories of indicators; environmental, economic and social.

‘Natural capitalism’ is another such framework which lays stress on four principles that are more or less linked with each other: radical resource productivity, bio mimicry, service economies and reinvestment (Ghauri, 2013). Singh R. K., has developed a composite sustainability performance index for the steel industry consisting of five dimensions; sustainability, environment, economic, social, organisational governance and technical aspects.

Table 2: The Triple Bottom Line variables

TBL dimension	Variables
Economic variables (financial)	expenditures, taxes, business climate
Environmental variables	greenhouse gas emissions, fossil fuel consumption, electricity consumption, solid and hazardous waste management
Social variables	measurements of education, health and wellbeing, access to social resources, quality of life and social capital

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C. Experimental Design

Kang, Ryu, & Kim, 2010, have developed a framework which is specific to the telecommunication industry. This is given in Figure 1.

Kang, Ryu, & Kim, 2010, have included the three pillars of sustainability and four derived interrelated sustainability dimensions. Therefore seven dimensions have been considered altogether. Out of all the models discussed, this framework is specific to the telecommunication industry and it has been developed to assess the sustainability management of the Korean telecommunication industry using two mobile telecommunication companies, therefore this study uses this framework (depicted in Figure 1) as its main experimental design. The sub category of renewable energy has been considered separately by this study, as it is a main practice stated in different studies related to telecommunication sustainability (NOKIA, 2010). The measures; Eco-friendly facility ratio and Degree of CO2 emission ratio have been considered under this category.



Figure 1: Sustainability Management Framework for Telecommunication services
Source: Kang, Ryu, & Kim, 2010

According to the dimensions in Figure 1 the suitable sub-dimensions and the measures to use have been derived (Kang, Ryu, & Kim, 2010). This is clearly depicted in Table 3. Each main dimension has equal weight assigned as done by several researchers (Kang, Ryu, & Kim, 2010; Singh R. K., Murty, Gupta, & Dikshit, 2007; Singh R. K., Murty, Gupta, & Dikshit, 2009). Similarly each sub-dimension is assigned an equal weight. In Table 3 the integrated weight is calculated by multiplying the weight of the sub-dimension with their dimensional weight.

The questionnaire developed consisted of the measures given in Table 3 and a rating scale of 1 to 10 (10 representing the highest value) was used to capture the responses.

Data was collected from all five organizations of the mobile telecommunication industry. The gathered data was analysed using the Telecommunication Sustainability Management Index (TSMI). This is shown in Table 4. The weighted scores shown in Table 4 are obtained by multiplying the rated score with the integrated weight. Finally the weighted score of each organization is totalled to calculate the overall result/value which depicts the sustainability.

III. RESULTS

The analysis results are shown in Table 4. The score obtained for each sub-dimension through the questionnaire and the weighted score against each sub-dimension which is calculated is given. The total score for each dimension is also given in Table 4. Through this the

sustainability of the organizations can be compared with each other overall and separately for the main dimensions.

IV. DISCUSSION AND CONCLUSION

A. Discussion

Table 4 shows the TSMI scores for the five organizations. The overall sustainability of B is the best which is followed by C and A respectively. The lowest is scored by E. When considering as an industry, except for E, the other organizations have satisfactory scores which show that they have a satisfactory level of sustainability management.

When considering each dimension, in terms of economic sustainability A and B are equal and they are followed by C. E has obtained the lowest value in this dimension. For social sustainability B, C and D have scored an equal value of 0.852. A has scored lesser in this dimension. Here too E has obtained the least score of all. In terms of environmental sustainability B has scored significant value which is well above the other organisations. This shows that B is well ahead of other players in environmental management and environmental reporting. It is followed by C and then A and D who have equal scores.

In terms economic-social sustainability, A and B are leading with equal scores while C is following them. In social-environmental sustainability C has the highest score which means that they are practising E-waste management best. In terms of economic-environmental sustainability which is measured through E-transactions B and C have higher scores. This implies that they are paying great attention towards it and practicing the use of E-transactions more than the other organizations. These organisations have conducted programmes to make customers aware about e-billing and use e-payslips. In terms of Economic-social-environmental sustainability, for facilities all organizations have scored less. When it comes to renewable energy none of the organizations are practicing strategies related to renewable energy at a significant level. Energy is mainly obtained from generators and the national grid. The strategy followed by organizations to reduce emissions is to switch from generator power to the national grid. Other than that organizations are not moving to new sources of renewable energy. This is a major shortcoming as other countries have commenced the usage of renewable energy.

Table 3: Telecommunications sustainability index

Dimensions	Weight	Sub-dimension	Weight	Integrated weight	Measure
Economic sustainability	0.142	Sales revenue	0.2	0.029	Level of profit of new service
		Productivity	0.2	0.029	Sales revenue per employee
		CSM	0.2	0.029	Customer value added
		EVA	0.2	0.029	Operating income after tax-capital cost
		Stock value	0.2	0.029	Excess return
Social sustainability	0.142	Partner relationship management	0.5	0.071	Partner relationship management improvement, Partner satisfaction index
		Social responsibility	0.5	0.071	Degree of contribution, Social investment volume, Volunteer activities
Environmental sustainability	0.142	Environmental report	0.5	0.071	Contents of reporting with regard to environmental practices
		Environmental management	0.5	0.071	Environmental policy, Strategy, Preservation activities
Economic-social sustainability	0.142	Research and Development	0.167	0.024	R&D system efficiency and performance, Preparedness regulation on new services
		Human Resource Development	0.167	0.024	Human resource development process, Motivation
		Provision of universal services	0.167	0.024	Service and infrastructure provision rate, Universal service obligation
		Contents soundness	0.167	0.024	Inner contents purification system, Contents ethics consultation
		Digital inclusion	0.167	0.024	Company policy for reduction of digital divide, Degree of response to regulatory obligations
		E-disaster	0.167	0.024	Provision of e-disaster service and infrastructure, E-disaster provision obligation
Social-environmental sustainability	0.142	E-waste	1	0.142	Cost saving from e-waste take back ratio and reuse, Response to e-waste take back and reuse obligation, EPR (Extended Producer Responsibility) execution
Economic-environmental sustainability	0.142	E-transaction	1	0.142	E-bill issuing ratio, Paper consumption ratio
Economic-social-environmental sustainability	0.142	Facility	0.5	0.071	Cost reduction from facility sharing, Facility sharing, Energy usage, Regulation for facility
		Renewable energy	0.5	0.071	Eco-friendly facility ratio, Degree of CO2 emission ratio

Source: Based on the research of (Kang, Ryu, & Kim, 2010) developed by the author

Table 4: Results of TMSI for the organizations

Dimensions	Sub-dimension	Integrated weight	Score (1-10)					Weighted score				
			A	B	C	D	E	A	B	C	D	E
Economic sustainability	Sales revenue	0.029	7	6	7	6	5	0.203	0.174	0.203	0.174	0.145
	Productivity	0.029	7	5	5	3	2	0.203	0.145	0.145	0.087	0.058
	CSM	0.029	6	8	6	5	8	0.174	0.232	0.174	0.145	0.232
	EVA	0.029	5	6	5	3	3	0.145	0.174	0.145	0.087	0.087
	Stock value (excess return)	0.029	5	5	5	6	3	0.145	0.145	0.145	0.174	0.087
	Total							0.87	0.87	0.812	0.667	0.609
Social sustainability	Partner relationship management	0.071	6	5	5	5	1	0.426	0.355	0.355	0.355	0.071
	Social responsibility	0.071	5	7	7	7	1	0.355	0.497	0.497	0.497	0.071
	Total							0.781	0.852	0.852	0.852	0.142
Environmental sustainability	Environmental report	0.071	4	8	5	7	1	0.284	0.568	0.355	0.497	0.071
	Environmental management	0.071	6	8	6	3	1	0.426	0.568	0.426	0.213	0.071
	Total							0.71	1.136	0.781	0.71	0.142
Economic-social sustainability	Research and Development	0.024	6	3	5	3	1	0.144	0.072	0.12	0.072	0.024
	Human Resource Development	0.024	7	6	4	2	1	0.168	0.144	0.096	0.048	0.024
	Provision of universal services	0.024	8	7	6	5	5	0.192	0.168	0.144	0.12	0.12
	Contents soundness	0.024	5	8	5	5	1	0.12	0.192	0.12	0.12	0.024
	Digital inclusion	0.024	8	8	6	9	4	0.192	0.192	0.144	0.216	0.096
	E-disaster	0.024	5	7	7	6	6	0.12	0.168	0.168	0.144	0.144
	Total							0.936	0.936	0.792	0.72	0.432
Social-environmental sustainability	E-waste	0.142	3	4	5	3	1	0.426	0.568	0.71	0.426	0.142
Economic-environmental sustainability	E-transaction	0.142	5	8	9	5	6	0.71	1.136	1.278	0.71	0.852
Economic-social-environmental sustainability	Facility	0.071	7	7	8	8	7	0.497	0.497	0.568	0.568	0.497
	Renewable energy	0.071	1	1	1	1	1	0.071	0.071	0.071	0.071	0.071
	Total							0.568	0.568	0.639	0.639	0.568
Total (Result)								5.001	6.066	5.864	4.724	2.887

Source: Autho

It is important to identify that except for four dimensions E has scored the least in all other dimensions. Therefore E is lacking behind sustainability in most of the areas. Digital inclusion is practiced by D in the highest level (with a score of 9 out of 10) when compared with the other organizations. B is having the highest score in four of the main dimensions, which reinforces that they are well ahead of other organizations in sustainability management. Another significant observation is that when it comes to e-waste all the organizations have low scores. This shows that the overall focus on e-waste by the industry is lacking behind.

B. Conclusion and Recommendations

In conclusion, there are many studies which have addressed general sustainability management issues, but there is a clear lack of telecommunication specific research related to sustainability management. Especially in Sri Lanka this research gap is prevalent. Therefore this study focuses on analysing the sustainability management of the telecommunication industry of Sri Lanka with a case study of the mobile telecommunication industry. The study shows that sustainability management in four out of the five companies are at a fair level. Organization 'B' is leading with highest score and a special sustainability report is published to make stakeholders aware of their sustainability practices and status. Therefore other organizations too should take this into consideration and start focusing more and more on sustainability management. E-transactions are practiced by most of the organizations which helps in reduction of paper consumption. Facility sharing is a practice popular with all five organizations which results in less construction of towers, energy consumption and emissions. Therefore this can be stated as a very positive practice. Organization 'E' is lacking behind in most of the dimensions and therefore must immediately start focusing on improving their sustainability management practices.

It could be recommended that overall the organizations should focus more on sustainability management especially in the specific areas that each organization is lacking behind. As an industry they could be recommended to focus on developing joint strategies for e-waste management and renewable energy usage. For organizations except B it could be recommended that they have a special sustainability report to provide information to stakeholders on their sustainability management practices as it could be a potential to enhance their corporate image as well. Research and development too is not focused adequately by most of the organizations. Therefore it could be recommended that they improve on research and development as it

focusing on all aspects of sustainability and there is also the potential to have collaborations among organizations on research and development. Certain organizations have such collaborations with universities, but it is not an industry wide practice yet.

As further research it could be recommended to develop sustainability management index using different methods such as differentiated weighted score method or analytic hierarchical process and to study on the trends of sustainability management practices of the industry. Additionally research could be undertaken to find feasible strategies to improve on the sustainability dimensions that are lacking behind.

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