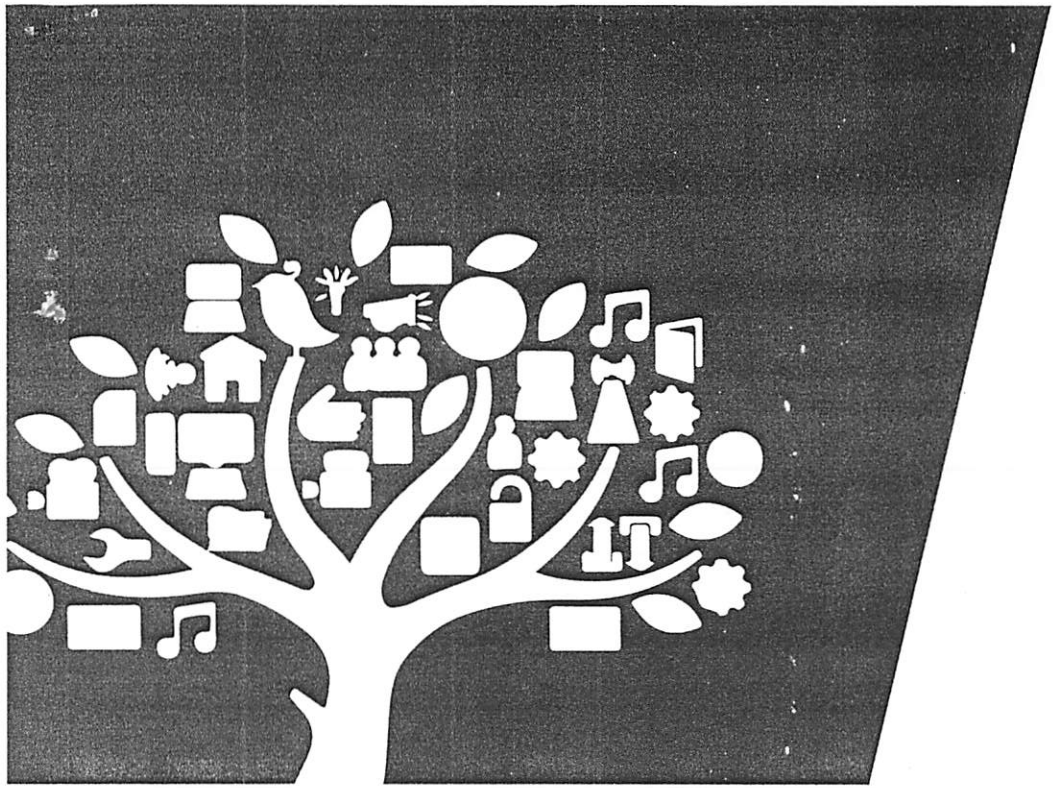



Contact
Faculty of Business Administration
Dhurakij Pundit University
Dr.Theerasak Kanchanapong (Building 5)
110/1-4 Prachachuen Road, Laksi, Bangkok 10210, Thailand
Telephone: +66-2954-7300 Ext.214,or 310, or 219
Fax: +66-2954-7350
Email: garcombs2014@dpu.ac.th


Sponsored by

BAFS

DPU
DHURAKIJ PUNDIT UNIVERSITY
PROGRESSIVE UNIVERSITY

# International Conference

The Global Advanced Research Conference on Management and Business Studies
(GARCOMBS 2014)

## "Sustainable Business Practices in Asian Context"

15-18 Oct 2014
Bangkok, Thailand

## Conference Proceedings

Organized by

DPU
DHURAKIJ PUNDIT UNIVERSITY
FACULTY OF BUSINESS ADMINISTRATION

Supporting Partners from Indonesia and Malaysia:

Universiti Malaysia Terengganu

## Table of Content

## Agenda

**2nd Global Advanced Research Conference on Management and Business Studies (GARCOMBS 2014)**
**Dhurakij Pundit University (DPU), Bangkok, Thailand**

---

**October 16, 2014 (Sawai Sudhipitak Hall, Building 6, Floor 7)**

8.00 – 9.00 am. Registration

9.00 – 9.45 am. Opening Ceremony Chaired by the President of DPU

9.00 – 9.10 Report and Message from the Program Co-Chair
**Associate Prof. Somboonwan Satyarakwit, D.B.A.**
Vice – President, Academic Affair, DPU

9.10 – 9.25 Welcoming Speech by the Conference Chair
**Associate Prof. Varakorn Samakoses, Ph.D.**

9.25 – 9.30 Message from the Program Co-Chair
**Prof. Dr. Hj.Ernie Tisnawati Sule, SE.M.Si**
Faculty of Economics and Business, UNPAD

9.30 - 9.45 Message from Education and Culture Attaché, Embassy of Republic of Indonesia, Bangkok, Thailand

9.45 – 10.00 am. Coffee/Tea Break

10.00 – 12.00 am. Panel Discussion
**"Sustainable Business Practices in Asian Context"**
(1) **Nury Effendi, Ph.D.**
Dean, Faculty of Economics and Business
Padjadjaran University, Indonesia
(2) **Sirikul Laukaikul, Ph.D.**
Founder, The BrandBeing Consultant Co., Ltd.



(3) **Mr. Woramol Khamkanist**
CEO, Impact Electrons Siam Company Limited
Moderator: **Assistant Prof. Harald Kraus, Ph.D.**
Dean, International College, DPU

12.00 – 1.30 pm. Lunch(President's Office Building, Floor 5)

1.30 – 3.00 pm. Parallel Sessions 1
(President's Office Building, Floor 3)

3.00 – 3.30 pm. Coffee/Tea Break

3.30 – 5.00 pm. Parallel Sessions 2
(President's Office Building, Floor 3)

6.00 – 9.00 pm. Welcoming Dinner
(Room 1-1, Building 4, Floor 1)

**October 17, 2014**

8.00 – 9.00 am. Registration

9.00 – 10.30 am. Parallel Sessions 3
(President's Office Building, Floor 3)

10.30 – 11.00 am. Coffee/Tea Break

11.00 – 12.00 am. Parallel Sessions 4
(President's Office Building, Floor 3)

12.00 – 1.30 pm. Lunch (DPU Cafe)

2.00 – 4.00 pm. Meeting for the GARCOMBS Steering Committee and Honorable Guest (DPU Cafe)

**October 18, 2014**

8.00 am. – 3.00 pm. Study Tour

## Oral Presentation Agenda

**Parallel Sessions 1 (October 16, 2014: 1.30 – 3.00 pm.)**

| Time | Seminar Room 3-2, President's Office Building<br>Organizational Behavior and HR Management |
|---|---|
| **Session Chair: Assistant Prof. Teerasak Khanchanapong, Ph.D.** | |
| 1.30 - 3.00 pm | The Mediating Effect of Knowledge Creation Process in Creating New Venture Among under Graduate Entrepreneurs in Bandung<br>***Sukmadi, Anang Sutono, Erry Ahdiana Putra and Andar Danova Gultom*** |
| | Knowledge Management, Industry Environment, Cooperative and Competitive Strategies in the Performance of Coffee Processing Company in Indonesia: A Literature Review<br>***Muhammad Adam and Hendra Syahputra*** |
| | Tower Sharing Approach: Towards Sustainable Business Practices in Telecommunication Industry<br>***Anisah Firli and UmiKaltum*** |

| Time | Seminar Room 3-3, President's Office Building<br>Finance |
|---|---|
| **SessionChair: Dr.ErieFebrian** | |
| 1.30 - 3.00 pm | Theoretical Review of The Application of Green Banking in Indonesia<br>***Joko Tri Haryanto*** |
| | Growth Company and Dividend Policy: Empirical Study on State Owned Enterprises (Growth of Firm and Dividend Policy: Empirical an Study on The State-Enterprises Own)<br>***AA Gunawan and Sulaeman Rahman Nidar*** |
| | The Effectiveness of Macroprudential Instruments and Banking Market Structure on Banks's Performance: Empirical Evidence on Emerging Countries<br>***Tumpak Silalah and RinaIn diastuti*** |



| Time | Seminar Room 3-4, President's Office Building<br>Marketing |
|---|---|
| **Session Chair: Assistant Prof. Sawitree Sutthijakra, Ph.D.** | |
| 1.30 - 3.00 pm | Asian Buying Behavior toward Counterfeit Product: Evidence from Indonesia<br>***Syahmardi Yacob and Musnaini*** |
| | The Effect of Service Quality on Customer Satisfaction of The Manise Hotel in Ambon, Indonesia<br>***Saul Ronald, Jacob Saleky, Dian Utami Sutiksno, and Aldina Shiratina*** |
| | Analysis on The Factors Influencing The Use of E-Commerce in The Creative Industry's Small and Medium Enterprises in Indonesia<br>***Rambat Lupiyoadiet, Suharto Abdul Majid, and Bramana Putra*** |

| Time | Seminar Room 3-5, President's Office Building<br>Operations and Supply Chain Management |
|---|---|
| **Session Chair: Assistant Prof. Pongsai Petcharak** | |
| 1.30 - 3.00 pm | Analysis of Logistics Delivery Performance: A Case Study of Rental Tools Delivery in XYZ Power Plant Project at The Energy Service Fossil Division<br>***Rinaldi Raymond, Nila K. Hidayat, Linus Pasasa, Efrata Denny Saputra and Yunus*** |
| | Using Chemical and Natural Hairdressing Service in Salon of Women in Bangkok<br>***Katanyu Hiransomboon*** |
| | Towards Sustainability in Thailand Automotive industry<br>***Pongsai Petcharak*** |

| Time | Seminar Room 3-6, President's Office Building<br>Strategic Management |
|---|---|
| **Session Chair: Mr.Juliater Simarmata** | |
| 1.30 - 3.00 pm | Analysis and Evaluation on the Strategy of Indonesian Airline Companies to Face the Increasing Price of Avtur and the Decreasing Exchange Value of Rupiah against the US Dollar<br>***Juliater Simarmata*** |
| | Strategy in Emerging Market: Bringing Blue Ocean Into Indonesian Construction Market<br>***Firdau sand Basbeth*** |
| | The Influence of External and Internal Environment on The Competitive Strategy and The Partnership Strategy and Its Impact on The Competitive Advantage and Its Implication on The Performance of Small and Medium Enterprises in West Sumatra<br>***Afriapollo and Syarifudin*** |

**Parallel Sessions 2 (October 16, 2014: 3.30 – 5.00 pm.)**

| Time | Seminar Room 3-2, President's Office Building<br>Organizational Behavior and HR Management |
|---|---|
| **Session Chair: Akkapong Kittisarn, Ph.D.** | |
| 3.30 – 5.00 pm | Roles of Zakat Distribution for Microenterprises in the Basis of Sustainable Family Empowerment in Indonesia<br>***Vita Sarasi and UmiKaltum*** |
| | Leadership Style and Training Development correlated with The Employee Performance of Koja Container Terminal<br>***Aswanti Setyawati*** |
| | Working Environment, Competence, Motivation and Organizational Citizenship Behavior in Internal Auditor<br>***Endang Pitaloka*** |



| Time | Seminar Room 3-3, President's Office Building<br>Finance |
|---|---|
| **Sessional Chair: H. SulaemanRahman Nidar** | |
| 3.30 – 5.00 pm | The Effects of Internal and External Factor on The Value of Firm through Its Investment Opportunitieson The Stock of The Southeast Asian Countries<br>***I Gede Adiputra*** |
| | The influence of profitability and capital adequacy rasio toward intellectual capital disclosure (An Empiric study on banking company listed in The Indonesian stock exchange 2010-2012)<br>***Galuh Tresna Murt*** |
| | Integrating Balanced Scorecard and Enterprise Risk Management in Banking<br>***Irwan Lubis*** |

| Time | Seminar Room 3-4, President's Office Building<br>Marketing |
|---|---|
| **Session Chair: Assistant Prof.Nuntasaree Suktho, Ph.D.** | |
| 3.30 – 5.00 pm | How to Make Brand Trust to The English Language Institution in Kediri, East Java Indonesia<br>***Nur Choirul Afifand Dian Utami Sutiksno*** |
| | The Effect of Religiosity, Ethnocentrism, and Corporate Image on Perception of Foreign Product Purchasing Behavior: Experience from Students of University of Suska Riau<br>***Julina Juli*** |
| | Marketing Strategy of Taxi Leasing Business in Bangkok<br>***Katanyu Hiransomboon and Adilla Pongyeela*** |

| Time | Seminar Room 3-5, President's Office Building Operations and Supply Chain Management |
|---|---|
| **Session Chair: Assistant Prof.Charanya Parnchareon, Ph.D.** | |
| 3.30 – 5.00 pm | Air Traffic On Time Performance of PT. Garuda Indonesia flight<br>***Lira Agusinta*** |
| | The Effect of Inconvenience of Recycling and the Importance of Recycling toward Recycling Behavior<br>***Lusi Suwandari*** |
| | Development Supply Chain Management Model of Horticulture in West Java<br>***Umi Kaltum*** |

| Time | Seminar Room 3-6, President's Office Building Strategic Management |
|---|---|
| **Session Chair: Dr. Diana Sari** | |
| 3.30 – 5.00 pm | The Innovative Business Model Concept Generation for pt. Len Industry Business Model Solutions in Achieving The Expected Net Profit margin<br>***Darman Mappangara*** |
| | Strategy Sustainability Business Growth by Value Innovation Product Smart Green Building<br>***Mombang Sihite*** |
| | The Uniqueness of Resources in Building The Partnerships Strategy and Competitive Strategy to Create The Positional Advantage and Its Implications on The Hospital Performance(A Study on Hospital Services in Indonesia)<br>***Yusuf*** |



**Parallel Sessions 3 (October 17, 2014: 9.00 – 10.30 am.)**

| Time | Seminar Room 3-3, President's Office Building Finance |
|---|---|
| **Sessional Chair: Assistant Prof.Dr.Titirut Thipbharos** | |
| 9.00 - 10.30 am | Firm Longevity Based on Human Capital Theory in Indonesia Cellular Telephone Operator Industry<br>***EngkosAchmadKuncoro*** |
| | The Impact of Discipline, Stress Toward Performance of Collector Card Center at pt. BANK MEGA Tbk. JAKARTA<br>***Gairah Sinulingga*** |
| | Manipulation of Regression Outliers by Imputation Method<br>***Titirut Thipbharos*** |

| Time | Seminar Room 3-4, President's Office Building Marketing |
|---|---|
| **Session Chair: Dr. Dian Masyitha** | |
| 9.00 - 10.30 am | Application of Analytical Hierarchy Process Method on Mayor Election at Bandar lampung Based on The Concept Political Marketing Mix<br>***Ridho Bramul yaIkhsan*** |
| | Development Model of Corporate Social Responsibility (CRS) Program Through Intellectual Capital Empowerment in Efforts to Educational Equity Improvement (Survey in Bandung)<br>***WaOde Zusnita*** |
| | Relationship Marketing and Marketing Mix of Customer Value and Brand Image and Its Impact: Case Study On Business Service Cellular Telecommunications Services In Customer Trust Indonesia<br>***Nina Kurnaiand HikmaWati*** |

| Time | Seminar Room 3-5, President's Office Building<br>Operations and Supply Chain Management |
|---|---|
| **Session Chair: Sophon Yamklin** | |
| 9.00 - 10.30 am | Zach's Star Model Testing on Product Innovation, Process, and the Implication to the Managerial Performance Achievement of PT. Len Industries<br>***Wahyuddin Bagenda*** |
| | Assessment the Supply Chain Reliability<br>***KittichaiAthikulrat, Vichai Rungreanganun and Sompoap Talabgaew*** |
| | Wood Fuel and Energy Use Hydro to Improve Efficiency: A Case Study of Tea Plantation Gods, PT. (Chakra DesaTenjolaya, KecamatanPasirjambu, Kabupaten Bandung, Jawa Barat) Tea Production Costs<br>***Sukiman*** |

| Time | Seminar Room 3-6, President's Office Building<br>Strategic Management |
|---|---|
| **Session Chair: Assistant Prof.Adilla Pongyeela, Ph.D.** | |
| 9.00 - 10.30 am | Empirical Model of Strategic Decision Making in Real Estate Development Relation between Economies, Capabilities, CRE Sustainable Development Strategies, and Performances<br>***Hastjarjo*** |
| | The Decision Making of Taxi Drivers in Bangkok Metropolitan Area toward Leasing Taxi Cars<br>***Adilla Pongyeela*** |



**Parallel Sessions 4 (October 17, 2014: 11.00 – 12.00 am.)**

| Time | Seminar Room 3-4<br>Marketing |
|---|---|
| **Sessional Chair:Assistant Prof.Dr. Teerasak Khanchanapong** | |
| 1.00 -12.00 am | Country of Origin Effect on Purchasing Intention: a Study of Japanese Television<br>***Diana Sari, Deki Fermansyah, and Ina Primiana*** |
| | The Mediation Effect of Marketing Mix Strategy on The Relationship Between Consumer Lifestyle and Repeat Purchase in The Thai Context<br>***Prerapha Taweesuk*** |

| Time | Seminar Room 3-5<br>Operations and Supply Chain Management |
|---|---|
| **Sessional Chair:Dr. Rachata Khumboon** | |
| 1.00 -12.00 am | Bad Manufacturing Practices in Street Food Business: Is It Really Jeopardized Profit and Growth? (Findings from Street Food Business at East Jakarta Region, Indonesia)<br>***Agus Kaharuddin, Agung Wahyu Handaru, Adzhani Achmad, Firdaus Basbeth, and Syahmardi Yacob*** |
| | Aggregate Planning Analysis to Achieve Cost Efficiency of Pastry Production at Pt Bonli Cipta Sejahtera<br>***Karina Puteri Hapsari*** |

# Tower Sharing Approach: Towards Sustainable Business Practices in Telecommunication Industry

Anisah Firli[1,2], Umi Kaltum[2]

[1]Economics and Business Faculty, Telkom University, Bandung - Indonesia

[2]Department of Management and Business, Faculty of Economics Padjajaran University, Bandung- Indonesia

firli297@yahoo.co.id, umi.kaltum@yahoo.com

## ABSTRACT

Mobile cellular is the highest rapid technology in all history. The amount users of mobile cellular are increasing globally. In several Asian countries particularly, the increase of users is proportionally inversed with the Average Revenue per User (ARPU). Global telecommunication industry, especially in Asia, is faced with the fierce competition between operators, the decrease of ARPU, and the price of communication services, also the capital expenditure trend which tend to increase every year. Capital Expenditure (CAPEX) in telecommunication companies is typically aimed to expand network, including the cost of tower's construction. Indonesia, as the second highest country with telecommunication operators in Asia, after India, is confronted with the severe competition. Ever since mobile technology has been introduced, inefficiency in the use of Base Transceiver Station (BTS) tower capacity has become financial (high CAPEX) and social issues in Indonesia. Facing this, operators are demanded to survive in the industry. Another issue is about the emerging telecommunication operational management which is how to optimize the telecommunication network in overcoming the efficiency problem (financial issue, CAPEX) and how to increase the service quality to endure in a competitive industry. Tower sharing optimization will be discussed on this paper as the expected solution to survive in the telecommunication business.

***Keywords:*** *Tower Sharing, Optimization, CAPEX, Service Quality, Telecommunication Business*

## I. INTRODUCTION

One of direct impact of Information Communication Technology (ICT) development is the use of mobile technology is widely used by the public in the digital age globally. The use of mobile technology is also very strongly felt in Asia and even in Indonesia. It proved with Indonesia as the second country after India as the country with the highest numbers of operators. With the number of operators who participate in providing mobile services certainly have some issues that arise in its implementation. The main problems that often arise include the decrease of ARPU, the price of communication services, and the capital expenditure trend which tend to increase every year. This paper will discussed the mobile cellular that widely used in Asia and Indonesia, current issues and challenges, and tower sharing approach as a solution that expected could solve implementation inefficiency and minimize social impact.

This paper consists of seven parts. First, the introduction describes the background and objectives, along with a list of the contents of this paper, second will be discussed about Asia's telecommunication followed by the third part discussed about Indonesia's telecommunication, and then will be described the issues and challenges about mobile telecommunications business also the tower sharing concept to optimized the implementation efficiency and finally the conclusion will be the end of the part from this paper.

## II. ASIA'S TELECOMMUNICATION

Asian countries are categorised by Business Monitor International based on the *"reward" and "risk"* categories. *Rewards* refer to the potential development of telecommunication market and social economy demography characteristics which give impacts to the industry development. On the other hand, risk refers to the industrial risk of the

country's social politics condition. These Reward and risk analysis are made for investment analysis to the countries in Asia, which can be a reference in describing the telecommunication's condition in Asia.

Japan, Singapore, Australia, Hong Kong, South Korea, China, Taiwan and Malaysia are *The Big Eight* with high telecom scores. Indonesia, Bangladesh, the Philippines, Pakistan, India, Thailand, Myanmar and Vietnam are categorised as the "Next Eight" which have potential development in Second Generation (2G) and Third Generation (3G) market. Nepal, Cambodia, Sri Lanka, and Laos are "*The Fragile Four*" countries which have low telecom scores as shown in Figure 1 (Business Monitor International, 2014).

**Figure 1. Asia-Pacific Ratings 2014 (Business Monitor International, 2014)**

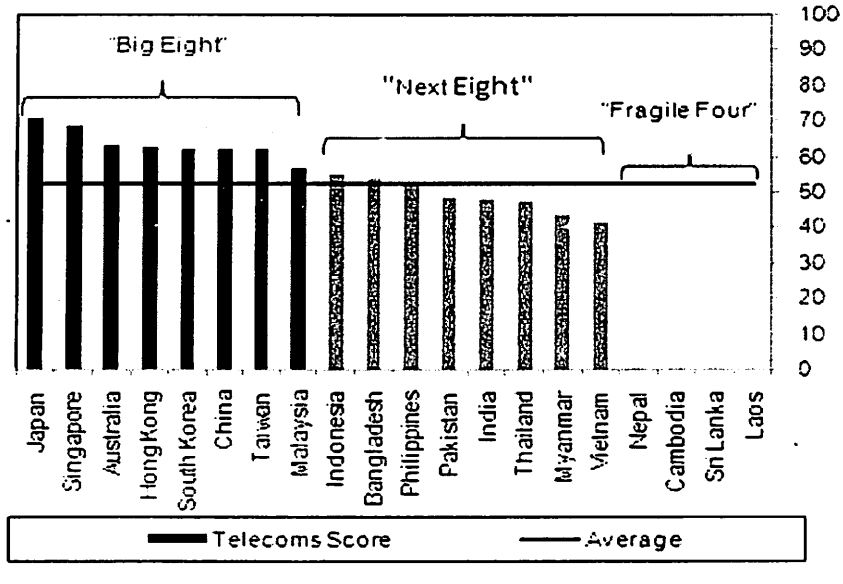



Table 1 show the essential phenomenon which is faced by "The Big Eight" countries in telecommunication business over the past years. The amount of customer's trend and mobile penetration of "The Big Eight" have been increasing for the previous and last three years, and are forecasted to be increasing to 2018. However, the decreasing of ARPU's trend will continue until 2018.

Table 1. Asia Mobile Telecommunication

(Japan, Singapore, Australia, Hong Kong, South Korea, China, Taiwan, Malaysia Telecommunication Report, 2014)

| JAPAN | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 2011 | 2012 | 2013 | 2014f | 2015f | 2016f | 2017f | 2018f |
| Mobile Cellular Subscribers (000) | 129.868.5 | 138.321.0 | 146.256.0 | 152.106.2 | 157.430.0 | 160.578.6 | 161.381.5 | 162.188.4 |
| Penetration (%) | 102.0 | 108.7 | 115.0 | 119.8 | 124.1 | 126.8 | 127.7 | 128.7 |
| ARPU (JPY) | 4769.1 | 4554.8 | 4330.8 | 4122.6 | 3943.3 | 3827.3 | 3770.2 | 3713.9 |
| **SINGAPORE** | | | | | | | | |
| | 2010 | 2011 | 2012 | 2013f | 2014f | 2015f | 2016f | 2017f |
| Mobile Cellular Subscribers (000) | 7285 | 7756 | 8064 | 8266 | 8431 | 8515 | 8600 | 8686 |
| Penetration (%) | 143.2 | 149.5 | 153.4 | 155.9 | 158.0 | 158.4 | 158.7 | 159.0 |
| ARPU (SGD) | 56.0 | 53.0 | 51.0 | 50.2 | 49.2 | 48.7 | 48.2 | 47.7 |
| **AUSTRALIA** | | | | | | | | |
| | 2011 | 2012 | 2013 | 2014f | 2015f | 2016f | 2017f | 2018f |
| Mobile Cellular Subscribers (000) | 29636 | 30567 | 30590 | 31202 | 31514 | 31829 | 32147 | 32480 |
| Penetration (%) | 132.6 | 132.6 | 131.0 | 132.0 | 131.7 | 131.4 | 131.1 | 130.8 |
| ARPU (AUS) | 48.3 | 45 | 43.3 | 43 | 42.3 | 42 | 41.6 | 41.9 |
| **HONGKONG** | | | | | | | | |
| | 2011 | 2012 | 2013 | 2014f | 2015f | 2016f | 2017f | 2018f |
| Mobile Cellular Subscribers (000) | 14931 | 16403 | 17445 | 18055 | 18416 | 18601 | 18787 | 18974 |
| Penetration (%) | 210.4 | 229.5 | 242.2 | 248.8 | 251.8 | 252.6 | 253.4 | 254.3 |
| ARPU (HKD) | 198 | 204 | 190.6 | 187 | 183 | 179.6 | 177.6 | 175.6 |
| **SOUTH KOREA** | | | | | | | | |
| | 2011 | 2012 | 2013 | 2014f | 2015f | 2016f | 2017f | 2018f |
| Mobile Cellular Subscribers (000) | 53251 | 54559 | 55526 | 56637 | 57769 | 588347 | 58930 | 60109 |
| Penetration (%) | 109.3 | 111.3 | 112.7 | 114.4 | 116.1 | 116.8 | 117.4 | 119.3 |
| ARPU (KRW) | 34723 | 36108 | 38889 | 38508 | 38130 | 38130 | 38130 | 37756 |
| **CHINA** | | | | | | | | |

| | 2011 | 2012 | 2013 | 2014f | 2015f | 2016f | 2017f | 2018f |
|---|---|---|---|---|---|---|---|---|
| **Mobile Cellular Subscribers (000)** | 975698 | 1110230 | 1233769 | 1332470 | 1425743 | 1511288 | 1586852 | 1650326 |
| **Penetration (%)** | 71.3 | 80.6 | 89.0 | 95.6 | 101.7 | 107.3 | 112.1 | 116.1 |
| **ARPU** | 67.8 | 62.5 | 61.8 | 60.3 | 58.8 | 57.5 | 56.6 | 55.9 |
| **TAIWAN** | | | | | | | | |
| | **2011** | **2012** | **2013** | **2014f** | **2015f** | **2016f** | **2017f** | **2018f** |
| **Mobile Cellular Subscribers (000)** | 28723 | 29552 | 30378 | 30985 | 31295 | 31452 | 31546 | 31577 |
| **Penetration (%)** | 123.7 | 126.8 | 129.9 | 132.3 | 133.3 | 133.8 | 134.0 | 134.0 |
| **ARPU (TWD)** | 678 | 684.36 | 695.9 | 678.9 | 653.1 | 629.4 | 600.16 | 565.2 |
| **MALAYSIA** | | | | | | | | |
| | **2011** | **2012** | **2013** | **2014f** | **2015f** | **2016f** | **2017f** | **2018f** |
| **Mobile Cellular Subscribers (000)** | 36662.0 | 41325.0 | 42956.0 | 45318.6 | 46995.4 | 48029.3 | 48365.5 | 48399.3 |
| **Penetration (%)** | 127.5 | 141.3 | 144.6 | 150.1 | 153.3 | 154.4 | 153.3 | 151.3 |
| **ARPU** | 49.1 | 48.1 | 47.7 | 45.4 | 45.1 | 45.4 | 46.5 | 46.4 |

The decreasing price in communication was caused by the tight competition and the buyer's power. Several operators also take a price war strategy or enter the industry by offering cheap services' prices which is one of the cause of ARPU's decrease. This condition is a condition which happens globally, not only in Asia. Europe and US's ARPU are decreasing and cause the decrease of business margin from 35-40% to 15% over the last 5 years. Operators are demanded to survive with the pressure from ARPU's condition. They are also faced with the new CAPEX expenditure (Karim *et al*, 2010). Ideally, telecommunication is always related with the network addition so the new CAPEX expenditure will appear.

## III. INDONESIA TELECOMMUNICATION

The amount of users and mobile cellular penetration in Indonesia is continually increasing for the past few years and it is predicted to increase until 2018 (See Table 2) in Indonesia and the other countries in Asia. ARPU's trend in Indonesia is also decreasing. Telecommunication industry in Indonesia is quite crowded by 8 operators in 2014, the second largest after India.

**Table 2 Indonesia Telecommunication (Indonesia Telecommunication Report, 2014)**

| | 2011 | 2012 | 2013 | 2014f | 2015f | 2016f | 2017f | 2018f |
|---|---|---|---|---|---|---|---|---|
| **Mobile Cellular Subscribers (000)** | 249806.0 | 281964.0 | 323038.0 | 339189.9 | 352757.5 | 363340.2 | 368427.0 | 367690.1 |
| **Penetration (%)** | 102.5 | 114.2 | 129.3 | 134.2 | 138.0 | 140.5 | 141.0 | 139.2 |
| **ARPU** | 28523.1 | 29379.7 | 27909.9 | 26005.6 | 24444.5 | 23379.5 | 22587.4 | 22045.4 |

Not only in Indonesia, ARPU's decreasing trend (See Table 1) is also happening in Cambodia, Laos, Chile, France, Nigeria, and India (Cambodia, Laos, Chile, France, Nigeria, India Telecommunication Report, 2014).

## IV. INEFFICIENCY AND SOCIAL IMPACTS

The customer's growth is supported by enhanced infrastructure. One of them is the amount of BTS in order to handle the services for the customer of telecommunication operator. Each BTS has the ability to handle the customer's traffic capacities. BTS is put in a tower which equipped with many devices.

Inefficiency practice which has happened in Indonesia; Single Tower for One Operator, each telecommunication operator build its own BTS tower, technically several BTS

can be put in the towers. In-social practice, BTS which damage aesthetics, social impact which caused by towers, many towers are not maintained regularly and become a complex issue in Indonesia (Windharto and Setiawan, 2009). Furthermore, Windharto and Setiawan (2009) design the tower's aesthetics with good appearance and tower placement by considering aesthetics. TRAI (Telecom Regulatory Authority of India) claims that the total emission which caused by BTS is 5 million tons and causes electromagnetic radiation (Dua, 2012), furthermore the research is done by Dua (2012) states that collaboration between telecommunication companies and tower companies in India can give impact to a greener environment (reduce $CO_2$ emission).

## V. CAPEX REDUCTION BY TOWER SHARING

In Middle East and Africa, operators invests (10-20 %) from their income to add BTS towers (Bahawa, 2009). Referring to several studies, operators can save (30%) CAPEX and (15%) Operating Expenditure (OPEX) by executing infrastructure sharing (Indian Express Online, 2010). In Indonesia, operators spend 300-500 million to build a tower (Tower Provider Database, 2013). With the licensing and high cost issues in Indonesia, tower sharing can press the CAPEX costs for each operator. India, with the largest amount of operators in Asia facing the tough price war, can save $1,5 billion in CAPEX by using tower sharing (Mc Clatchy Tribun Business News, 2010).

Collaboration between telecommunication companies and Tower Companies to do Infrastructure collaboration can give impact to Return on Investment (ROI), Revenue, OPEX, and CAPEX (Dua, 2012). Based on the research conduct by (Djamal *et al*, 2013; Dua, 2012) which was infrastructure sharing gives a critical role to the development of telecommunication sector and gives the impact to efficiency of CAPEX and OPEX. Frisanco and Tafershofer (2008) research gives details to the discovery in tower sharing, between

operators, resulting in efficiency of 18% CAPEX. Djamal *et al* (2013) proves the existence of efficiency in OPEX and CAPEX with different quantities in each region (dense, sub urban and rural) with different infrastructure model.

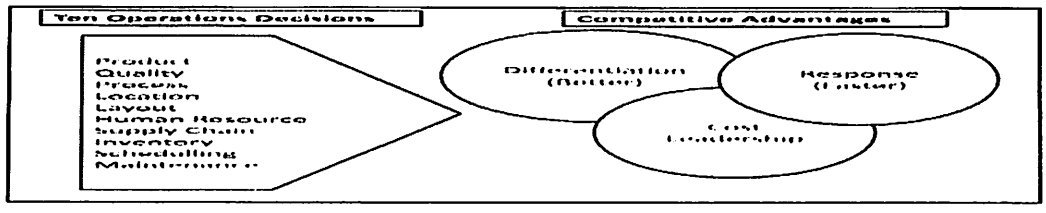
A research relating to tower sharing from the technical side was finished by Koumadi *et al* (2013). It discovers that the tower's loading, an un-optimal antenna which gives negative impact to cell coverage, signal strength, Quality of Service (QoS) achievement, and backbone microwave links.

Kibida *et al* (2013) research proves through a model of how infrastructure sharing can generate coverage efficiency. Based on Koumadi *et al* (2013) discovery that there is no positive impact from the technical side by doing tower sharing, therefore it is advisable to consider the financial side; CAPEX, whether there is a decrease of CAPEX and the impact to operators, whether operators have to use the existing towers or not, and other further options.

## VI. CHALLENGE IN OPERATION MANAGEMENT

Effective operation management will enable the company to compete in modern era (Schroeder *et al*, 2012). There are 10 decisions which should be made in operation management which are Product, Quality, Process, Layout, Human Resource, Supply Chain, Inventory, Scheduling, and Maintenance. These 10 decisions are aimed to achieve the competitive advantage of the company which are differentiation, response, and cost leadership (Heizer and Render, 2011)

**Figure 2 Ten Operation Decisions (Heizer & Render, 2011)**




In operation management, every output creation against input is demanded to always be effective and efficient. The elaboration of telecommunication industry issue in Indonesia, decisions regarding to capacity and location have not been done in an optimum way. Decisions about capacity need to be done because it will affect the costs. If the capacity of a facility is too big, the idle facility's capacity adding the production costs. On the other hand, if the facility's capacity is too small, it can give an impact of losing customers or achievable market. Decisions about capacities are intended to achieve a high utility high return of investments (Heizer and Render, 2011).

Decisions about location are important decisions because locations have big impact to the costs. Wider impacts from location's decisions are risks and company's profit. Locations are a moving factor to costs and significant income. The essence in locations decisions is to maximize the company's benefits (Heizer and Render, 2011).

Related to the previous elaboration of telecommunication industry issue (tough competition, high costs of CAPEX because of "single tower for one operator", decreasing ARPU), a tower sharing strategy is needed to improvise costs efficiency side (excess capacity in one tower, unoptimum placement of tower). Therefore, the effectiveness option is an absolute factor to achieve, which is network performance (Service Quality). Eventually, the challenge is how to optimise telecommunication infrastructure in terms of efficient and

effective tower sharing strategy application, in order to reduce CAPEX operators and increase network performance (Service Quality).

## VII. CONCLUSIONS

Telecommunication infrastructure practice in Indonesia reflects an inefficient condition of a capacity side handled by a tower. Tower placements are only based on the consideration from operators and the government permit, without concerning to optimal location. Although there are many literatures and research related to tower sharing benefits from the financial side, it is not yet found a comprehensive research about optimization model to existing condition and examine the impact to CAPEX and Service Quality. A research related to tower sharing optimization model in Indonesia (with the amount of optimum tower as parameter, optimum tower location, type of tower) which efficient from CAPEX side and effective from (Service Quality) side is being reviewed in this research and also about the efficient and effective model of tower sharing practice expected as a solution to sustain in a competitive industry, especially in rural development and forecasting to technology changes to the next generation (4G LTE).

## REFERENCES

Bahawa, Al. (2009). *Telecom Operators in Region Can Save Over $8 Billion in Next 5 Years by Sharing Network Tower.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Asian Risk and Reward, Indonesia Telecommunication Report.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Japan Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Singapore Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Australia Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Hong Kong Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. 2014. *South Korea Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *China Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Taiwan Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Malaysia Telecommunication Report*. Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Cambodia Telecommunication Report.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Laos Telecommunication Report.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Chile Telecommunication Report.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *France Telecommunication Report.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Nigeria Telecommunication Report.* Accessed on May, 2014. Available at http://www.proquest.com/.

Business Monitoring Report. (2014). *Asian Risk and Reward.* Accessed on May, 2014. Available at http://www.proquest.com/.

Dua, Vikas. (2012). *IT Mobile Tower Infrastructure Industry Collaboration- Leap towards Green, Smart & Sustainable Future.* Modern Applied Science Vol 6 No 12 ISSN 1913-1884 E-ISSN 1913-1852.

Eddine Meddour, Djamal., Rasheed, Tinku., Gourhant, Yvon. (2011). *On The Role of Infrastructure Sharing for Mobile Network Operators in Emerging Market.* Elsevier Volume 55, Issue 7 Pg 1576-1591.

Frisanco, Thomas., Tafershofer, Paul. (2008). *Infrastructure Sharing for Mobile Network Operators*. Network Operations and Management Symposium IEEE pages 129-136 ISSN 1542-1201.

G. Schroeder, Roger., Mayer Goldstein, Susan., Rungtusanatham., M johnny. (2011). *Operations Management.* NewYork : Mc. GrawHIill.

Heizer, Jay & Render, Barry. (2011). *Operations Management.* New Jersey : Pearson.

Kibilda, Jacek., Da Silva, Luiz. (2013). *Efficient Coverage Through Inter-Operator Infrastructure Sharing in Mobile Network.* IEEE Conference page 1-6 ISSN: 2156 9711.

M. Koumadi, Koudjo., Folley Rayment., Quist-Aphetsi., Acakpovi, Amevi. *Technical Challanges of Tower Sharing in Multi Operator Mobile Communication Environments.* International Journal of Informatics and Communication Technology Vol 2 No 3 pp 124-131 ISSN: 2252-8776.

Lintas Arta Database .(2014*). Internal Database.* Jakarta; Lintas Arta.

Tega, Karim., Opitz, Michael., Portal, Jesus., Karuvilla, Thomas. (2010). *Cost Reduction in The Telecom Industry.* Arthur D Little.

Thomas Philip, Joji (2010). *Telco to save $ 1,5 Billion on Lowe Capex.* Washington; Tribun Information Services. Available at proquest.com.

Tower Provider. (2013). *Tower Provider Database*. Jakarta; Tower Provider.

Windharto & Seatiawan.(2009). *Multi Operator BTS Aesthetic Tower Design*. Proceedings of the 1st CIRP Industrial Product Service Systen Conference, Cranfield University. 1-2 April 2009.pp8.