

**A CASE STUDY OF POWER SAVING INITIATIVES IN A  
TELECOMMUNICATION COMPANY**

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## **ABSTRAK**

Kajian ini adalah untuk menunjukkan bagaimana inisiatif yang dijalankan oleh Syarikat Telekomunikasi X dalam penjimatan tenaga elektrik dan seterusnya pengurangan perbelanjaan operasi. Fokus kajian ini adalah terhadap penjimatan dan pengoptimaan tenaga elektik pada bahagian “access” untuk rangkaian telekomunikasi bergerak. Pelbagai cara yang ada digunakan sebagai kajian seperti peningkatan suhu di alat pendingin hawa dan alatan baru yang mempunyai kecekapan penggunaan tenaga. Pembuktian konsep dijalankan di rangkaian di dalam anak syarikat Telekomunikasi X di Malaysia dan Bangladesh. Penjimatan ini digambarkan melalui pengiraan “Total cost of ownership” yang mengambil kira perbelanjaan capital dan operasi. Daripada pengiraan tersebut, dijangkakan penjimatan sebanyak RM2 juta untuk rangkaian di Malaysia dan USD4 juta untuk rangkaian di Bangladesh. Pengetahuan daripada pembuktian konsep ini akan digunapakai dan membantu anak-anak syarikat lain di bawah Syarikat Telekomunikasi X untuk implementasi inisiatif penjimatan tenaga ini.

## **ABSTRACT**

The aim of this study is to provide the initiatives done by Telecommunication Company X in studying and implementing the power saving as part of operational expenditure reduction. The initiatives are concentrated to the power savings at the access part covering energy optimization. The alternative solutions available are reduction of energy consumption by increase of air conditioner temperature and energy efficiency equipments usage. The proof of concept was done for verification and suitability to implement in the network of host in Malaysia and Bangladesh. The savings was calculated using Total Cost ownership model which comprises capital expenditure and operational expenditure. The total estimated savings for Malaysia and Bangladesh network are RM2 million and USD4million respectively. The knowledge gained from the proof of concept trial will help Telco X in adopting power saving initiatives and will be shared among the subsidiaries.

## **EXECUTIVE SUMMARY**

Telecommunication Company X is the holding company of 5 mobile operators in Asia region. To maintain profitability, the company has embarked on the power saving initiatives as part of the effort to bring down the operational expenditure. The study was done on the options available in the power savings and proof of concept was implemented by two of its subsidiaries in Malaysia and Bangladesh on the suitability and forecasted savings. The result of the proof of concepts will be shared with other subsidiaries as part of knowledge sharing.

## **CHAPTER 1 : INTRODUCTION**

### **1.1 BACKGROUND OF THE CASE**

Telecommunication Company X (Telco X) is the holding company with six subsidiaries and five affiliates companies in Asia Region. Five of its subsidiaries are mobile telecommunication operators in the developed and developing countries. With the mission to expand presence in the region by addressing the unfulfilled communications needs and develop operational excellence model to maximize growth and margin in a competitive environment, Telco X Group has plans and strategies, among others is to further improve operational synergies and efficiencies, and actively managing costs and margins by maximizing margins in low Average Revenue Per User (ARPU) environments. Profit after taxation for Telco X Group based on the Financial Statement in Annual Report 2007, shows the reduction of RM73.2 million from RM820.8 million in 2006. Meanwhile, total operating cost has increased to RM4130.4 million in 2007 from RM2900.4 million in 2006. This shows the need for Telco X to manage cost efficiently and effectively.

In the global economic recession, Telco X has to ensure profitability of company and measures has to be taken to reduce the total operating cost. In April 2008, Technology Group has been instructed to come up with suggestions to reduce the operating expenditure of group companies on the network. The group comes up with list of initiatives in helping reducing current network operational expenditure and capital

expenditure of the company inline with the strategies of Telco X to be a leading regional mobile telecommunication provider. Upon presentation to top management, there are few initiatives classified as urgent and must be implemented. Among the initiatives is power saving at the access network.

Power is the most important component to ensure the electronics component to be up and running. However, utilization of power in the access site can be adjusted based on the operational strategy and alternative technology. Among others are increase temperature air conditioner, use of inverter type air conditioner and hybrid solar power.

## **1.2 PROBLEM STATEMENT**

Cost saving is important in maintaining revenue and profitability of the company. Streamlining in the operational cost where the initiatives that is not interfere with the quality and operational will be in the focus. Thus, based on the discussion above, this case study will explore the potential savings by power utilization by introduction of new methods and technology. The case study will explore on:

1. How Telco X Group reduce Operational Expenditure in each Operating Companies via power management?

### **1.3 RESEARCH QUESTION**

Based on the background of the case and problem statements which have been outlined above, the study will answer the following question:

1. What are alternative solutions available for Telco X to reduce network operational expenditure?
2. How much is the savings?
3. What are the challenges faced by the Telco X group based on the trial conducted?

## **1.4 ISSUES EXAMINED**

Power cost represents 30% of overall operational cost in the Telco X Group companies. The main and biggest component in cellular network is the Base Transceiver Station (BTS) where the growth of sites is proportional towards the capacity and coverage growth of the network. BTS is the biggest component in mobile telecommunication in charge of sending and receiving radio signals and communicate back to center of mobile network. To serve bigger community and coverage, the more number of sites used for BTS are required. Therefore, implementation of the power saving at the sites would contribute to major savings in the operational expenditure of the company.

Since most of the Telco X's company lies in the developing country, therefore the power system is not as efficient as the developed country. The reliability of the grid system is questionable and high dependence on the back up system can not be avoided. The back up system is on generator which is fuel based machine and battery as few minutes back-up before the generator is up and running readily to take over.

The current fuel cost has gone up which causes higher cost for the company to sustain in the situation. Some of sites location is not easily accessible by road and transportation also contributes to higher operational cost when the need to top-up the fuel.

Indirectly, the initiative addresses the green environment campaign and contributes towards Corporate Social Responsibility. One of the companies implemented this

initiative is Vodafone, group of Telecommunication companies around the world. In Vodafone Corporate Responsibility Review June 2008, Mr Arun Sarun, Chief Executive of Vodafone has wrote “I believe that we can grow our business while also contributing more favourably to the environment and importantly without imposing significant costs or constraints on our operations. We recently announced a new climate change commitment focusing on greener energy and improving our energy efficiency” Further, Vodafone has target to achieve 50% CO<sub>2</sub> emission by lower carbon telecommunication networks, cooling network equipment and green energy.

## **CHAPTER 2 : LITERATURE REVIEW**

### **2.1 INDUSTRY PROFILE**

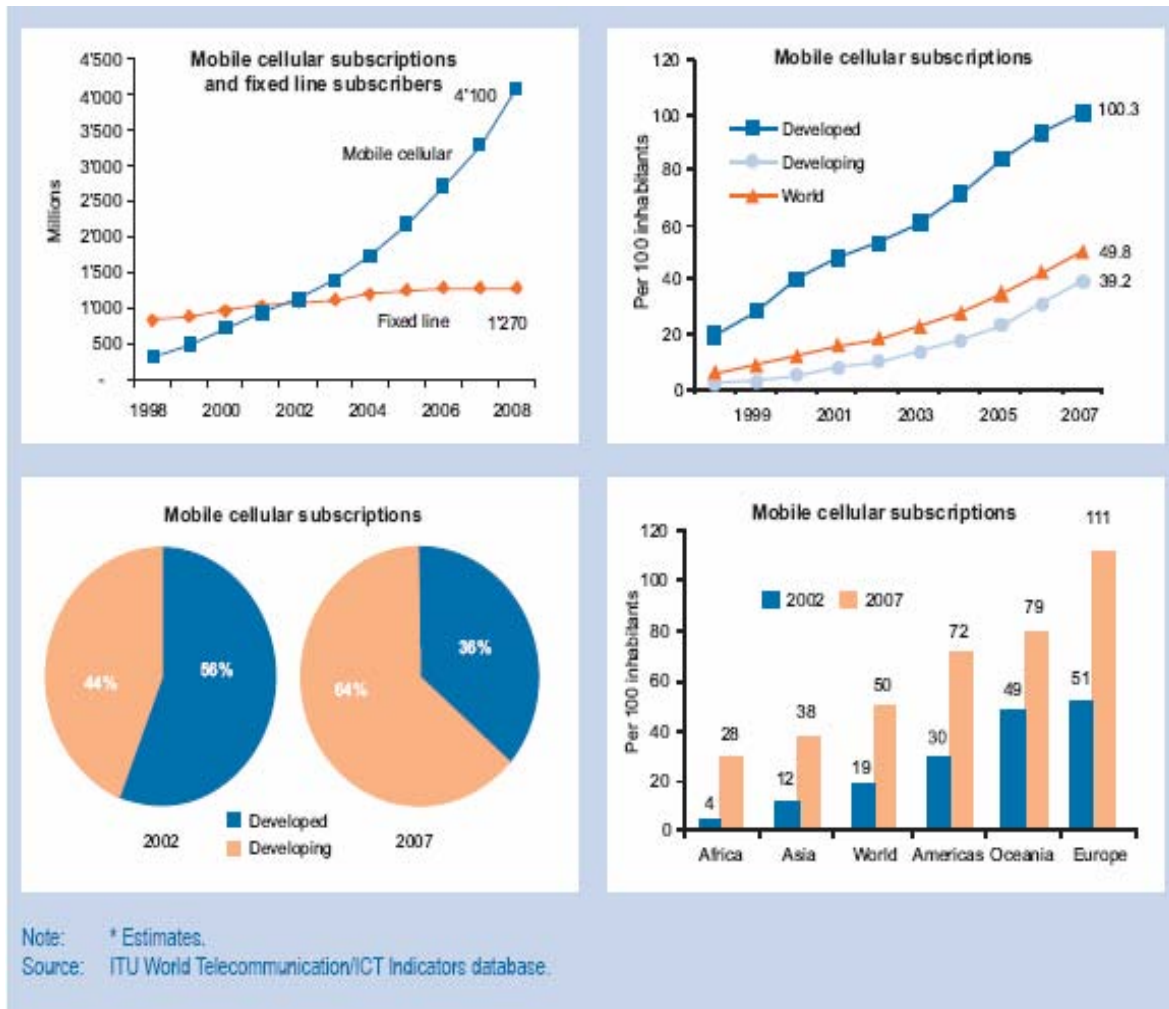
Telecommunication industry is growing to serve the needs of communication to reach to anyone anywhere. The industry has evolved from analog to digital in the fixed and mobile telecommunications and now towards data centric services in the cities and developed countries. The mobile communication has started evolved from voice only to text service via introduction of short message service and currently, the data services which allow subscribers to surf internet and sending email even on the move.

The mobile communication has reached 4 billion subscriptions in 2008 as published by International Telecommunication Union (ITU) and will continue to grow dramatically as shown in the top left corner chart of Figure 1. Comparably, the fixed line market has reached saturation and the growth is stagnant. The mobile subscription in the developed countries is over subscribed by 0.3% per 100 habitants as now it is reaching 100.3% due to double Subscribed Identity Module (SIM) card ownership of the subscribers.

The highest mobile growth rates are continuously coming from the developing market like Africa and Asia as shown in the chart below. However, developed countries has reached the market maturities and well penetrated. In 5 years, the mobile subscription in Asia has tripled to 38 subscriptions in year 2007 from 12 subscriptions in year 2002 per

100 habitants. The trends will continue and offers the opportunity for mobile operator in the region to expand.

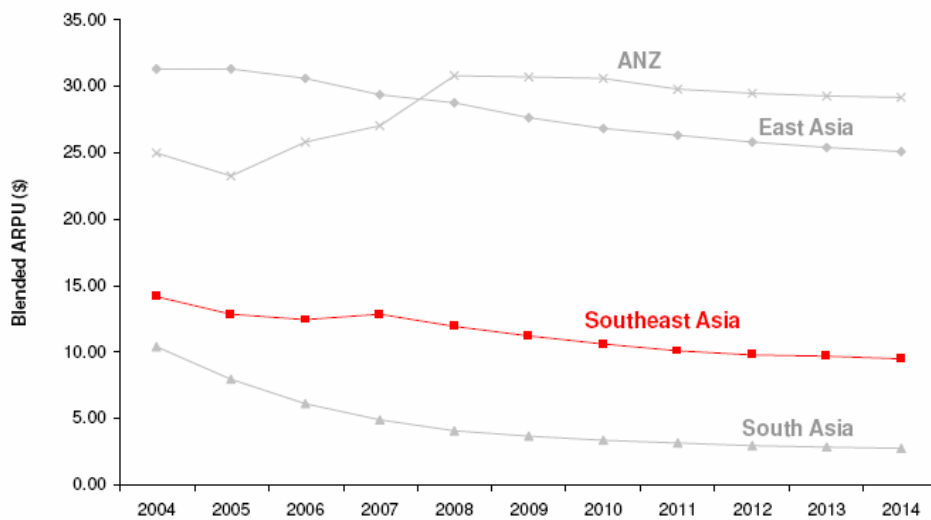
**Figure 1: Global Mobile Subscriptions**



Average revenue per user is derived from total revenue divided by total number subscribers of a mobile company and been used as a measure the revenue each subscriber will bring in. Blended ARPU is combining the ARPU for prepaid and postpaid subscribers. Trend of mobile subscribers Average Revenue Per User (ARPU) as studied

by Frost & Sullivan for 2008 is declining steadily as shown in Figure 2. The ARPU in South East Asia is lower compared to Australia and New Zealand. The declining of ARPU is due to a price war in competition and the new addition subscribers are forecasted from the rural areas.

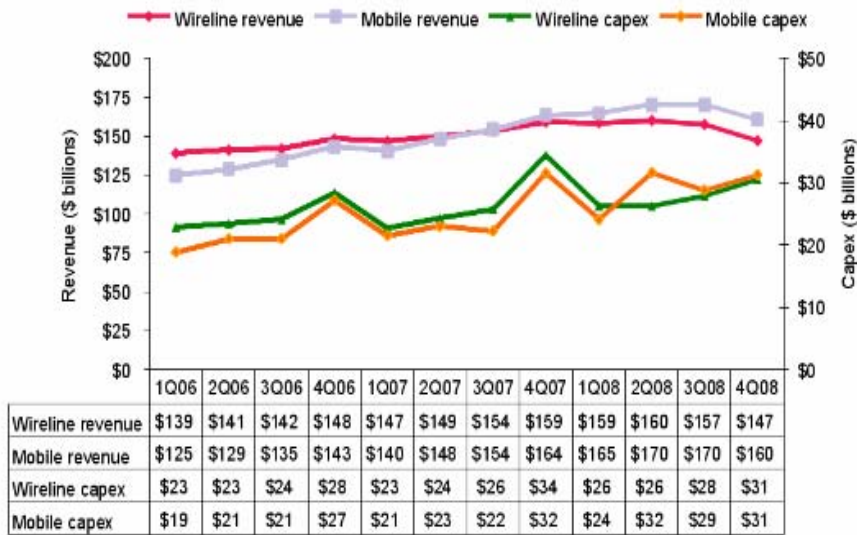
**Figure 2 : Asia Pacific Blended ARPU Trend**



*Note: All figures are rounded; the base year is 2008. Source: Frost & Sullivan*

Capital expenditure of mobile operators is in upwards trend and the revenue generated is decreasing. Ovum in their quarterly report supported this as depicted in the figure below from the study done to the top mobile operators globally. The increasing of capital expenditure may due to the current network expansion on mobile network is reaching to the rural areas. The major city and towns has been well served by mobile operators. Thus, mobile operators' strategies to reduce cost of production are relevant.

**Figure 3 : Revenue vs Capex For Mobile and Wireline Operators**



Source : Company reports and Ovum

In the heat of competition and the declining ARPU trends around the world, a mobile operator has to strategize their expenditure without compromising the quality of service and reaching to the rural. The potential market lies in the rural areas; however, the subscribers in the area are price sensitive. The balance of the low cost network and declining ARPU will sustain the profitability of the mobile operator.

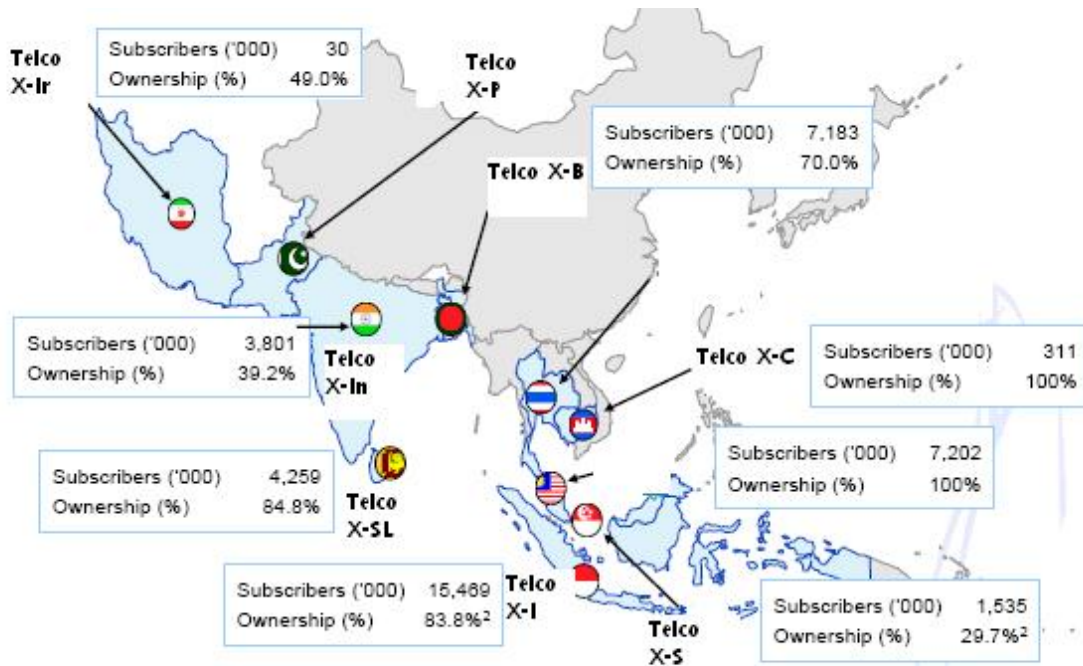
## **2.2 COMPANY PROFILE**

### **2.2.1. BACKGROUND OF THE COMPANY**

Telco X Group is one of the 50 Malaysian Government Linked Companies (GLC) under the major shareholder of Khazanah Nasional as the investment holding arm of Government of Malaysia. The group's main role is as the investments company of telecommunication and consultancy services to its subsidiaries in Malaysia, Indonesia, Sri Lanka, Bangladesh and Cambodia; and associated companies in India, Singapore, Iran, Pakistan and Thailand as shown in the figure below. Telco X is one of main mobile telecommunication player in South Asia and South East Asia region. Telco X also involved in providing services of broadband in Sri Lanka and Pakistan. Television and satellite services are provided by Telco X in Sri Lanka market only.

The investment has been made to the countries in the region through acquisition. Telco X also actively looking for new foot print in the region in becoming the leading mobile operator in Asia. The group has corporate centre located in Kuala Lumpur to look over and consolidate the group financial, strategy, technology, operational and procurement. The group is aggressively moving towards group initiatives in all aspects to gain group synergy by identifying talent and strengths within the group.

**Figure 4: Telco X presence as of Dec 07**



The strength of Telco X Groups presence in the country of its subsidiaries and affiliates are as listed in Table 1.1 and 1.2 respectively. As of Dec 2007, Telco X-SL is holding a market share of 53.4% and is the first mobile operator in Sri Lanka. Telco X-M capture 30.9% market share with 7.2 million subscribers and is the second largest mobile operator in Malaysia. Meanwhile, Telco X-B, Telco X-C and Telco X-I is third largest mobile operator in Bangladesh, Cambodia and Indonesia respectively.

Meanwhile, Telco X-S in Singapore, Telco X-Ir in Iran and Telco X-In in India are the affiliates of Telco X and operating mobile network.

**Table 1: List of Subsidiaries**

No	Company Name / Country	Subscribers (million)	Market position / share	Business Type	Shareholding
1	Telco X-M / Malaysia	7.2	# 2 / 30.9%	Cellular	100%
2	Telco X-SL / Sri Lanka	4.259	# 1 / 53.4%	Quadruple play	84.81%
3	Telco X-B / Bangladesh	7.183	# 3 / 20.4%	Cellular, ISP	70%
4	Telco X-C / Cambodia	0.311	# 3 / 12.7%	Cellular	100%
5	Telco X-I / Indonesia	15.469	# 3 / 16.6	Cellular	66.99%
6	Telco X-P / Pakistan	0.01	Na	Broadband, Long Distance International	78%

**Table 2: List of Affiliates**

No	Company Name / Country	Subscribers	Business Type	Shareholding
1	Telco X-S / Singapore	1.535 million	Cellular	29.69%
2	Telco X-Ir / Iran	30,568	Cellular	49%
3	Telco X-T / Thailand	-na-	Holding company	18.97%
4	Telco X-Ti / Thailand	-na-	Mobile content and mobile distribution	35.58%
5	Telco X - In / India	3.8 million	Cellular	39.2%

Telco X was incorporated in Malaysia under the Companies Act, 1965 of Malaysia, on June 12, 1992 as a private limited company and commenced business in 1994. On October 16, 2001, the company changed its name and on December 12, 2007, the company was converted into a public company. In 2 April 2009, Telco X has new name to mark new branding identity.

#### 2.2.2. VISION & MISSION

Telco X has the vision of becoming the leading mobile operator in Asia. Thus, the company has set out the following mission to achieve its vision and published in its website:

- *To expand its presence in the region by addressing the unfulfilled communication needs of local populations with affordable and innovative products and services*

- *To develop an operational excellence model to maximize growth and margin in a competitive environment*
- *To be the leading mobile operator in South/South East Asia by 2015*

Telco X also has come up with set of strategies and published in its website to provide path to achieve its vision and mission and among others is

- *further improving operational synergies and efficiencies, and actively managing costs and margins by maximizing margins in low ARPU environments;*
- *further developing our network coverage and enhancing network quality;*

Hence, concentration has been given to reduce cost to retain profitability as the telecommunication market in the low ARPU environment due to price war in competitive market.

### 2.2.3. COMPANY PERFORMANCE

Telco X group reported in Annual Report 2007, has shown positive revenue growth of 19.7% contributing 26.2% to revenue composition in 2007, 2% higher compared to 2006. Mobile customer also has grown 39.6% to 39.8million from 28.5 million in 2006. However the profit in year 2007 shows the declining of RM73.2 million from RM820.8 million in 2006.

**Table 3: Telco X Group Other Operating Cost, Earning Before Interests Taxes Depreciation and Amortization (EBITDA) and Average Revenue Per User (ARPU) per subsidiaries.**

	2005	2006	2007
<b>GROUPWIDE (RM million)</b>			
Total operating costs	1165.5	2900.4	4130.4
Other operating costs	934.2	2080.1	3201.8
Adjusted EBITDA	956.4	1942.7	2122.5
Profit after taxation	708.6	820.8	747.6
<b>Telco X-M ARPU (RM per month)</b>			
Prepaid	46	39	52
Postpaid	122	108	111
Blended	61	51	63
<b>Telco X-SL ARPU (SLR per month)</b>			
Prepaid	426	432	412
Postpaid	1635	1682	1688
Blended	697	658	590
<b>TELCO X-B ARPU (BDT per month)</b>			
Prepaid	408	299	234
Postpaid	1755	1485	1094
Blended	498	342	261
<b>Telco X-C ARPU (USD per month)</b>			
Prepaid	14	13.5	12.6
Postpaid	44.6	43.5	39.9
Blended	14.2	13.9	12.8

Telco X's subsidiaries operating Global System Mobile (GSM) network for 2<sup>nd</sup> Generation mobile system in Malaysia, Sri Lanka, Bangladesh, Indonesia and Cambodia and offering 3<sup>rd</sup> Generation mobile system based on Universal Mobile

Telecommunication System (UMTS) in Malaysia and Indonesia. To capture higher market share of mobile telecommunication subscribers, the mobile operator has to provide biggest coverage and good quality network. The component that reaches to the subscribers for the coverage and capacity is known as Base Transceiver system (BTS) for GSM and Node B in UMTS. BTS and Node B have to be located to the strategic location to provide optimum coverage and capacity. The BTS and Node B will be connected back to its core on backhaul system of transmission which can be on owned or rental basis.

The table below shows the number of BTS and Node B (use in UMTS and have same function of BTS in GSM) for GSM and UMTS in the Telco X Group. The number is still growing to enable Telco X Group companies to provide better services coverage and capacity as required by the market demand. As of end 2007 as reported in Annual Report 2007, there are more than 25000 BTS in the group. The latest number as reported during the launch of Telco X new branding, the number of BTS in the group has reached 28000.

**Table 4: BTS Growth in Telco X**

<b>Operating Company</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
Telco X-M / Malaysia	3322	3749	4202	5053	8148
Telco X-SL / Sri Lanka	588	672	833	1211	1211
Telco X-B / Bangladesh	369	505	1548	2770	3905
Telco X-C / Cambodia	96	136	170	202	274
Telco X-I / Indonesia	1491	2357	4324	7260	11597

Ericsson as telecommunication equipment provider has mentioned in Sustainable energy use in mobile communication, a white paper published in August 2007 shows that in GSM and WCDMA mobile networks, the highest contributors to carbon dioxide (CO<sub>2</sub>) emissions in use phase is radio access networks particularly BTS. CO<sub>2</sub> emission is the measure of environmental impact for greenhouse effect. Therefore, serious attempt was done by mobile operators and providers for energy efficient in BTS compared to other areas.

#### 2.2.4. SWOT ANALYSIS

A SWOT Analysis is a strategic planning tool used to evaluate the Strengths, Weaknesses, Opportunities, and Threats involved in a project or in a business venture or in any other situation of an organization or individual requiring a decision in pursuing a company's objective.

It is the key of identifying internal and external factors that are important in achieving the company's objective. The factors can be categorized as below:

##### Internal Factors

It refers to the company's internal 'strengths' and 'weaknesses' which give the impact to the company's objectives. It includes all the 4Ps as well as personnel, finance, manufacturing capabilities, etc.

##### External Factors

It refers to the company's 'opportunities' and 'threats' which influences from the external environment. It includes macroeconomic matters such as technological change, legislation, socio-cultural changes as well as marketable changes.

##### Strengths

Improving presence in Asia with being top 3 mobile operator in the countries of presence especially Indonesia, Malaysia and Sri Lanka

Focus into mobile operations sector and ability to adapt and adopt new technology

Skillful employees in telecommunications sector and knowledge transfer within the group

#### Weakness

Group synergy in utilizing common platform of management, procurement and advantages yet to be achieved

#### Opportunities

Market potential in mobile telecommunication in Bangladesh and Sri Lanka

Promotes data services via 3G services in the suitable market

#### Threats

Competition and price war

Declining Average Revenue Per User trend for mobile subscribers

#### Matching Strengths to Opportunities and Converting Weaknesses and Threats

1. Improving the presence in Asia as there is market potential in the countries of presence.
2. As the group is focusing on the mobile sector, promoting data services utilizing 3G services would be advantages with adapting the 3G services experiences in other markets.
3. The group synergy and utilizing the group advantages in face the competition challenges

4. Introduction of low cost network operational expenditure from group synergy to ensure the profitability to overcome low Average Revenue Per User trend

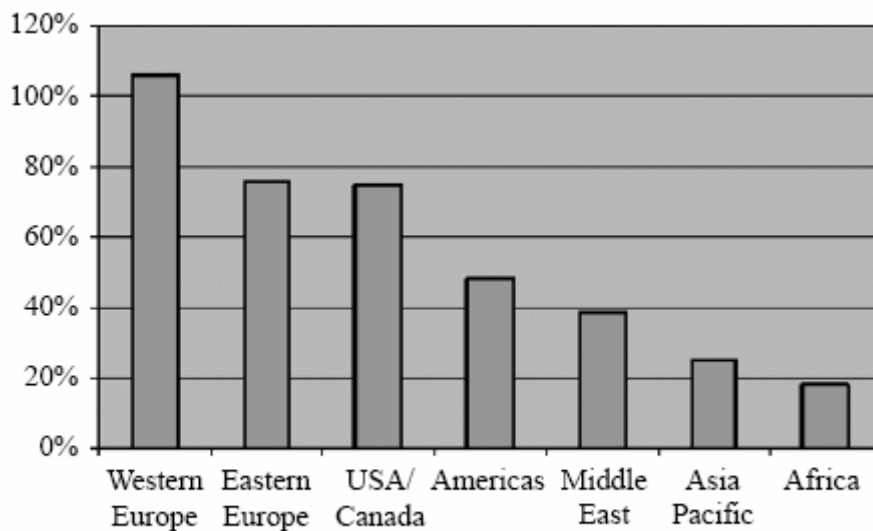
In this case study, the focus is given to Malaysia and Bangladesh subsidiaries. Telco X-M in Malaysia is one of the three largest mobile operators with 7.2 million subscribers and 97% population coverage. Background of the Malaysia market is as reported by Business Monitor International Q3 2008, shows that penetration of excess 80% and the growth would be slow. Thus, to remain profitability, Telco X-M has to launch aggressive marketing and product offerings to retain subscribers and to reduce operation cost.

In Bangladesh market, Telco X-B is the third largest mobile operators with 7.2 million subscribers. The infrastructure in Bangladesh is still needs improvement with concentration done to Dhaka and Chittagong only. The power supply shortages due to supply did not meet rising demand. Business Monitor International Q3 2008 suggested for the mobile operators to expand its coverage to the beyond major cities to reach the unserved market to reach penetration forecast of 80% in 2012.

### 2.3 LITERATURE REVIEW

Anderson, (2007) mentioned that the biggest opportunity for the mobile operator is to provide mobile communication to the untapped market in the low-income consumers in developing markets. Most of this is coming from the Asia and Africa. The report provided by GSM Associated Universal Access Report in 2006, as shown in Figure below, shows the mobile penetration in Asia Pacific and Africa is within 20 per cent. There is opportunity for the company like Telco X group to expand and capture market share in Asia Pacific.

**Figure 5 Mobile Penetrations in Developed and Developing Market, Q2 2006**

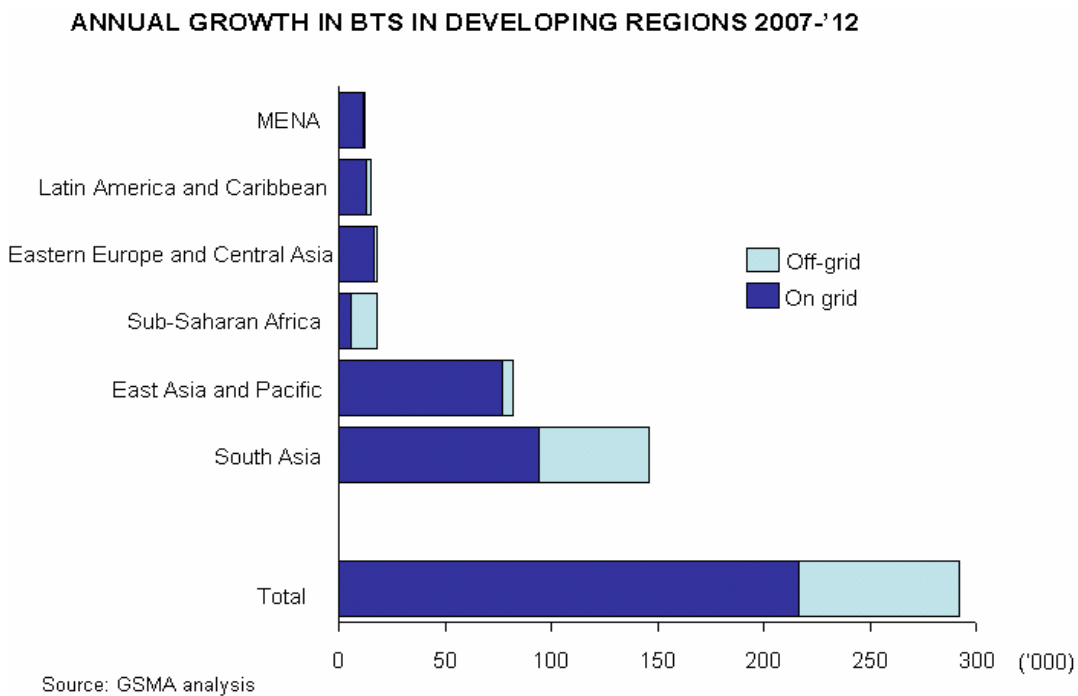


Source: GSM Association Universal Access Report (2006)

For mobile operator to reach and provide coverage to subscribers, the need for BTS as the medium to transmit and receive signal is needed. In mobile network, the biggest

quantities are the BTS. The Annual growth BTS as projected by GSM Association (GSMA) is as depicted below:

**Figure 6: BTS Annual Growth in Developing Regions 2007-2012**



The projection GSMA includes the number of BTS would be on power grid and alternative energy. The number of BTS on off grid in the South Asia and Sub-Saharan Africa is high due to the fact that the mobile network expansion in the developed countries are already matured or near to maturity. GSMA study also reported that the cost of grid connection cost in South Asia and Sub Saharan Africa can be up to USD35,000 per site and the lead time can be up to 2 years.

### 2.3.1. LOW COST NETWORK OPERATIONAL EXPENDITURE

To maintain profitability, the company has to be attractive and well position in the industry. Porter's Generic Strategies has illustrated that there are two main stream of firm's strength namely cost advantage and differentiation. By adopting low cost in the price war scenario in the mobile telecommunication market, the mobile operator would be able to sustain the same profitability. Low cost could be achieve by improving the operational and new investment of the expansion equipment.

The study done by GSMA shows that energy optimization has become a focus for mobile network technology development as part of reducing total cost ownership. The technology evolves in reducing number of sites, less site space, low energy consumption and alternative power which will provide opportunity for network operator to reduce cost and fully utilizing the existing site.

In this case study, Total cost of ownership will be used as a basis for calculation of savings before and after installation of various methods. Other method in calculating capital investment such as Net Present Value and Internal Rate Return are not been used to maintain confidentiality of the Telco X's internal data. The savings will be shown based on the comparison of total cost of ownership graphs.

## Total Cost of Ownership

Total cost of ownership concept has been introduced in 1987 to analyze IT investment. Total cost of ownership includes cost of acquiring and operational which also has known as capital expenditure which is one time investment and operational expenditure which is operating cost recurrent monthly or yearly. Ellram (1993) has mentioned that total cost of ownership provides more accurate cost data than conventional purchase price analysis. In telecommunication operators, both components of total cost of ownership are representing process of network deployment and operational respectively. The network operator needs to fully consider both figures in deciding the effective, efficient and value for investment network solution. Operational expenditure consists of operation and maintenance such as operation of site, site rental, leased line for backhaul, hardware and software for upgrading and manpower cost. In-stat 2008 study shows Operational expenditure for cellular network operators cost 73% of the TCO as illustrated in the figure below.