

**Regulatory Policies for Cambodia's Mobile  
Telecommunications Industry with  
Consumer-Oriented Perspectives**

消費者観点によるカンボジアにおける  
移動通信産業の規制政策

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## ABSTRACT

As one of least developed countries in the Asia, Cambodia has moved forwards the development of a better infrastructure of telecommunications technology, especially mobile telecommunications industry. The country allows many competing carriers to offer cellular services by removing all restrictions on entry into all segments of the markets. This approach does not bring the efficiency and stability to the telecommunications sectors as an unclear picture of licensing policy and licensing procedure. Cambodia has been facing many challenges which possibly lead to a failure of telecoms market owing to the absence of specific regulations. Correspondingly, there has been a constant stream of business disputes and accusation of unfair business practices between mobile carriers such as price dumping and access pricing. Therefore, this paper aims to resolve the abovementioned challenges by proposing an approach to regulatory policy for Cambodia's mobile telecommunications Industry.

Based on the research methodologies used in some previous studies, a consumer-oriented approach, incorporating with the consumer perspectives, would be a tool for a systematic and periodic process to assess the performance of cellular suppliers and existing regulatory policies for certain pre-established criteria or regulatory objectives. Even though previous studies have applied a variety of research analytical models, the proposed approach differs in concentrating on the mixture of both adoption theory and choice model. The paper investigates market performance and development in Cambodia during the absence of the overarching framework and telecoms law, which is devoted to the efficiency and fairness in supplying telecommunications services. The study focuses on three case studies, with different theoretical approaches and different analytical tools. In order to express their points of view on mobile telecommunications service and the tradeoffs in regulatory policies with several dimensions, consumers in Cambodia's mobile telecoms market are randomly selected and interviewed.

The first case study is keen to improve the efficiency in adopting basic services and new innovative services as well as licensing controls in terms of entry licenses and numbering plans in Cambodia's mobile telecommunications industry by examining the adoption and motivational factors driving to the subscription. The research focuses on the discussion framework from the decomposition of theory of planned behavior with a mixed approach of both quantitative and qualitative. After spending one and half month on data collection, 330 valid respondents were obtained. The outputs from AMOS show that the most influential factor is the Perceived Behavioral Control with correlation coefficient of 0.470 at the 99% of significant confidence. Attitude toward Behavior had 99% of significant confidence with the correlation coefficient of 0.143 while Promotions and Subjective Norm were found out to have similar statistical significant impact on the Behavioral Intention of correlation coefficient of 0.109, and

0.106 respectively. T-test was also conducted and it shown that no statistically significant difference occurred between different sample sizes of incomes on the BI.

The result implies that the main diffusion and motivational factors of mobile telecommunications carriers to retain existing users and to provide incentives for incoming subscribers were perceived behavioral control, attitude toward behavior and promotion factors. Network coverage, network service quality, resource availability and network effects were recognized as the first prioritized requirements from subscribers and also barriers to some users to adopt new technologies where those do not exist. Mobile telecommunications companies with bigger networks will have more competitive advantages of network externality over their smaller counterparts. Meanwhile the mobile carriers shall improve the ease of use and usefulness of their products. After the products were available to target customers, promotional discounts shall be applied during the first subscription or recharging accounts. Moreover, the last essential factor, so called subjective norm, was the sight effect of lowering costs in using services within the same network or group and the impact of changing a phone number which is mostly suitable for retaining users not to switch to other carriers. Its influence will be decreased in case mobile number portability exists in the country.

The following empirical case intends to increase the competitive market and the exertion of their ability and power to switch between mobile telecommunications suppliers in Cambodia. This case adopts a research model from Push and Pull Model and results of prior research. Satisfaction (pushing factor), alternative attractiveness (pulling factor), switching barriers (mooring factor) and mobile number portability (MNP) are conducted to study consumer switching intention in Cambodia's mobile telecommunications market. Both multiple regression analysis and structure equation modelling are used to study the consumer switching behavior. As a result of the pre-test of online sample of 33 current users of mobile carriers in Cambodia, 393 valid samples have been obtained from the randomly selected population. The result of AMOS shows that the customer switching behavior is statistically and significantly influenced by the three factors at 99% level of confidence; pushing (0.180), mooring (0.142) and pulling factors (0.163), while the MNP also displays its statistical significance of 0.088 on the dependent variable at 90% confidence level.

The proposed theoretical model of the second case is validated from all factors of PPM model and MNP factor in mobile telecommunications industry in a developing country where the MNP does not exist or where it is at its introduction stage. Moreover, the findings indicate that the dissatisfaction is the main cause for mobile telecommunications subscribers to switch suppliers and satisfactions are mostly measured by the functionality of service, availability of service, large network coverage, service quality, availability of products, big network externality, information security. Also, the attractiveness from competitors is the second influential factor on switching intention. When the attractiveness at other carriers is relatively higher than the satisfaction level at the current supplier, users might decide to

change to new suppliers. This switching intention might also be locked from another essential factor, called switching barriers. Users with switching intention always face some costs of terminating contract with the incumbents, costs of searching for new supplier, and costs of subscribing services or related products of new supplier. Additionally, the introduction of the MNP shows significant impacts on switching intention.

The last section of this paper aims to study the regulatory tradeoff in the mobile telecoms industry from three drivers, the fairness, economic efficiency and sustainable development. As it seems not so simply to be calculated to numerical values, the stated preference method is used to estimate the regulatory tradeoff. 775 copies of questionnaire were collected and taken into account. The results from the conjoint analysis conclude that most respondents prefer the fairness to the economic efficiency and the stable development. The regulations and policies in mobile telecoms of Cambodia, shall firstly focus on the fairness/transparency goal before improving the economic efficiency and ensuring the sustainable development of the sector. The fairness objective is preferred at upper medium level, while the regulatory intervention to improve economic efficiency is preferred at low level. Despite the low priority, the participants suggest a development of mobile telecoms services with regulated level.

It is really interesting to note that in all three cases of this study participants show their strong preference on the importance of the network size or network coverage, the quality of services and the network externalities. These are the main aspects driving customers to adoption mobile telecoms services and to switch between mobile service providers. In this paper, the customers' preference on the fairness to the economic efficiency and sustainable development was also found statistically significant during the regulatory tradeoff. The most noticeable finding to emerge from the analysis is that these preferences are linked to objective of the fairness or transparency and the economic efficiency. According to the current situation of Cambodia mobile telecommunications industry, the government should first enforce the regulatory reform to achieve the fairness and economic efficiency.

By introducing the regulatory policy on frequency and licensing management, universal service obligations, and competition, the network coverage will be expanded and the service quality will be enriched. This will reduce the digital divide and the adoption efficiency of mobile telecommunications services will be improved. Simultaneously, the competition policy will create a fair competitive environment by resolving previous challenges in the market such as the use of market power, predatory pricing, interconnections and disputes between mobile carriers in Cambodia. This law will also create the right conditions to attract private investment in mobile telecommunications and a well-functioning market in which consumers are ensured to have enough ability and confidence.

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## LIST OF ACRONYMS AND ABBREVIATIONS

ABT	: Agreement on Basic Telecommunications
ACCC	: Australian Competition and Consumer Commission
ADB	: Asian Development Bank
AMOS	: Analysis of a Moment Structures
AMPS	: Advanced Mobile Phone System
ASEAN	: Association of Southeast Asian Nations
ATB	: Attitude toward Behavior
BI	: Behavioral Intention
CAT	: Communications Authority of Thailand
CDR	: Call Detail Record
COLI	: Cost of Living Index
CSOs	: Community Service Obligations
DI	: Dependent Variable
DOJ	: Department of Justice
EC	: European Commission
EU	: European Union
FBC	: Facilities-Based Competition
FCC	: The Federal Communications Commission
FTC	: The Federal Trade Commission
GATS	: General Agreement on Trade in Services
GDP	: Gross Domestic Product
GFIA	: General Framework for Interconnection and Access
GSM	: Global System for Mobile Communications
GSMA	: GSM Association
HHI	: Herfindahl-Hirschman Index
ICT	: Information Communication Technology
IDI	: ICT Development Indexes
IMPS	: Instance Messaging and Presence Service

ISP	: Internet Service Provider
IT	: Information Technology
ITU	: International Telecommunications Unions
LDC	: Least Developed Countries
LMDS	: Local Multiple Distribution Services
M	: Mean
M&A	: Merger and Acquisition
MNP	: Mobile Number Portability
MPTC	: Ministry of Post and Telecommunications of Cambodia
MVNO	: Mobile Virtual Network Operators
NGO	: Non-governmental Organization
NiDA	: National Information Communications Technology Development Authority
OECD	: Organization for Economic Co-operation and Development
OLS	: Ordinary Least Square
PBC	: Perceived Behavioral Control
PCA	: Principle Component Analysis
PEU	: Perceived Ease of Use
PhD	: Doctor of Philosophy
PPM	: Push Pull Mooring
Pro	: Promotion
PSTN	: Public Switch Telephone Network
PU	: Perceived Usefulness
SBC	: Services-Based Competition
SEM	: Structural Equation Modeling
SI	: Switching Intention
SMS	: Short Message Service
SN	: Subjective Norm
SP	: Stated Preference
Std.	: Standard Deviation
TA	: Telecommunications Act
TC	: Telecom Cambodia
TOT	: Telephone Organization of Thailand
TPB	: Theory of Planned Behavior

TRC	: Telecommunication Regulator of Cambodia
TRE	: Telecom Regulatory Environment
U.K.	: United Kingdoms
U.S.	: United States
UN	: United Nation
UNTAC	: United Nation Transition Authority in Cambodia
US\$	: US Dollar
VAS	: Value Added Services
VNPT	: Vietnam Posts and Telecommunications Corporation
VOIP	: Voice over Internet Protocol
WSIS	: World Summit on the Information Society
WTO	: World Trade Organization



## TABLE OF CONTENTS

ABSTRACT.....	I
ACKNOWLEDGEMENT .....	IV
LIST OF ACRONYMS AND ABBREVIATIONS.....	V
TABLE OF CONTENTS.....	VIII
CHAPTER I:.....	1
INTRODUCTION .....	1
1. Overview of Cambodia’s Telecommunications Market Structure .....	1
2. Regulatory Environment in Cambodia’s Telecoms Sector.....	14
2.1. Regulatory Framework in Cambodia’s Telecoms Sector.....	14
2.2. Development of Regulatory Policies in Cambodia’s Telecoms Sectors .....	17
2.3. Past and On-Going Challenges in Cambodia’s Telecoms Industry .....	18
3. Research Problems .....	30
4. Research Objectives .....	31
5. Significance of Study.....	31
6. Organization of the Dissertation.....	32
CHAPTER II:.....	33
LITERATURE REVIEW .....	33
1. Overview of Regulatory Policies.....	33
2. Challenges and Effective Regulations in Telecommunications Industry .....	34
3. Landscape of Telecommunications Regulations among the ASEAN Countries.....	41
4. Analysis on Challenges in Cambodia’s Telecommunications Market .....	46
5. Related Literature .....	47
6. Research Methodology .....	51
6.1. Theoretical Approach.....	51
6.1.1. Theory of Planned Behavior (used in case study of chapter III).....	51
6.1.2. Migration Theory (used in case study of chapter IV) .....	52
6.1.3. Theory of Consumer Decision Making (used in chapter V).....	53
6.2. Analytical Method.....	55
6.2.1. Multiple Regression (used in chapter III and chapter IV) .....	55
6.2.2. Structured Equation Modeling (used in chapters III and IV).....	56
6.2.3. T-test Analysis (used in chapter III) .....	56
6.2.4. Conjoint Analytical Method (used in chapter V).....	57
CHAPTER III: .....	59

CONSUMER ADOPTION BEHAVIOR IN CAMBODIA’S MOBILE TELECOMMUNICATIONS MARKET.....	59
1. Background of Consumer Adoption Behavior .....	59
2. Literature Review of Consumer Adoption Behavior.....	61
3. Methodologies Used for Studying Consumer Adoption Behavior .....	65
3.1. Model Specification .....	65
3.2. Analytical Procedure .....	65
3.3. Data Collection.....	66
4. Empirical Findings on Consumer Adoption Behavior .....	66
4.1. Respondents’ Information of Consumer Adoption Behavior.....	66
4.2. Factors of Consumer Adoption Behavior.....	69
4.2.1. Attitude toward Behavior.....	69
4.2.2. Promotion.....	70
4.2.3. Subjective Norm .....	71
4.2.4. Perceive Behavioral Control.....	72
4.2.5. Behavioral Intention .....	73
4.3. Descriptive Statistics of Consumer Adoption Behavior.....	74
4.4. Outputs of AMOS .....	76
4.5. Comparison of Adoption Behavior between Groups of Incomes.....	77
4.6. Qualitative Results .....	78
4.7. Interpretation of Consumer Adoption Behavior.....	79
5. Insights into Consumer Adoption Behavior .....	82
CHAPTER IV: .....	83
CONSUMER SWITCHING BEHAVIOR IN CAMBODIA’S MOBILE TELECOMMUNICATIONS MARKET.....	83
1. Background of Consumer Switching Behavior .....	83
2. Literature Review of Consumer Switching Behavior.....	86
2.1. Influences on Switching in Telecommunications Market.....	86
2.2. Migration Theory and Measures of Switching Behavior .....	88
3. Methodologies used for Studying Consumer Switching Behavior.....	92
3.1. Research Model Specification.....	92
3.2. Analytical Tools .....	92
3.3. Data Collection.....	93
4. Findings on Consumer Switching Behavior .....	93
4.1. Participants’ Information of Consumer Switching Behavior .....	93
4.2. Factor Loadings of Consumer Switching Behavior .....	94
4.2.1. Pushing .....	94

4.2.2.	Pulling.....	96
4.2.3.	Mooring.....	97
4.2.4.	Mobile Number Portability.....	98
4.2.5.	Switching Intention.....	99
4.3.	Descriptive Statistics of Consumer Switching Behavior.....	100
4.4.	Statistical Influences on Consumer Switching Behavior.....	102
4.5.	Interpretation of Consumer Switching Behavior.....	104
5.	Insights into Consumer Switching Behavior.....	106
CHAPTER V: .....		108
REGULATORY TRADEOFFS IN CAMBODIA’S TELECOMMUNICATIONS INDUSTRY ...		108
1.	Background of Regulatory Policies.....	108
2.	Literature Review of Regulatory Policies.....	113
2.1.	Rationale and Implementation of Regulatory Policies.....	113
2.2.	Measures of Regulatory Policies.....	115
2.3.	Tradeoff Analysis of Regulatory Policies.....	117
2.4.	Stated Preference Method.....	118
3.	Methodologies Used for the assessment of Regulatory Tradeoffs.....	121
3.1.	Attributes of Regulatory Policies.....	121
3.2.	Tradeoff Scenarios of Regulatory Policies.....	123
3.3.	Analytical Specification.....	124
3.4.	Data Collection.....	124
4.	Findings on Costs and Benefits of Regulatory Policies.....	125
4.1.	Participants’ Information of Regulatory Policies.....	125
4.2.	Consumer Preference for Regulations.....	127
4.3.	Discussion and Interpretation.....	128
CHAPTER VI: .....		132
CONCLUSION AND CONTRIBUTIONS.....		132
1.	Conclusion.....	132
2.	Contributions.....	135
2.1.	Contributions to Academics.....	135
2.2.	Contributions to Regulators.....	136
2.3.	Contributions to Mobile Carriers.....	137
2.4.	Contributions to Consumers.....	137
3.	Directions for Further Research.....	138
REFERENCES.....		139
APPENDIX.....		155
Appendix 1:	Questionnaire of Consumer Adoption Behavior.....	155

Appendix 2: Questionnaire of Consumer Switching Behavior .....	158
Appendix 3: Questionnaire of Regulatory Tradeoffs .....	160

## LIST OF FIGURES

Figure-1: Mobile Cellular Operators in Cambodia between 1990 and 2019.....	3
Figure-2: Changes in Operators and Subscriptions in Cambodia, 1993-2010 .....	5
Figure-3: Comparison of Mobile Market Shares in Cambodia between 2008 and 2010 .....	6
Figure-4: Market Share among Mobile Cellular Operators in Cambodia in 2019 .....	8
Figure-5: Private Investment in Cambodia’s Telecommunications Industry, 1992-2019 .....	9
Figure-6: Total Subscriptions of Telecoms Services in Cambodia between 2004 and 2019 .....	10
Figure-7: Changes in Mobile Phone Ownership in Cambodia between 2014, 2015 and 2016.....	11
Figure-8: Increasing Importance of Internet as a Key Sources of Information in Cambodia.....	12
Figure-9: Increasing Pricing Gap between intra-network and inter-network, 2010 - 2019.....	14
Figure-10: Hierarchy and Roles of Regulatory Authorities in Cambodia’s Telecoms.....	15
Figure-11: Current Challenges in Cambodia’s Telecommunications Industry .....	19
Figure-12: Disputes and Resolutions in Cambodia’s Mobile Telecommunications Market.....	21
Figure-13: Comparison between Production Costs and Market Price in 2019.....	22
Figure-14: Decreases in Total Calls (Minutes) and Regulator Fee .....	26
Figure-15: Decreasing Total Duration of Within-network and Crossing-network Calls .....	27
Figure-16: Misconducts of three Market-leading Mobile Carriers in Cambodia .....	28
Figure-17: Consumer-Oriented Approach.....	51
Figure-18: Theory of Planned Behavior (Ajzen I. , 1985) .....	52
Figure-19: Push-Pull-Mooring Model (Lee S. E., 1966).....	53
Figure-20: Number of Subscribers in Cambodia.....	60
Figure-21: Factors Affecting Consumer Adoption Behavior .....	64
Figure-22: Subscription of Additional Services .....	68
Figure-23: Unstandardized Regression Coefficients in Predicting Behavioral Intention.....	76
Figure-24: Mobile Telecommunications Subscriptions in Cambodia .....	83
Figure-25: Market Share of Mobile Operators in Cambodia, July 2015 .....	84
Figure-26: Percentage of Used and Unused Phone Numbers in Cambodia .....	85
Figure-27: Factors Influencing on Studying Consumer Switching Behavior.....	91
Figure-28: Unstandardized Regression Coefficients in Predicting Switching Intention.....	103
Figure-29: Number of Mobile Operators and Subscribers from 1993 to 2019 .....	109
Figure-30. Variables of Regulatory Policies .....	116
Figure-31. Relationship between Profiles, Attributes and Levels .....	123

## LIST OF TABLES

Table-1: Telecommunications Suppliers and Market Share in Cambodia in 2003 .....	4
Table-2: Decreases in Prices of Telecom Services in Cambodia between 2010 and 2019 .....	13
Table-3: Numbering Licenses among Mobile Carriers by July 2019.....	20
Table-4: Summary of Promotion Campaigns in Mobile Sector .....	23
Table-5: Historical Data and Forecasts of Declining ARPUs of VimpelCom’s Beeline .....	24
Table-6: Summary of Research Scheme .....	50
Table-7: Respondents of Adoption Behavior .....	67
Table-8: Model Summary of Attitude toward Behavior.....	69
Table-9: Multiple Regression Result for Attitude toward Behavior .....	70
Table-10: Model Summary of Promotion .....	70
Table-11: Multiple Regression Result for Promotion .....	71
Table-12: Model Summary of Subjective Norm .....	71
Table-13: Multiple Regression Result for Subjective Norm .....	72
Table-14: Model Summary of Perceived Behavioral Control.....	72
Table-15: Multiple Regression Result for Perceived Behavioral Control.....	73
Table-16: Model Summary of Behavioral Intention .....	73
Table-17: Multiple Regression Result for Behavioral Intention .....	74
Table-18: Descriptive Statistics of Consumer Adoption Behavior .....	75
Table-19: Regression Weights .....	77
Table-20 Comparison between Groups of Monthly Incomes.....	78
Table-21: Participants’ Information of Consumer Switching Behavior.....	94
Table-22: Model Summary of Pushing Factor .....	95
Table-23: Multiple Regression Result for Pushing Factor .....	95
Table-24: Model Summary of Pulling Factor.....	96
Table-25: Multiple Regression Result for Pulling Factor.....	97
Table-26: Model Summary of Mooring Factor .....	97
Table-27: Multiple Regression Result for Mooring Factor .....	98
Table-28: Model Summary of Mobile Number Portability.....	99
Table-29: Multiple Regression Result for Mobile Number Portability.....	99
Table-30: Model Summary of Switching Intention.....	100
Table-31: Multiple Regression Result for Switching Intention.....	100
Table-32: Descriptive Statistics of Consumer Switching Behavior .....	101

Table-33: Regression Weights on Switching Intention.....	103
Table-34: Mobile Carriers and Numbering Licenses, July 2019.....	110
Table-35. Scales of Measurement of Stated Preference .....	120
Table-36. Attributes, Description and Levels of Regulatory Policies .....	122
Table-37. Tradeoff Scenarios of Regulatory Policies .....	124
Table-38. Demographics of Respondents.....	126
Table-39. Part-Worth Utilities.....	127
Table-40. Total Utility of Scenarios .....	128

## **CHAPTER I: INTRODUCTION**

### **1. Overview of Cambodia's Telecommunications Market Structure**

Over the past couple of decades with improving economic performance, the GDP per capita of Cambodia grew substantially from 254.18 in 1993 to 1,643.12 US dollars in 2019<sup>1</sup>. A greater than fivefold increase in GDP per capita since 1993 becomes a remarkable achievement that has brought Cambodia to the edge of achieving lower-middle income nation status. To improve the national economic growth and poverty reduction which have more significant relationship with the infrastructure development of the country, the government of Cambodia has paid more attention on building and expanding the infrastructures, such as the transportation, water resource and irrigation, energy and electricity, and especially the information and communications system. However, the country's national backbone was, compared with most neighboring countries, out-of-date and erratic due to the destruction during civil wars as well as a lack of maintenance.

As a matter of fact in Cambodia's telecommunication industry, only 3,000 telephone lines was used for the communication between Phnom Penh and provinces during the presence of the United Nation Transition Authority in Cambodia (UNTAC) in early 1992 (Sum, 2008). To promote and safeguard the human right at the national level, the UNTACT was required to have their own radio stations connecting to all provinces. Since then, the infrastructure was secured by the UNTAC's communication system, and the number of fixed lines increased to 4,000 by the end of 1992, according to a case study on Internet in Cambodia (ITU, 2002a). The national election in 1993 has finally formed a 120-member constituent assembly which drawn up a constitution and a new government of Cambodia. Several months after the successful task, it was obligatory for the UNTAC troop to withdraw themselves from the country by 15 November 1993.

All at once, the communication system and equipment, including television/video, radio and other information facilities, used by the UNTAC before and during the election, were handed over to the newly elected government. As a result, Camintel was established by a joint venture between PT Indosat (49%) and the country (51%) in 1995 for taking over the infrastructure network of the UNTAC, some

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<sup>1</sup> GDP per capita (current US\$), World Bank national accounts data, and OECD National Accounts data files. <https://data.worldbank.org/indicator/NY.GDP.PCAP.CD>



of which had already used the network of Indosat satellite (ITU, 2002a). The fixed network of Camintel had become available in many further provinces of Cambodia. However, restoring the nationwide communication network had faced a big challenge of high installation costs, which left the nation with a lack of cable lines (Roberts, 2011).

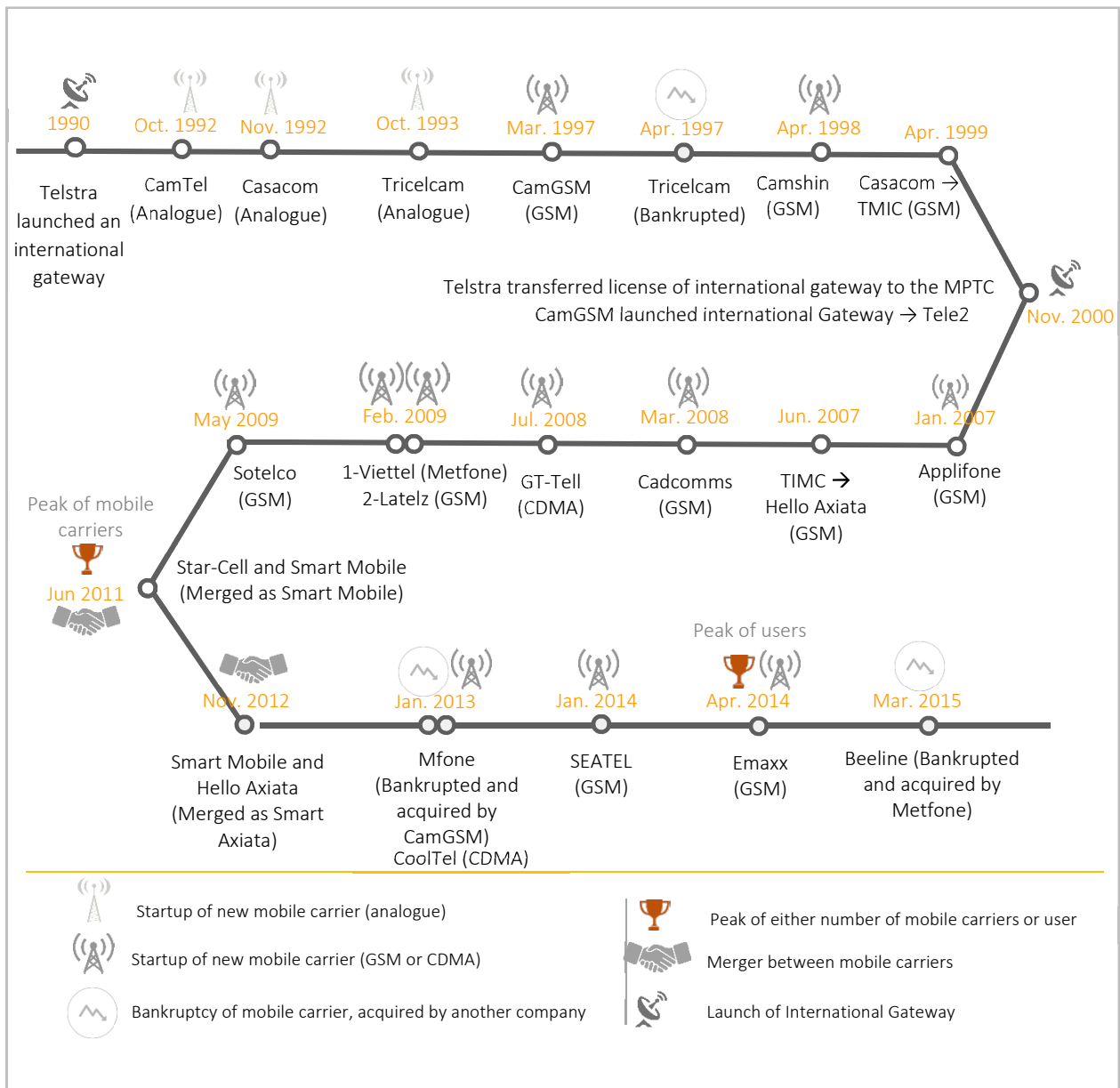
In 1990, Telstra International of Australia (then called OTC International Australia Ltd.) was established to launch an international gateway (WorldBank, 2002). Then, the first mobile cellular service was available in 1992 with the analogue technologies. This first service provider was Cambodia Mobile Telecommunication Company (CamTel), launching its advanced mobile phone system (AMPS) in October 1992 (ITU, 2002a). CamTel was known as a subsidiary of the CP Group of Thailand. However, the introduction of the GSM had negatively affected on the business operation of CamTel, due to the limited functionalities and analogue handsets. Answering to the presence of GSM technology, CamTel was also granted a GSM license in 2002 and the government has planned to privatize CamTel Company. Though, the privatization plan was fails after two top bidders withdrew their offers in 2006 (Carmen, 2008) and the company was no longer in operation by the end of 2007 without an exact date of its bankruptcy.

In November 1992, few months after the operation of CamTel, Cambodia Samart Communications Company Ltd. also launched its service. This joint-venture company was started with the initial investment of US\$ 7.5 million between Samart Group of Thailand, Telekom Malaysia and Cambodia. Despite the recession of the analogue system in 1997, the company had received another license to provide GSM mobile services in April 1999 and the company was renamed as TMIC (Telekom Malaysia International Cambodia) which was later changed to Hello Axiata in 2007. Following Casacom, Tricelcam was established and launched to offer the analogue services in 1993. Tricelcam was formed by the incorporation between TRI Malaysia and the Cambodian government. Similar to CamTel, the AMPS platform of Tricelcam was suffered from the rapid development of the GSM and financial crisis in 1997. Consequently, it was ended in the same year when the company had about 3500 subscribers (Joseph, 2006).

Later on, Mobitel (then called CamGSM) launched its mobile telecommunications services in 1997 and it became the country's largest telecoms operator in the following year. This company shared its annual revenues with the MPTC but the change of the annual share was confidential; for instance, 10% in 2001 (IBP, 2008). In 2009, the RGC acquired all Millicom's shares, making it the only telecommunications company whose 100% of shares are owned by Cambodian. One subsidiary, known

as Tele2, was established to launch the international gateway in November 2000, during which the Telstra decided to withdraw its investment by transferring all assets to the MPTC after the expiration of the 10-year license on the international gateway (WorldBank, 2002).

Figure-1: Mobile Cellular Operators in Cambodia between 1990 and 2019



Source: International Telecommunications Union (ITU, 2002a) and (Moa, 2019)

In 1998, Camshin Shinawatra was also permitted by the MPTC to provide 1,800MHz cellular services although the company had been established in Cambodia since 1993. The company offered only WLL technology in the beginning (IBP, 2008). Camshin was granted the GSM license in 1998 and

the license is valid until 2032 (35-year licensing). Based on the ITU's report, fixed line services by three operators, analogue cellular by two operators, GSM cellular services were provided by three mobile operators, and international gateway by two operators in 2003 (table-1). The fixed line service of the MPTC gained the largest share of 63% in 2003, while CamGSM, compared to other 3 operators, owned up to 68% of mobile telecommunications service in Cambodia.

Table-1: Telecommunications Suppliers and Market Share in Cambodia in 2003

Service	Number of Operators	Name of Operator	Market Share	Notes	
<b>Fixed line</b>	3	MPTC	63%	In Phnom Penh and since 2000, 8 provinces	
		Camintel	16%	Provinces and 1,112 WLL in Phnom Penh	
		Camshin	21%	WLL in Phnom Penh	
<b>Mobile</b>	2	Analogue cellular	Casacom (TMIC)	7%	NMT-900
		Camtel	2%	AMPS-800 network in Phnom Penh	
	3	GSM cellular	Casacom (TMIC)	14%	GSM 900
		CamGSM	68%	GSM 900	
		Camshin	9%	GSM 1800	
<b>International Gateway</b>	2	MPTC		International gateway built buy Telstra, which was passed to the government in 2000	
		Tele2		Launched November 2000	

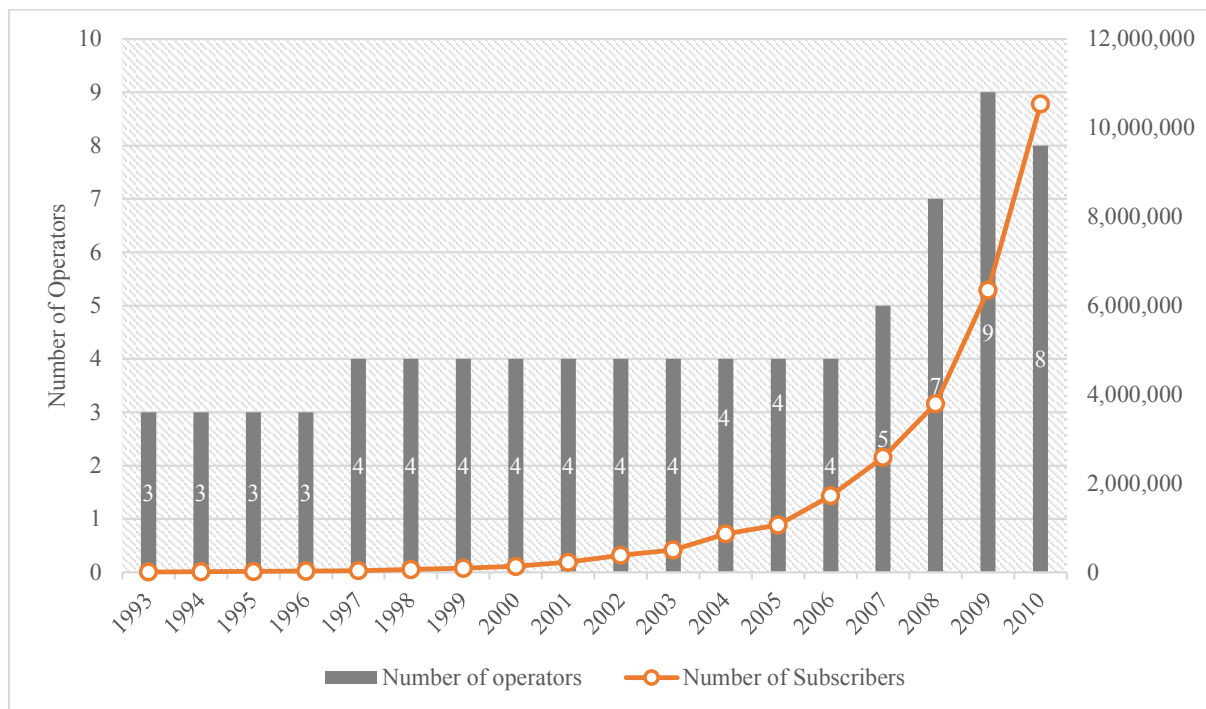
Source: CUTS Center for Competition, Investment & Economic Regulation (Mahesh, 2006)

Prior to 2007, there were only four mobile operators in Cambodia and those joint-ventures were shared by the government of Cambodia. Due to the limited number of suppliers, the network infrastructure was very limited and the subscriptions were slowly increasing from 4,810 in 1993 to 130,547 in 2000 and 1,721,650 in 2006, according to the data from the World Bank<sup>2</sup>. The number was likely to increase sharply and a remarkable growing number of mobile operators in 2007 since the government's policy on the openness of the telecommunications market to international investors in Cambodia. Indeed, the government allowed mobile operators to be fully owned by the local and/or foreign private investors, such as Applifone's Star-Cell which began to provide the GSM service in 2007 with a combination of solar-driven telecoms infrastructure and satellite transmission.

<sup>2</sup> Mobile Cellular Subscriptions, the World Bank, <http://data.worldbank.org/indicator/IT.CEL.SETS?locations=KH>

One year later, the government of Cambodia granted various licenses such as 2G, 3G and CDMA to five foreign investors, namely Cadcomms (launched in March 2008), GT-Tell's Excel (July 2008), Viettel's Metfone (February 2009), Latelz's Smart Mobile (February 2009) and Sotelco's Beeline (May 2009). Then, nine mobile operators were in their operations while some licensed companies did not start any business operation. The increasing number of mobile carriers has made the Cambodia's mobile telecommunications market more and more crowded, reported by the MPTC (Im, 2019).

Figure-2: Changes in Operators and Subscriptions in Cambodia, 1993-2010

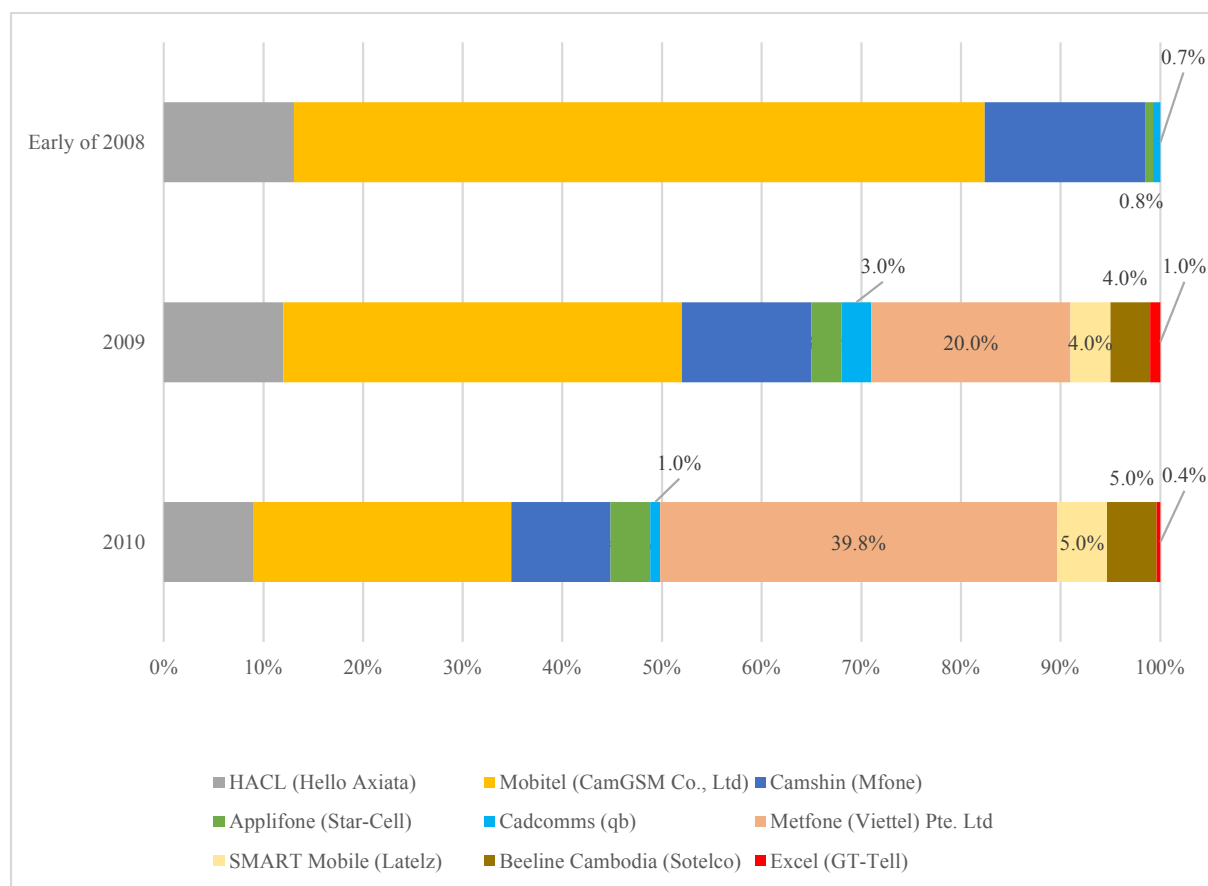


Source: Telecommunication Regulator of Cambodia (Im, 2019)

In line with the reports of the Telecommunication Regulator of Cambodia (TRC), the mobile users were dramatically increasing from 4.2 million in 2008 to 6.3 million in 2009 and it continued to grow to 10.5 million in 2010. Simultaneously, the market competition has excessively forced some mobile operators to consolidate (acquisition) or cooperate together (merger) with the intention of increasing their competitive advantages in terms of network effects, and avoiding the bankruptcy. Indeed, the overcrowded environment had lasted less than two years and then Star-Cell and Smart were officially approved to be merged as the fourth largest mobile service provider in Cambodia at the late of 2010, with the total aggregate users of 903,000. 75 percent of this company's shares was owned by the Smart's owner, Cyprus-based Timeturns Holding, and 25 percent by Star-Cell's parent company, TeliaSonera AB, as mentioned in a research paper on Cambodia's telecoms sector (PPS, 2011).

The extremely large investment in 2007 has had significant effects on the development of Cambodia's mobile telecommunications industry. There have been huge changes in both mobile operators and subscribers. The subscription in mobile service kept increasing from 2007 while the number of suppliers started to decrease in 2010 due to high market competition. As consequence, the market shares between mobile operators were frequently changed in Cambodia between 2007 and 2009. Few years later, merging between operators and acquisition have been applied with the intention of gaining larger market shares and being able to compete against others in the Cambodia's mobile telecommunication market.

Figure-3: Comparison of Mobile Market Shares in Cambodia between 2008 and 2010



Source: Data in 2008 (Chan, 2009), Data in 2009 and 2010 (BMI, 2013)

The above Figure-3 compares the fluctuation of the market shares among mobile telecoms carriers in Cambodia from the early of 2008, 2009 to August 2010. During the early 2008, there were only five mobile cellular operators in Cambodia while CamGSM had the largest market share of 69.3%, equal to 2 million subscriptions, compared to Camshin (16.1%) and Hello (13.1%). When the number of suppliers increased to nine in 2009, the market of CamGSM sharply decreased to 40% (2.8 million

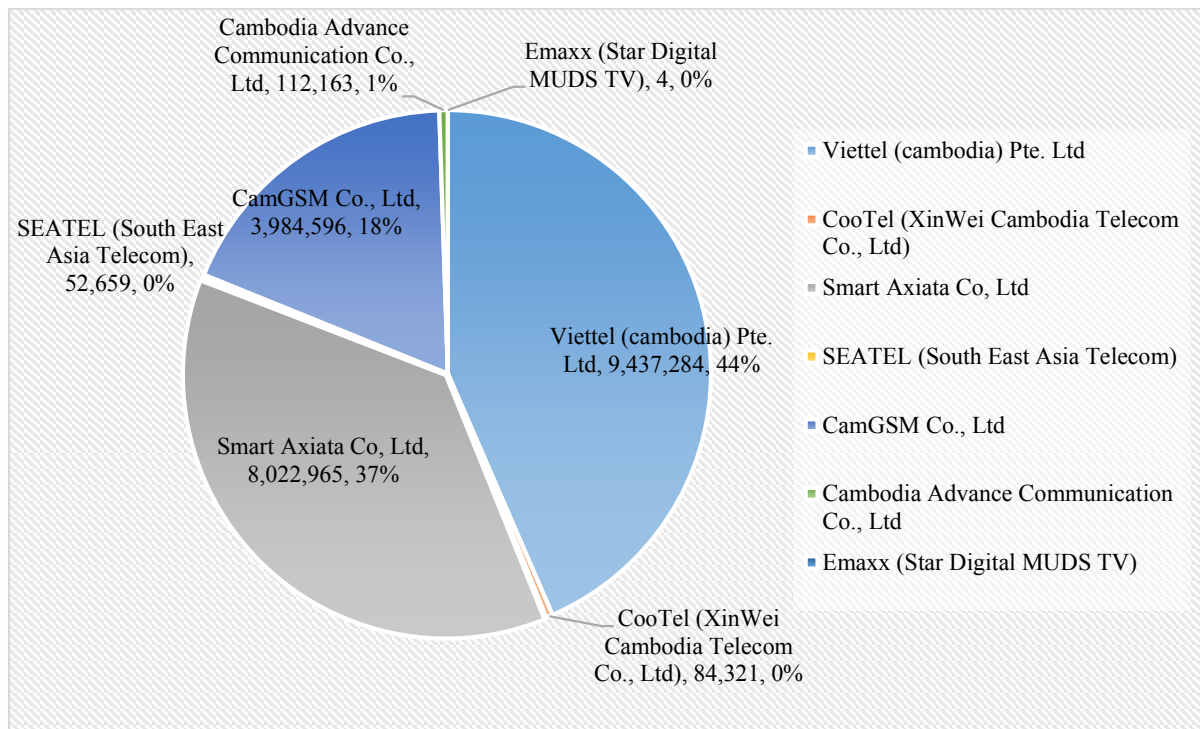
subscriptions) but Viettel rapidly became the second market-leading provider in the country with the market share of 20% or 1.4 million users.

However, the market shares of Hello and Camshin gradually dropped over time to 12% and 13% respectively in 2009 while other five operators had their market shares less than 4% each. Particularly, Viettel has continued increasing its market share to be the biggest one in 2010 with 39.8% and other three following firms (CamGSM, Hello, and Camshin) slowly dropped their market shares to 25.9%, 9% and 10%. Nevertheless, there were very little changes of the market share among other mobile cellular operators. It was only Viettel which had a rapid increasing number of users and became a largest firm as a result of their business strategies in providing many free simcards with a small amount of money to Cambodian people, such as students, government officers, monks and so on.

In 2011, the consolidation between Star-Cell and Smart Mobile has dropped the number of mobile operators to eight. The ambition of Smart Mobile to increase the market competition did not end up by acquiring the major share of Star-Cell. One year later, the company continued to merge with another mobile operator, called Hello Axiata, as of the late 2012. Thereafter, the market competition in Cambodia became even more intense and has started to go through some forms of rationalization. Mfone started to disclose its financial struggle; which was a sign of bankruptcy in the early of 2013. Mfone was then approved to transfer its assets to CamGSM, ensuring that Mfone's users were not abandoned after its collapse. Similar to Mfone, Beeline faced financial crisis before its licenses and assets were transferred to Metfone as of March 2015.

While the number of mobile operators was gradually decreasing from nine, few entrants also entered the market, so called Xin Wei's CooTel in 2013, South East Asia Telecom Group Pte Ltd in 2014, and Emax (Star Digital MUDDS TV) in April 2014. As of 2019, there were only six mobile operators in Cambodia. The total mobile subscription was also steadily increasing from 10.5 million in 2010 to 20.8 million in 2015 and 21.7 million in 2019. However, these new operators did not gain any enormous share of Cambodia's mobile market as their main objectives concerns about broadband internet. The market share and total subscriptions of all mobile carriers in Cambodia in July 2015 are illustrated in the below Figure-4.

Figure-4: Market Share among Mobile Cellular Operators in Cambodia in 2019

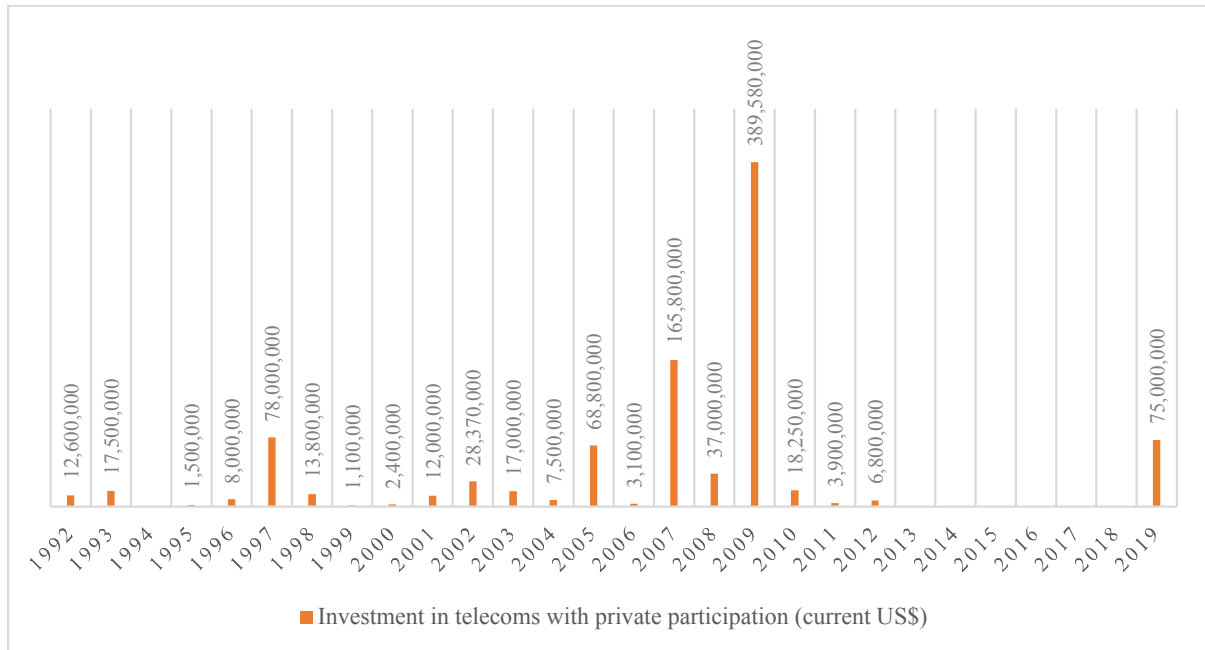


Source: Telecommunication Regulator of Cambodia (Im, 2019)

As stated by the Council for the Development of Cambodia, a huge private capital from foreign investment was invested in the telecommunications industry. This substantial investment has developed not only modern telecommunications infrastructure and services in Cambodia, but also the national economy and social welfare. As a consequence, MPTC revenue contributes a large portion of total government revenue. According to online database of the World Bank, the Figure-5 proves the investments in telecommunications sector with private participants from 1992 to 2015. The total of US\$ 132.5 million was invested in telecommunications from 1992 to 1999.

Prior to 2007, it seemed the total amount of the annual investment was not so high, with its peaks at 78 million in 1997 when CamGSM and Camshin entered the market, and 64 million in 2005. However, the investment increased to 165 million in 2007 when the Star-Cell was building their infrastructure and when the networks of CamGSM and Camshin were under their expansion. It is more interesting that the telecoms investment in 2009 went up to 389.6 million which was partially shared by the presence of five mobile operators in Cambodia. From 2013, the investment is not available although three small operators entered the market and consequently they are marked zero in the Figure-5. In 2019, the total private investment in ICT was known at 75 million US dollar, according to Worldbank's data.

Figure-5: Private Investment in Cambodia’s Telecommunications Industry, 1992-2019



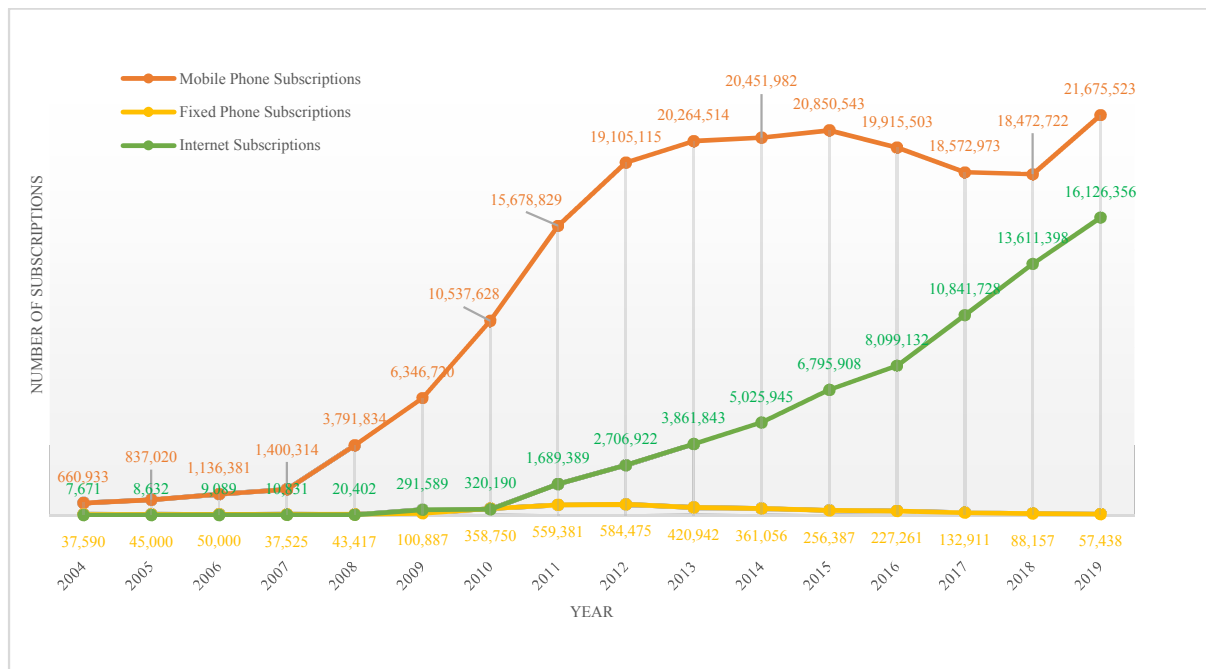
Source: Online Statistic of the World Bank<sup>3</sup>

When the investments in telecommunications sector had huge impacts on the sustainable development of the industry, the subscriptions of mobile, fixed/wireless and internet services in Cambodia between 2004 and 2019 were summarized in the Figure-6, based on the annual MPTC’s report (Khan, 2014) and the TRC’s report (Im, 2015a), as well the online data of the TRC. As of 2015, the total mobile registered simcards in Cambodia almost reached 21 million, compared to 10 million in 2010 (Im, 2019). After the peak in 2015, the users have been slightly decreasing to 19.9 million in 2016 and 18.5 million in 2018. However, the number of mobile subscription turned to 21.7 million in 2019. The penetration rate per 100 populations increased from 5% in 2004 to 71.8% in 2010 and continued to be 139.4% in 2014 before it slightly decreased in 2015 to 134.5%. This penetration rate continuously decreased to 119.2% in by April of 2018 and fluctuated to 139.8% in 2019. However, fixed line services were slowly expanding from 0.37 million in 2004 to 0.58 million in 2012 while the decrease doubled for the last few years to 0.26 million subscriptions in 2015 and 0.057 million in 2019. Among 100 Cambodian people, there were only 0.3 subscription of fixed phone services in 2019, decreasing from 4.0 in 2012.

<sup>3</sup> Investment in Telecommunications with Private Participant, <http://data.worldbank.org/indicator/IE.PPI.TELE.CD>



Figure-6: Total Subscriptions of Telecoms Services in Cambodia between 2004 and 2019



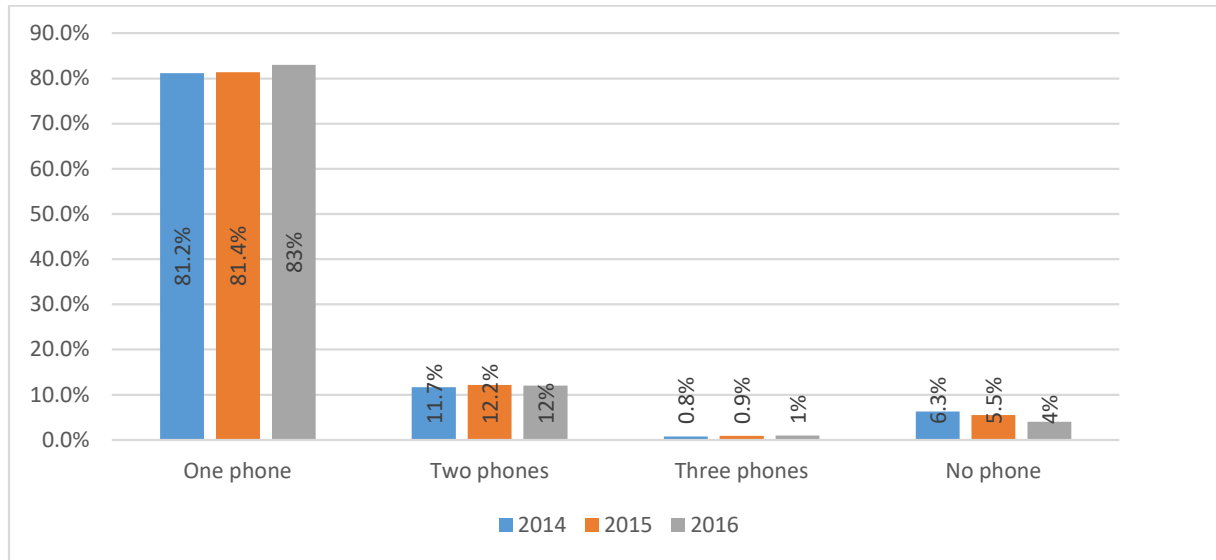
Source: Telecommunication Regulator of Cambodia (Im, 2019) and Online Data at TRC

The market of mobile services is more likely to continue its growth following the limitation of basic network services at 90% of the total population or 60% of the total territory of Cambodia. Cambodia is one of the countries where the mobile services have been more preferable to the fixed ones for both individuals and organizations. This preference is definitely linked with the terms and conditions to subscribing services as well as the variety of handsets. A study on mobile phones and internet in Cambodia shows that 96% out of 2,061 sampling respondents (aged between 15 and 65 years old) owned their mobile phones in 2016, increasing 0.8% from 2014 and 4.5% from 2013 (Phong & Solá, 2015). There was a slight difference between the mobile phone ownership in urban and rural areas, with the ratios of 97% and 95% respectively in 2016. Almost three fourths of those, who do not have a phone, could be reached through a household phone (mobile phone).

In Cambodia, it has not been uncommon for an individual to hold few mobile handsets, some of which operated with multiple simcards. The reports of Phong and Solá (2014, 2015, and 2016) revealed that there was slightly increasing users who possessed at least one cellphone from 81.2% in 2014 to 83% in 2016, two phones from 11.7% to 12% and three phones from 0.8% to 1% (Figure-7). In average, the phone possession became 1.07 per individual. Moreover, 48% of cellphones in Cambodia were smartphones in 2016, up 26% from 2015. This implied that 9.5% of Cambodian people were using at least one smartphone. In the meantime, the reports clearly distinguished the mobile cellphones and the

mobile carriers subscribed by the same phone users. In 2016, about 27% of Cambodian people possessed simcards from a single mobile carrier and 3% used simcards from few different carriers, the same ratio as in 2015. In average, one Cambodian subscribed to 1.20 mobile carriers by 2016.

Figure-7: Changes in Mobile Phone Ownership in Cambodia between 2014, 2015 and 2016



Source: Study on Mobile Phones and Internet in Cambodia (Phong & Solá, 2014, 2015, 2016)

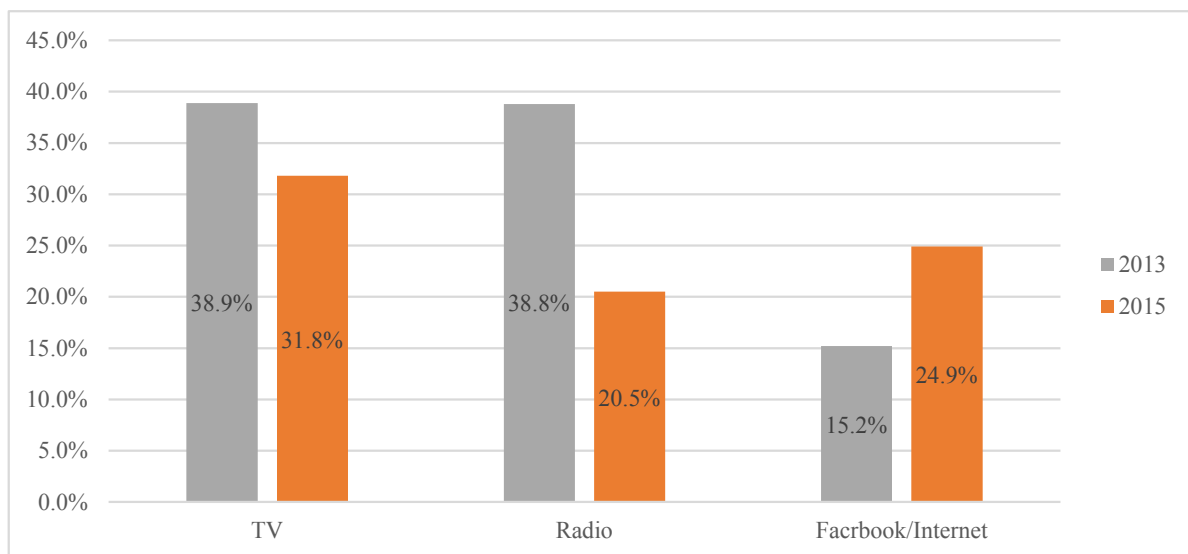
As a majority of Cambodian people are living in rural areas, the development of mobile telecoms industries has boosted the improvement of other sectors. Indeed, smaller health centers have established better connections via the existing mobile broadband. For educational sector, the mobile telecommunications system has increased the ability of teachers and students to access more updated educational materials. For instance, the mobile telecoms service allowed farmers to communicate with others about the best market price of their crops, through calling, SMS or internet (Denis, 2008). Similarly, another recent study of Shimamoto, Yamada and Gummert (2015) shows that among 160 rice farmers (household heads in rural areas of Cambodia), 82% usually use mobile telephones to get market information before trading their harvest rice.

Talking about the internet connection, the expansion is mainly dominated by the mobile network's backbone. The internet market started to expand in 2007 when the mobile broadband services were introduced into Cambodia's market as its effective alternatives. Figure-8 shows a jump up of the internet penetration, compared to fixed-line penetration from 2010. The curve of internet users was sharply increasing from 310,190 in 2010 to 16,309,612 in 2019, and 91% of them were mobile internet users. In contrast, the fixed line services have been slowly expanding from 0.37 million in 2004 to 0.58 million

in 2012 while a big decrease of the fixed services occurred during the last few years to 0.057 million in 2019. More recently, the rapid expansion of the mobile broadband has boosted online activities. For example, the mobile broadband connections increased from 13.8% in 2014 to 14.8% in 2019. As indicated in a report on digital, social and mobile in APAC, only 8.8 million were active internet users in 2019, increasing from 3.6 million in 2015, while the active social media users increased to 71.3%, according to the TRC. The number of users who were currently using internet and used to access internet increased from 26.7% in 2014 to 52.6% in 2019.

According to the study of Phong and Solá (2015), 27 percent of accessed information through mobile internet was related to entertainment, 14.8 percent of news, and other 10.9% of various topics such as health, agriculture, etc. This report also revealed that Facebook and internet were the second important source of news in Cambodia at 24.9%, following the TV (31.8%) while the radio and word of mouth were 20.5% and 17.8% respectively, as demonstrated in the Figure-8. TV and radio were decreasing from 38.9% and 38.8% in 2013 while the Facebook and Internet were increasing from 15.2%.

Figure-8: Increasing Importance of Internet as a Key Sources of Information in Cambodia



Source: Study on Mobile Phones and Internet in Cambodia (Phong & Solá, 2014, 2015)

In Cambodia, young adults were likely to change the ways to get information and entertainment from TV and radio to internet. As a matter of fact, another survey of young Cambodians in 2010 also showed that almost six out of ten young Cambodian were radio audients (58%), three quarter (77%) were TV viewers, and 46% were audients of both radios and TVs (UNDP, 2010). However, only 6 percent have ever experienced internet access although almost 93 percent had phones' possession.

Experiencing the rapidly growing investments and suppliers, the significant development in Cambodia's telecommunications industry has been providing some essential services such as basic voice and internet. Also, the total subscription is growing so fast to surpass the Cambodian population in 2011 at rate 106.8% and recently it becomes 134.5%. Since the fast growing market has become overcrowded with many private mobile cellular operators, the intense competition has noticeably forced to decrease market prices. The table-2 compared the changes in prices set by market-leading suppliers in Cambodia's telecommunications market in 2010 and 2019. There have been significant changes in prices during the last five years, especially prices of on-net voice call and internet services, except the off-net services. The price settings in 2019 were used as the latest ones because there is no any change in prices officially set by all mobile operators in Cambodia.

Table-2: Decreases in Prices of Telecom Services in Cambodia between 2010 and 2019

No.	Operators	2010			2019		
		Within-network Calling Prices in 2010 (Cent/Min)	Internet Prices in 2010 (Cent/MB)	Cross-network Calling Prices in 2010 (Cent/Min)	Within-network Calling Prices in 2019 (Cent/Min)	Internet Prices in 2019 (Cent/MB)	Cross-network Calling Prices in 2019 (Cent/Min)
1	Viettel's Metfone	6.5	2.0	10.0	0.3	0.2	9.0
2	Smart Axiata	5.0	2.1	6.0	0.3	0.2	8.0
3	CamGSM	5.0	2.6	7.0	0.3	0.1	8.0
	AVERAGE	5.4	2.2	7.4	0.3	0.2	8.5

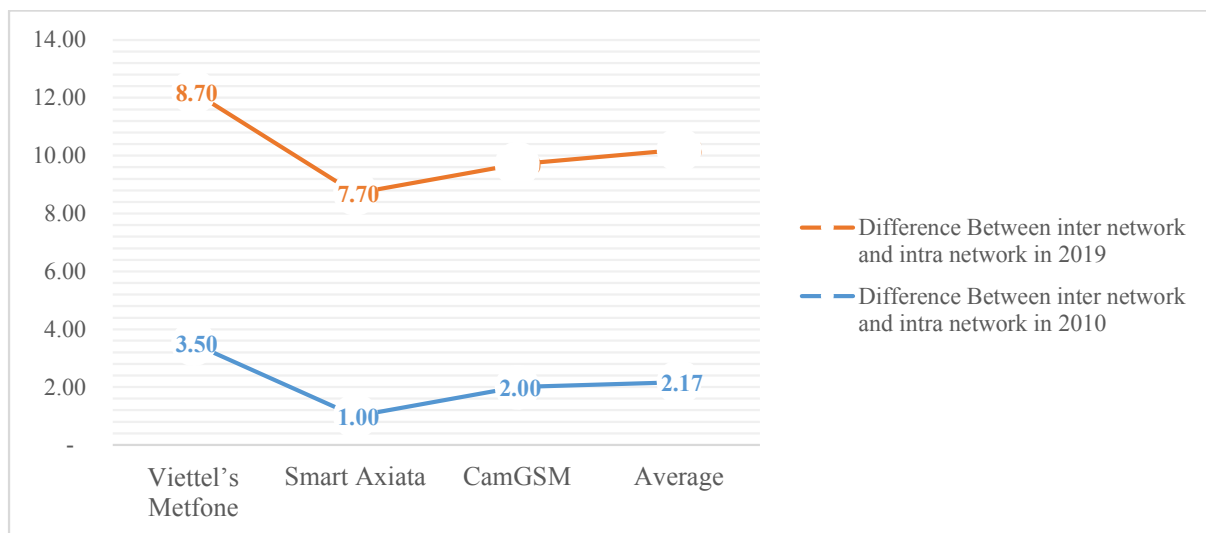
Source: Data in 2010 (Vong, Lee, & Zo, 2012), and data in 2019 (Moa, 2019)

According to Vong, Lee and Zo (2012), the prices of within-network voice calls among operators in Cambodia in 2010 varied between 5.0 to 6.5 cent (US\$) per minute, with an average price of 5.4 cent per minute. The on-net price has gradually dropped between at 2000% among three market-leading companies. For instance, Viettel, CamGSM and Smart Axiata reduced their on-net price to 0.3 cent (US\$) per minute in 2019. Similarly, the price of internet access has decreased around 11 times, from an average of 2.2 cent per MB in 2010 to 0.2 cent in 2015. Among the three largest carriers, CamGSM was known to drop the price at 2600% (from 2.6 to 0.1), compared to others (1000%).

However, the market competition has no positive impacts on the prices of all services as a whole. In contrast, the average interconnection price of voice service slightly increases from 7.4 to 8.5 cent per minute. In particular, Viettel was the only mobile cellular operator which has reduced the price from

10.0 to 9.0 cent while other suppliers have indirectly raised their on-net prices to 8.0 or 9.0. By comparing the prices of within-network and cross-network services, a huge gap between them was steadily enlarged in 2019 (0.3 and 8.5 cent respectively), as presented in Figure-9. In 2010, the gap varied between 1.0 and 3.5 cent per minute while the range increased from 6.0 to 8.8 cent. This situation has become an issue for users in communicating crossing networks although they have a very low price of basic services for intra-network. Then, lowering the prices for intra-network services is not exactly a result of the competitive market but possibly a form of price war between mobile cellular operators, also called predatory price by the government of Cambodia (Moa, 2019). The details of this pricing war are going to be explained in the following section.

Figure-9: Increasing Pricing Gap between intra-network and inter-network, 2010 - 2019



Source: Data in 2010 (Vong, Lee, & Zo, 2012), and data in 2019 (Moa, 2019)

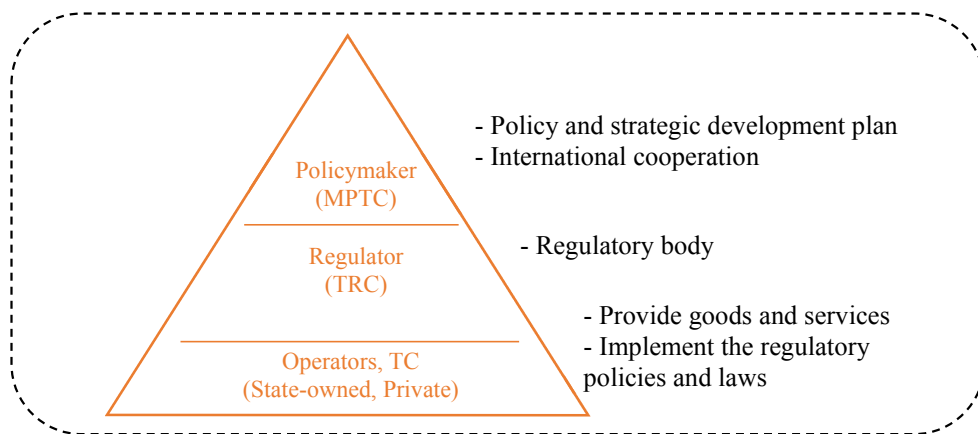
## 2. Regulatory Environment in Cambodia's Telecoms Sector

### 2.1. Regulatory Framework in Cambodia's Telecoms Sector

As of 1991, the telecommunications infrastructure had mostly been out of date caused by the destruction during civil wars. The government has been then playing an essential role in encouraging the growth of the sector, by authorizing the ministry of posts and telecommunications of Cambodia (MPTC) to become a policymaker, a regulator and also one of the telecommunications service providers (Sum, 2008; Im, 2015a). Accordingly, the ministry has issued various licenses to many private mobile operators. Later on, the MPTC's responsibility was limited to the policy and regulation, and the Telecom Cambodia – a state-run enterprise – was established in January 2006 to take charge of the development of information technology, and telecommunications industry (Im, 2015a). When there

were increasing regulators in both developed and developing countries over the past few decades, Telecommunication Regulator of Cambodia (TRC) was also established in 2012. This institution is responsible for studying the current laws, regulations and related policies, and establishing new regulatory policies and the management of telecommunications markets and the performance of telecommunications suppliers (Im, 2015a). At present, the regulatory framework of the Cambodia's telecommunications sector is composed of three different layers, as mention in the Figure-10.

Figure-10: Hierarchy and Roles of Regulatory Authorities in Cambodia's Telecoms



Source: Telecommunication Regulatory of Cambodia (TRC, 2013)

Standing on the top as a policymaker in the telecommunications sector, the MPTC is responsible for the policy preparation, the strategic development plans and the legal framework of supporting the telecommunications operations, as well as the infrastructures and networks in the Kingdom of Cambodia. The MPTC has been also assigned to be a signatory and representative of the Royal Government of Cambodia in the international cooperation, with the aim of promote the establishment and the utilization of the universal services obligation program, capacity building, research and development plan (Im, 2015b). Furthermore, it provides all relevant instructions to facilitate issues relating to the telecommunications sector and the operators. In some cases, the MPTC must issue Prakas on permits, certificates or licenses. The MPTC is, at the same time, in charge of managing the network connections, setting standards of utilization of infrastructures and networks and providing telecommunications services.

By the way, the TRC, established on September 20, 2012, has become an official unit to grant, alter, suspend, transfer and withdraw permits, certificates or licenses in line with the provisions of the new draft law and other regulations by examining and approving the proposals for permits, certificates or licenses complying with the requirements of this law and regulations (Im, 2015b). The TRC plays a

critical role in foreseeing the demands of consumers and operators and initiating the regulatory policies for the growth of the ICT, by ensuring the social and economic benefits. It stimulates a policy environment with fairness and transparency, strengthens the sector and encourage a fair competition through the inspection of providing telecommunications services, compliant with applicable regulations (Im, 2015b). Then, the TRC has to report all matters, which are related to the management, development and monitoring the telecommunications sector, to the MPTC. In particular, this unit also has the authorizations to issue regulations, policies, standards, instructions and circulars in order to provide possible solutions to the current and future problems. Though the Prakas or legal instruments are issued by the MPTC, the proposals are made by the TRC (Im, 2015b). Besides, the TRC acts as a regulatory body to resolve the disputes between players in telecommunications market and to take the appropriate actions. It investigates and suppresses all businesses that are illegal and against code of conduct, the technical and standard conditions, the quality of services and the telecommunications equipment set out under the law and other regulations.

The bottom of the chart is talking about both state-owned and private enterprises. Telecom Cambodia, semi-privatized enterprise, is in charge of developing an appropriate information technology and telecommunications. It is to ensure the access availability of the reliable and sophisticated telecommunications services and to create an efficient infrastructure supporting investment and trade in Cambodia. This semi-privatized enterprise has another critical role in controlling all interconnections between local telecoms operators and international connections (Lao 2008). The data of all interconnections and traffics between private operators are also recorded at the transit point at TC in order to monitor the transparent interconnection and to collect the related fees including crossing TC fee and regulator fee. This chart also allows the establishment and the operation of private-owned companies, such as optical fiber cable infrastructure operators, mobile phone operators, fixed phone operators, international gateway operators, internet service providers (ISPs), VoIP operators and very small aperture terminal provider (Lao 2008).

As per the ICT assessment undertaken by the USAID, National Information Communications Technology Development Authority (NiDA) was established in 2000, directly under the prime minister to deal with problems concerning over the ICT development. Despite the absence of the proper regulatory policies and framework in the telecoms sector and the ICT, NiDA sets up its own objectives to integrate the ICT activities in the public and private sectors ensuring national optimal economic and social stimuli through achieving community framework agreements. These aspects include supporting the development of the national ICT master plan, finalizing and implementing new telecommunications

law, separating policy and regulation from operations within the MPTC, lowering restrictions and practices regarding internet, expanding awareness, education and skill-building for ICT-related topic, and building a common UNICODE for Khmer language.

## **2.2. Development of Regulatory Policies in Cambodia's Telecoms Sectors**

The Cambodia's telecommunication industry was privatized and opened to both local and international investors after the first national election in 1993. In the meantime, there was no any specific regulation on frequency and licensing management in Cambodia. The radio frequency management is ambiguous since all licenses were made under the foreign direct investment law. Before the establishment of the TRC, the MPTC was acting as a policymaker and a regulator to review the laws and regulations, and to manage the telecoms market (Im, 2015b). Hence, many circulations and orders on the market performance of telecommunications payers had been issued by the MPTC and other related ministries till the draft laws and regulations of the telecommunications sector were promulgated by the National Assembly in December 2015.

As a matter of fact, the MPTC issued a Prakas (proclamation) on the fee of telephone numbering and signaling point code was issued in 2003 and another Prakas on the "management of radio telecommunications equipment and service fee for the use of radio frequencies" in March 2008 (Im, 2015b). Due to the lack of regulatory framework and proper policies, especially laws on licensing, spectrum allocations, numbering plans, competition and other essential laws, many service providers have been licensed. The Cambodia's market then became crowded and the market competition began to intensify; this consequently caused some unfair competitions among private operators in term of the price war and the interconnection block since 2009. Moreover, the lack of regulatory framework and regulations had limited the MPTC's role to be as an arbitrator compromising the business conflicts. The MPTC and other related ministries had continuously issued many circulations and declarations on the price floor and the interconnection block. As a result, these issues cannot be solved and they are still in use in the telecommunications market due to the absence of proper telecoms law.

Later on, the RGC issued another inter-ministerial circular on "the management of the business and use of telecommunications services" in 2012 to provide the descriptive role of suppliers and to register personal information of subscribers in order to void any criminal case caused by using phone (Im, 2015b). One year later, the TRC was established to take over some tasks from the MPTC, including the autonomy to perform its administrative, regulatory and financial duties and functions. Accordingly, the TRC has released two separate guidelines on the "application for frequency licensing" and "application



for certificate and permitted letter for importing radio communications and telecommunications equipment.” Still, the regulations and policies should have been strengthened through the technical standardization following the ITU’s recommendation and other worldwide organizations. In particular, these regulations and policies should be for the sake of a fair competition in compliance with both local and international markets (MPTC, 2012). More interestingly, Cambodia has been also shaped by the ASEAN and e-ASEAN’s initiative on trade-related policies, including the e-commerce, the adjustment on licensing issues and the increase of ITC adopters with respect to the goals and objective of ASEAN ICT Master Plan. Finally, the telecoms law of Cambodia was firstly drafted after the government had spent years in cooperation with the ITU and the Asian Development Bank.

This drafted law had been reviewed several times by a technical assistance from the ADB before it was sent to the Council of Ministers (COM) in March 2008. Receiving feedbacks on the drafted law back from the COM in November 2008, the MPTC revised and resubmitted the final draft to the COM in January 2009. The COM signed off on the telecoms law to regulate the telecommunications sector in October 2015. Yet, the government had not released a copy of the new draft law, until the final approval from the National Assembly (NA) of Cambodia in December in 2015. Since the government efforts failed to resolve some issues in the market environment such as interconnection block and pricing predatory, the ADB technical assistance also suggested that the drafted laws should have been discussed with the public before passed to the national assembly. It was also expected that the NA would have been debated on the drafted law before it was approved smoothly by majority of the NA’s members without any modification. Later on, the sub-decree on the implementation of universal service obligation was issued on 21 July 2017. This legislation is to establish a mechanism to execute the universal service obligation effectively.

### **2.3. Past and On-Going Challenges in Cambodia’s Telecoms Industry**

Although the Cambodian government has liberalized the telecommunications market, by providing many licenses to both local and foreign private investors, the market is most likely to be unstable and it may even result in a failure. This is known as one of the consequences when a country privatizes any market with a full competition by eliminating all restrictions of entry and regulatory policies. In telecommunications industry, this phenomenon generally causes some common matters in terms of the interconnections and pricing strategies. Indeed, the Cambodia’s telecommunications market became so crowded in 2008 and some difficulties have arisen from the misconducts of all mobile carriers under the lack of telecoms frameworks and regulations.

As it happened during the ITU’s international training program held in August 2015 in Kuala Lumpur, Mr. Im Vutha, on behalf of the TRC, stressed the remaining challenges and some disputes in the Cambodia’s telecommunications market (Im, 2019). The matters were about the misallocation of the scarce resources, the unfair competition, the interconnection issues, the sustainable development of the industry and some business disputes between telecoms service providers. The disputes were usually related to the fact that the mobile carriers kept accusing one another of their unfair business practices such as a price dumping, the unpaid interconnection fees and the like. The unresolved disputes were likely to cause some undesirable consequences and to delay the introduction of new services and infrastructures, the flow of capitals from investors, the market competition with a higher price and a lower service quality, and the market liberalization (Im, 2019). Similarly, another report of the TRC revealed five groups of challenges in the Cambodia’s telecoms industry, as summarized in the below Figure-11 (Moa, 2019).

Figure-11: Current Challenges in Cambodia’s Telecommunications Industry



Source: Telecommunication Regulator of Cambodia (Moa, 2019)

Regardless of existing foreign private investments, in partnership with the MPTC and in forms of fully private ownership, to expand the telecommunications network, it was remarkably a lack of transparency and accountability to implement the foreign investment policies in the telecommunications sector (ITU, 2002a). There was no clear picture of licensing or other related policies and the timetable for the liberalization of the telecommunications industry. This has consequently provoked a confusing

mix of the government shareholdings and agreements. As a matter of fact, the market entry was restricted by the agreements which had been signed by the MPTC and operators, such as contract with Telstra for establishing an international gateway in which no newly further international gateways would be allowed even though the Telstra license had been expired. However, the government granted another license on the international gateway to Tele2 in 2000, a sister's company of CamGSM.

Table-3: Numbering Licenses among Mobile Carriers by July 2019

No.	Mobile Operator	Prefix	Total prefix	Total licensed numbers	Subscribers by 2019	% of active subscribers
1	Viettel (Cambodia) Pte. Ltd	097*, 088*, 071*, 060, 066, 067, 068, 090, 031	9	36,000,000	9,437,284	26.21%
2	CamGSM Co., Ltd	012, 014, 017, 077, 078, 089, 092, 095, 011, 061, 076*, 085, 099	13	17,600,000	3,984,596	22.64%
3	Smart Axiata Co, Ltd	010, 069, 070, 086, 093, 096*, 098, 015, 016, 081, 087	11	16,000,000	8,022,965	50.14%
4	South East Asia Telecom	018*	1	8,000,000	52,659	0.66%
5	XinWei (Cambodia) Telecom Co., Ltd	038*	1	8,000,000	84,321	1.05%
6	Cambodia Advance Communication Co., Ltd	013, 080, 083, 084	4	3,200,000	93,698	2.93%
<b>Total</b>			43	88,800,000	21,675,523	24.41%

\* 7-digit number license with 8 million numbers; 6-digit number license consists of 0.8 million numbers

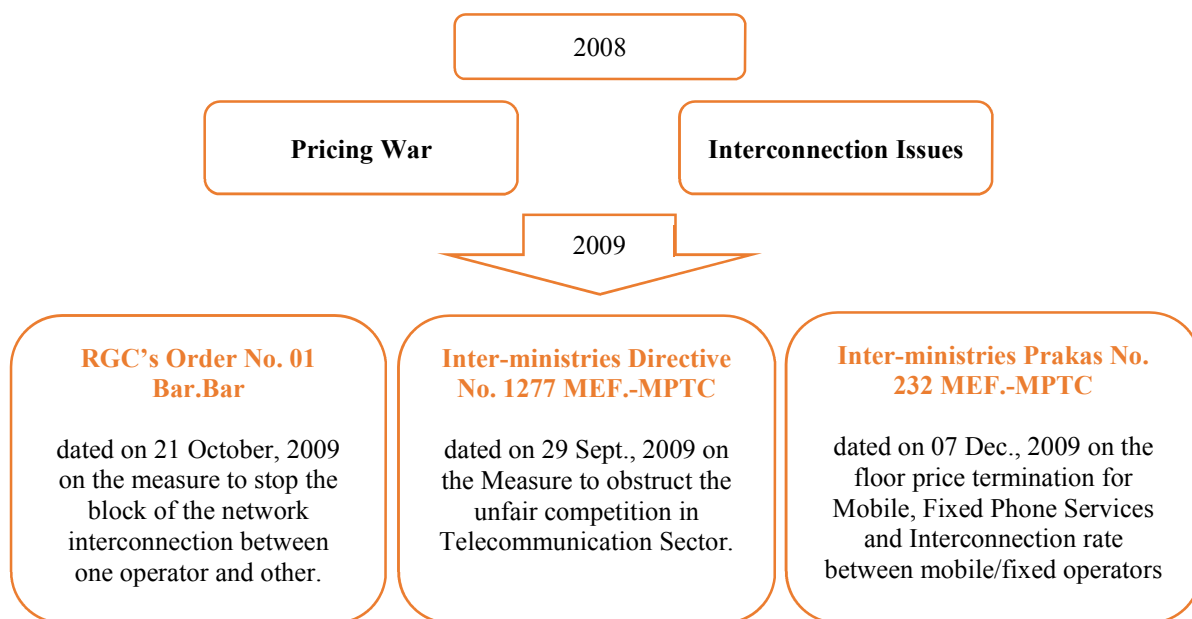
Source: Monthly Achievement Report of the TRC (Moa, 2019)

Moreover, the unclear procedure for granting licenses and the license fees which had been set without any specific pricing method even caused the Cambodia's telecom market some deficits and issues. The license fees on numbering plans in the Cambodia's telecommunications industry were set at the rock-bottom prices by the MPTC. The low fees have encouraged mobile carriers to purchase various number segments in order to supply special and lucky numbers to the market. This has caused some and this also become one of the existing challenges in the Cambodia's telecommunications market, as some service providers have purchased many number segments and sold them to the market inefficiently (Moa, 2019). Up till now, Metfone has received licenses to offer nine segments while Smart Axiata has 11 and CamGSM possesses 13 (table-3). The TRC also clearly reports that the percentage of registered simcards at Metfone is about 26% of the total license, compared to Smart Axiata at 50% and CamGSM at 23% (Moa, 2019).

In some cases that the licenses on numbering plans are unused or inefficiently used, the MPTC, under the foreign investment laws, is lack of legal authorization to optimize the license usage or to

revoke those licenses. Besides, subscribers could not port their numbers from one to another carrier down to the absence of mobile number portability (MNP) though half of users had within-network congestions and over 70% faced across-network congestions (Vong, Lee, & Zo, 2012). This becomes significant barriers for new entrants and future expansion of the mobile network and further investments (Im, 2019). Also, the mobile operators with only one numbering license are likely unable to compete against the incumbents which possess many numbering licenses. It is even harder to impose extra obligations, such as the universal service obligation. The inefficient allocation would be part of the instability and failure of the market while most of the scarce resources are controlled by the incumbents.

Figure-12: Disputes and Resolutions in Cambodia’s Mobile Telecommunications Market



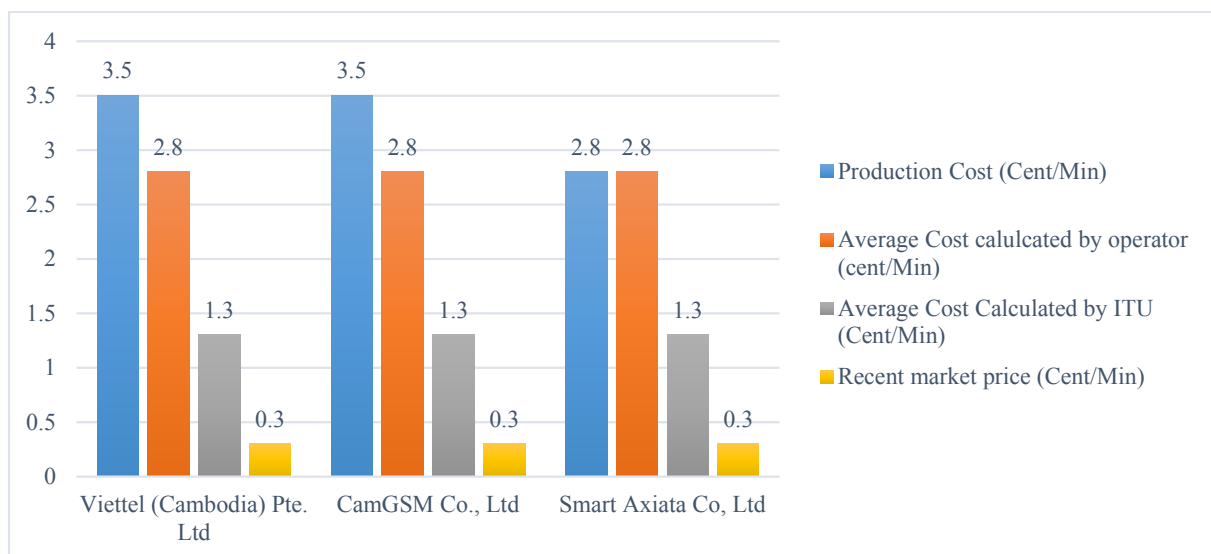
Source: Telecommunication Regulatory of Cambodia (Im, 2015a)

As a regulation-free market, Cambodia has experienced various kinds of disputes, caused by the commercial activities of mobile carriers in terms of the price war and the interconnection blocks. On one hand, the incumbents have used the promotion campaigns for on-net calls as predatory pricing to retain users and attract new ones since 2008 (Figure-12). On the other hand, they have blocked the network interconnections from other competitors. Even so, the MPTC finds difficulties in resolve the problems. To relive such tensions, the RGC has enacted the inter-ministerial circulars on “anti-unfair competition in telecommunications sector” on 29 September 2009 and Prakas (declaration) on the “telecom interconnections” on 05 October 2009 (Im, 2019). Another order titling “measuring to cease interconnection blocking between mobile/fixed service operators” was announced afterward. Few months later, another inter-ministerial circular was released to set the minimum price and the

interconnection fee between mobile operators, including the obligations of all mobile carriers to establish and maintain the interconnections with other local or international networks through the transit point at the Telecom Cambodia (TC).

Still, the direction on the price floor has been put a halt due to some public demonstrations, as presented in the Figure-12. The problems remain unsolved and the predatory pricing policies and the network interconnections are implemented by all licensed companies (Moa, 2019) and the TRC has already declared that their promotion campaigns are against the inter-ministries notifications and directives (Im, 2019). This implies the increasing price war between mobile carriers, by putting the low rate of on-net retailed prices below the cost base, and providing a very high rate of bonus to their customers between 200% and 500% for recharging accounts. As of the early of 2019, the TRC’s director has reported to the MPTC about the price war in Cambodia’s mobile telecommunications market where the operators have offered on-net services at prices which were much lower than their production costs. The report clearly stated that the on-net voice service was produced at the lowest cost by Smart Axiata (2.8 cent US\$ per minute, with Fully Allocated Cost method), compared to Viettel and CamGSM at 3.5 cent while Beeline produced their on-net voice service at 5.0 cent per minute (without specifying the calculation method). In average, the within-network voice service was possibly produced at 2.8 cent, if compared to the average price calculated by the ITU at 1.3 cent, by using Long Run Incremental Cost method. In contrast, these mobile cellular carriers offered their voice service at 0.3 and 0.3 cent per minute (Figure-13).

Figure-13: Comparison between Production Costs and Market Price in 2019



Source: Telecommunication Regulator of Cambodia (Moa, 2019)

The TRC has warned the mobile network operators to avoid engaging in a price war, following the launch of their money exchange programs. In the mid of 2016, Smart Axiata started Smart Xchange promotion to allow that 1US\$ would acquire 30US\$ worth of voice, SMS and data use for internet within network<sup>4</sup>. Few weeks later, other two market-leading operators, CamGSM and Metfone, launched the same promotion in the market. In January 2017, CamGSM has increased the amounts of exchanged money to 100US\$. Smart Axiata upped the stakes with a 1US\$ for 125US\$ promotion which came less than two weeks after CamGSM<sup>5</sup>. The price war has then continued with another Big Love program of CamGSM during 14 February 2017 while the promotion offered an exchange of 1US\$ to 250US\$<sup>6</sup>. In answering to these big mobile network operators, SeaTel, one of small mobile network operators, is providing a similar program with 2000 US\$ worth exchanged from 2US\$<sup>7</sup>. In the March 2017, Metfone launched its Super Exchange program which means users can exchange 1US\$ to 150US\$ worth of voice, SMS and data services within network<sup>8</sup>. The last but not least, Smart Axiata is offering a big promotion to their users by allowing them to exchange 1US\$ to 333\$ since June 2017. The table-4 lists down all promotions which have caused price war since 2016 till these days.

Table-4: Summary of Promotion Campaigns in Mobile Sector

<b>Date</b>	<b>Operators</b>	<b>Promotion</b>	<b>Value of Promotion</b>
Note: worth of voice, SMS and data use for internet within network			
<b>May – 2016</b>	Smart Axiata	Smart Xchange	1US\$ exchanged to 30US\$
<b>June – 2016</b>	CamGSM	Osja Xchange Program	1US\$ exchanged to 30US\$
	Metfone	Exchange Money	1US\$ exchanged to 30US\$
<b>Jan – 2017</b>	CamGSM	Osja Xchange Program	1US\$ exchanged to 100US\$ + free daily 30mn
	Smart Axiata	Smart Xchange	1US\$ exchanged to 125US\$
<b>Feb – 2017</b>	CamGSM	Big Love Program	1US\$ exchanged to 250US\$
	SEATEL	Preferential Tariff	2US\$ exchanged to 2,000US\$
<b>Mar-2017</b>	Metfone	Super Exchange	1US\$ exchanged to 150\$
<b>Jun-2017</b>	Smart Axiata	Smart ThomMornng	1US\$ exchanged to 333\$

Source: Telecommunication Regulator of Cambodia (TRC, 2017)

<sup>4</sup> Smart Xchange at Smart Axiata, <https://www.smart.com.kh/plans/addon-services/smart-xchange>

<sup>5</sup> Power Plus Program at Smart Axiata, <https://www.smart.com.kh/plans/power>

<sup>6</sup> Big Love Program at CamGSM, <http://www.cellcard.com.kh/en/promotions/big-love/>

<sup>7</sup> Preferential Tariff Program at SeatTel, [http://www.seatelgroup.com/en/service-and-tariff\\_en/preferential-tariff/](http://www.seatelgroup.com/en/service-and-tariff_en/preferential-tariff/)

<sup>8</sup> Super Exchange at Metfone, <http://www.metfone.com.kh/kh/news/promotion/exchange-money>

Though, the market prices of off-net voice service remain high at 9.0 cent by Viettel and Beeline, while Smart Axiata and CamGSM offer at 8.0 cent. They were making high profits from cross-network service at 2.05 and 3.05 cent (US\$) respectively after deducting the interconnection fee and other related fees (aggregate of 5.95 cent). Based on the directive on floor price calculated by the ITU, the interconnection fee paid to terminate operator is set at 4.65 cent per minute and it is also required additional payments of 1 cent to the TC and 0.3 cent to the TRC as well as some related taxes. The formula to calculate accessing price can be written as follows: *Accessing Price = Interconnection Fee (4.65) + TC Fee (1) + Regulator Fee (0.3) + other taxes*. Compared to the average market prices of the on-net service (0.3 cent), the off-net price (8.5 cent) is relatively much higher. Moreover, the money exchange program has enlarged the gap between the on-net and off-net prices. For instance, the 1US\$ = 100US\$ program means that the on-net price is reduced 100 times compared to the market price set by the MPTC. On one hand, the consumers pay a very low fee for connections within the same network while on the other hand they spend very high prices for call termination with users of another network. This implies that the users of larger network have a huge advantage over those of the small ones. There becomes discrimination between users of different networks. As the result, Star-cell, Mfone and Beeline were subsequently bankrupted. The exit of these mobile carriers not only reduces the number of mobile carriers but also grows concerns over increasing market power of the remaining suppliers.

Table-5: Historical Data and Forecasts of Declining ARPUs of VimpelCom's Beeline

Quarterly ARPU	Sep-10	Dec-10	Mar-11	Jun-11	Sep-11	Dec-11	Mar-12	Jun-12	Sep-12	Dec-12
Mobile Subscribers in thousand	505	651	755	818	808	1,013	1,078	1,126	1.12	597
ARPU (US\$)	3.2	3.8	3.5	3.0	3.0	2.0	1.6	1.7	1.5	1.8
Annual ARPU	2010	2011	2012 <sup>e</sup>	2013 <sup>f</sup>	2014 <sup>f</sup>	2015 <sup>f</sup>	2016 <sup>f</sup>	2017 <sup>f</sup>		
ARPU (US\$)	3.8	2.0	1.8	1.5	1.3	1.2	1.1	1.0		
Market Average	2.8	2.6	2.4	2.3	2.1	2.0	1.9	1.8		

<sup>e</sup>: estimated, <sup>f</sup>: forecast

Source: Cambodia and Laos Telecommunications Report (BMI, 2013)

The gigantic gap between the off-net and on-net services has created troubles for some mobile carriers in Cambodia. Indeed, VimpelCom's Cambodia, parent company of local telecoms provider Beeline, had revealed that the intense price competition and overcrowded market made the company

unable to make profits. Regardless of increasing number of subscribers, VimpelCom used its historical data to calculate the average revenue per user (ARPU) and to estimate the future values. The MBI's report in 2013 showed that the ARPU of Beeline gradually dropped from US\$3.2 in September 2010 to US\$1.5 in September 2012 (table-5), which appeared to be going in the reverse direction of increasing mobile subscriptions (BMI, 2013). The operator experienced its annual ARPUs lower than the estimated market averages at about US\$0.6 in 2011 and 2012. The revenue gap even became larger from year to year. Furthermore, the company estimated and forecasted the ARPUs which would keep declining to US\$1.0 in 2017, with an annually decreasing rate of US\$0.1, while the estimated market average value of the ARPU is US\$1.8. Smart Axiata, in particular, has retained its ARPU above the market average after the consolidation between Smart and Hello Axiata. The annual ARPU of Smart Axiata slightly declined from US\$4.45 in 2011 to US\$3.74 in 2012.

Beside the pricing problems, M&A (merger and acquisition) has been announced as one of matters which lead to the economic inefficiency and the failure of market competition. The failure is possibly caused by the restraint on suppliers while the market powers of few telecommunications operators keep increasing. Indeed, there were consolidations between mobile operators in order for them to answer to the problems of pricing war and network effects. Indeed, as of November 2016, Metfone acquired Beeline and remained the leading mobile operator with the largest market share of 46%. Smart Mobile acquired Applifone and merged with Hello Axiata to surpass CamGSM and to be the second market leader with market share of 40%, while CamGSM acquired Mfone to own a market share of 13% and other four operators hold less than 1%.

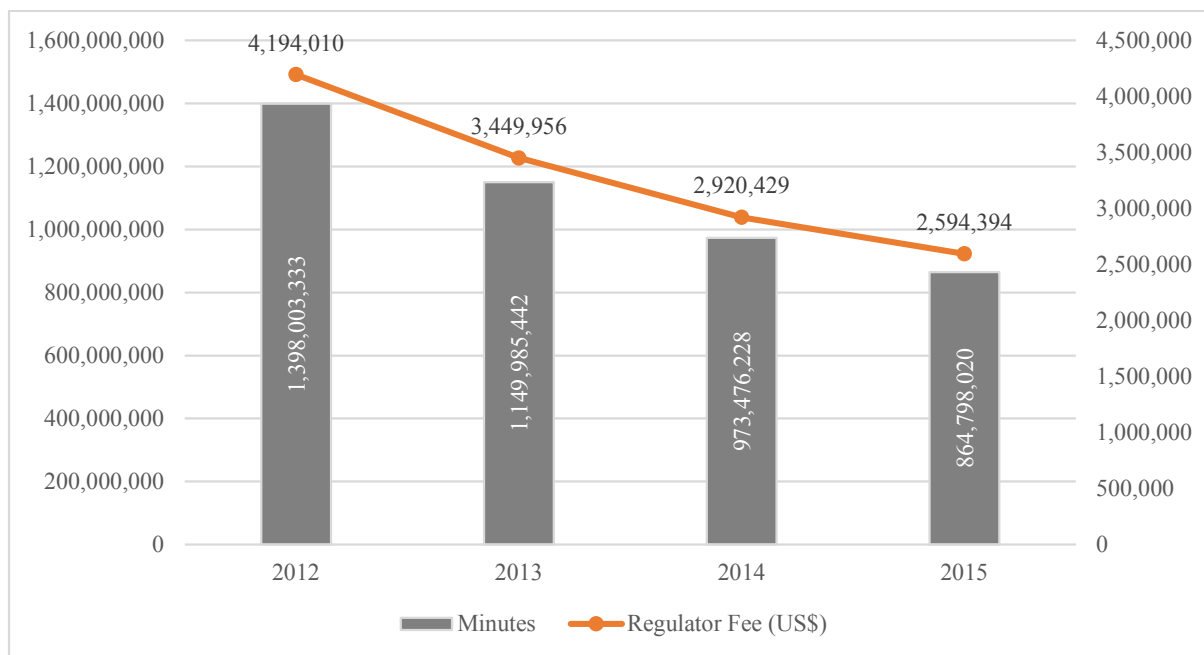
Furthermore, these few dominant suppliers caused the market high concentrated, checked by the Herfindahl-Hirschman Index (HHI) which is widely accepted in the competition law, antitrust law and technology management to measure the concentration level in a particular industry (William & Alan, 2009). The HHI of Cambodia's mobile market was about 3600 in 2015, compared to 2310 in the early of 2010 (Im, 2015c; Phun, 2010). The market competition is possibly moving toward the duopoly or even monopoly. The intense competition has emerged when the mobile market started through some of rationalization by the end of 2011, based on the media map project in Cambodia (Roberts, 2011).

The TRC lately reported a steady decrease in the calling duration which causes the loss in regulator fees (Im, 2015a). With the fixed interconnection fee of 0.3 cent (US\$) per minute, the drop in inter-network connection were gradually decreasing the total regulator fees between 2012 and 2015, presented in Figure-14. It decreased by 11% in 2015, compared to 15% in 2014 and 18% in 2013 (Im,



2015a). The decline of regulator fees in 2013 was caused by the merger between Hello Axiata and Smart, and the bankruptcy of Mfone. Also, there were differences between the minutes at the TC and those reported by Viettel. However, the decrease in 2014 was resulted from promotions among the three market-leading operators, which provided free additional balances for within-network calls. The fact that Sotelco was acquired by Viettel in 2015 and on-going promotions of free within-network calls have forced the incomes of the MPTC from the regulator fees to decline at 11%. When few mobile operators possess a larger market share, the regulator fee will possibly decline (Im, 2015a). So, the merger and acquisition has to be well regulated and controlled by the telecoms law.

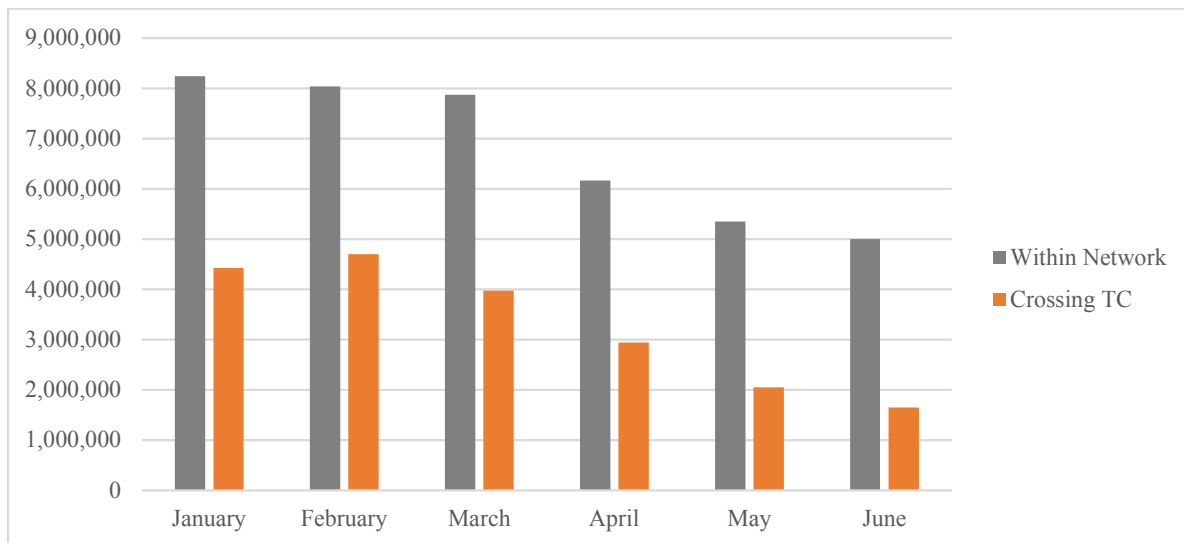
Figure-14: Decreases in Total Calls (Minutes) and Regulator Fee



Source: Telecommunication Regulatory of Cambodia (Im, 2015a)

Another reason why the regulator fees keep steadily decreasing is from the difference in call records given by each operator and by the TC (Im, 2015a). During the first half of 2015, the total duration of cross-TC calls was about 2% to 3% lower than the call detail record (CDR) from Viettel, Smart Axiata, and CamGSM. Figure-15 presents the decrease of total call durations during the first half of 2015. Both within-network and cross-network calls were decreasing from 8.2 million to 5.0 million minutes and from 4.5 million to 1.6 million minutes respectively. From the above inefficient way of collecting data, the TRC also requires the establishment of data management center (DMC) to control the operation of all mobile telecommunication suppliers. This aims to improve the efficiency in collecting data, making reports on time, and verifying the data.

Figure-15: Decreasing Total Duration of Within-network and Crossing-network Calls



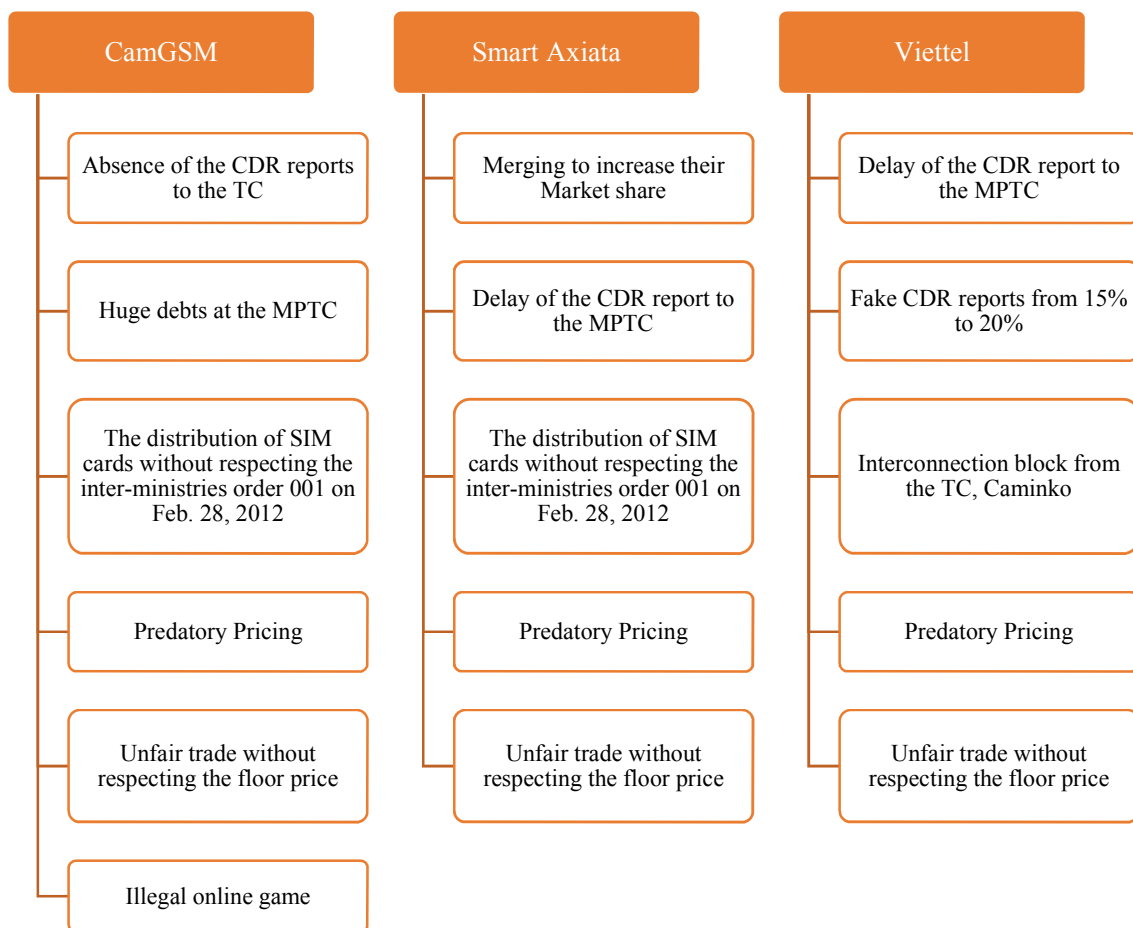
Source: Telecommunication Regulator of Cambodia (Im, 2015a)

The below Figure-16 summarizes the misconducts provoked by three-leading mobile service providers in Cambodia. The common problems among them are related to the retard and the absence of the CDR's report, the predatory pricing, the unfair trade against the floor price, and the distribution of simcards without respecting the inter-ministries order 001 on February 28<sup>th</sup>, 2012. Furthermore, though the MPTC and the Ministry of Interior have issued orders twice to force all, the business operations are uncontrollable with poor business reports and simcards are still sold without consumers' identity (Im, 2015b). It is known that most difficulties and obstacles to issue any legal letter or notification are caused by the deficiency of regulation (Khan, 2014). Without legal power, it is hard for the TC to collect the CDR from their operators and there are always differences between call records given by each operator and data collected by the TC (Im, 2015a). For example, Smart Axiata usually reports their CDR late 28 days after the due date, compared to 35 days of late report from Viettel, while CamGSM rarely makes their reports. Furthermore, some operators even submit fake reports which have been adjusted from the actual ones (Im, 2015a).

Opening telecommunications market to competition is believed to make consumers more active in choosing any product and service with a better quality at lowest price. It may also stimulate firms to introduce the innovative technologies by putting pressures on the suppliers to compete in terms of increasing quality and decreasing prices. Consequently, this results in an improvement in the consumer welfares and the economic efficiency. However, the ubiquitous and open networks provide not only great benefits to the society as a whole, but also some vulnerable consequences, as mentioned above.

Since both desirable and non-desirable situations may happen, it requires an adequate provision for a lawful interception to make sure that the public interest is protected, or the products and services are run into the best interests of the majority of the citizens. More specially, when the benefits which are resulted from operating as private companies in new competitive market are met, the newly privatized firms have to operate within certain limits and regulations. Indeed, almost all telecoms markets have suffered from aberrations regardless of multiple players. So, the government plays a fundamental role in establishing necessary terms and conditions in which mobile telecommunications can develop through efficient allocation of wireless spectrum, enactment of vital legislation, and leadership in e-government or m-government (Tim, Nicolas, Michael, & Masatake, 2012). The government also needs to create an environment in which all players can fairly collaborate or compete.

Figure-16: Misconducts of three Market-leading Mobile Carriers in Cambodia



Source: Telecommunication Regulator of Cambodia (Im, 2015a)

The telecoms laws in Cambodia contains 15 chapters and 114 articles which mainly focus on the separating powers and roles of legal institutions such as the MOPT (previously called MPTC) and the TRC. The general provision of this first version of telecommunications law aims to ensure the quality

and effective use of telecoms infrastructures, networks and services, to encourage telecommunications investment, to protect consumers and to earn national revenues. It firstly determines the authority of the MPTC and the TRC to be responsible for differently separated functions including resource management, regulation, monitoring, tracking operations of the telecommunications sector, and governance procedures. As mentioned in the second chapter of the law, any person conducts or involves with telecommunications operation in Cambodia must be granted permission from the TRC in terms of *a permit* and *certificate* for performing any action related to telecommunications equipment, and *license* for constructing network infrastructures and providing telecoms services. Even though this chapter includes the procedures of application and transfer of licenses, the requirements and instructions are not yet available and will be determined later by the MPTC and TRC, based on the Article 18 of the law.

The scope of the law also allows the MPTC to control over the telecommunications infrastructure and networks of mobile operators in Cambodia, with the exception of the security and national defense sectors. The networks are required to interconnect with some appropriate contents and conditions in accordance with the requirements of the standards of technical and service quality at affordable price, without any discrimination and blocks. The interconnection agreement should be made between bilateral parties before the proposal is submitted to the TRC in case both operators cannot come into agreement. However, the terms and conditions of interconnection are set under other regulations which will be established by the TRC. Similarly, the law proves authority to the MPTC to determine specific regulations on the standard, quality of services, universal service obligations, frequency management, numbering plan, tariffs and competition.

More interestingly, the law mostly focuses on the penalty provision to punish cellular operators which do not comply with any condition of the law and any legal person who intentionally commits offenses to destroy or damage the telecommunication infrastructure and network. Mentioned in Article 78 to 109 of the law, both Cambodia criminal and civil laws are also applied for those who have committed other illegal acts by using the telecommunications system without permission with an intention to destroy or damage the property of other, or by using personal telecommunications system to record or listen to dialogue of other people. In response to this telecoms law, some non-governmental organizations had complained and criticized that this law would improve nothing, except increasing government legal power to control over the telecoms systems. “It appears to aim at nothing less than the extension of government control over the very architecture of the Internet itself,” warned by rights group Licadho in a report on the status of Cambodia’s Internet freedoms in May 2015 (Pung, 2015).

In short, the current Cambodia's telecoms law lacks of some specific regulatory policies on the standards, the quality of services, the interconnection, the efficient allocation of licenses and frequency spectrums, telecoms numbering, the pricing and accessing price, or universal service obligations. The provision of these regulations in the new telecom law of Cambodia is subject to be determined and set by the MPTC and the TRC afterwards.

### **3. Research Problems**

While the Cambodia's telecommunications sector has been steadily developing since the early 2000s and the mobile penetration rate has reached 134.0 per 100 habitants in 2019, Cambodia is the only ASEAN member which has not adopted formal competition law. The excessive competition has lied with the way the market became overcrowded and the way seven to nine mobile cellular operators had been granted licenses to offer mobile cellular services under an unclear picture of licensing policy and licensing procedure in Cambodia. This approach does not bring the efficiency and stability to the telecommunications sectors as the scarce resource of frequency and numbering licenses has been owned and inefficiently used by some mobile carriers. Digital divide for the underserved population and residents in remote areas has limited the country in fully using the potential of the telecommunications services and additional services. Some main mobile carriers in Cambodia provide services only in metropolitan areas while frequency and numbering licenses are mostly owned by them.

The market condition become even more severe when some suppliers are unfairly competing in the telecommunications market by misusing their market powers in terms of price setting and interconnections. From the past experiences, the lack of proper telecommunications regulations has become loopholes for mobile carriers in Cambodia to typically set the prices of their on-net services much lower than the cost bases while the prices of off-net services remain high. The average difference was 8.23 cent (US\$) in 2019, increasing from 2.05 cent (US\$) in 2010. Moreover, with the recent exchange money programs (1US\$ acquires 333\$ worth of voice, SMS and data use for internet within network), the prices and market condition have been highly shifting and unstable. The pricing war has made all operators difficult to make profits and to plan further investment programs and productions because the prices are not able to cover production costs. In case that these challenges remain unsolved, the price movement will cause the changes in the conditions of the service supply, which leads to the unsustainable development of the industry.

This might happen at the initial stage of economic development when Cambodia has to first focus on establishing basic legal building blocks of economic infrastructures. Moving towards a market-

oriented economy without formal law and regulation, the market condition is becoming more unstable. The unstable condition has been highly caused by many challenges and some of them have not been solved for years. The market condition is heavily triggered by the predatory pricing policies which have been set by the mobile carriers without respecting the Notifications and Prakas of the MPTC. The royal government of Cambodia and related ministries have issued numerous Notifications, Prakas and Decisions in order to reduce the tension. While those instructions were made on the basis of theories and the interests of supply's side, the implementations were not successful and public demonstrations were being held against the government. Therefore, the digital divide and unfair marketing competition among mobile carriers remain unresolved problems which lead to unstable market or market failure.

#### **4. Research Objectives**

The study aims to resolve the instability problem of the Cambodia's telecommunications market, by proposing a consumer-oriented approach, derived from the ICT-adoption theories and theories of consumer decision-making, for the sake of the social welfare and the sustainable development. The approach is to identify the consumer behavior to adopt mobile telecommunications services and its complimentary services, and then apply the insights of the actual consumer behavior for the regulatory policies. This proposed model aims to supplement the lack of the explanation offered by policy-oriented approach in the study on mobile telecommunications services. The mixing approach would be a tool for a systematic and periodic process to assess the performance of suppliers and existing regulatory policies in relation to certain pre-established criteria or regulatory objectives.

Hence, this approach intends to help solve the problems when policy-makers face the tradeoff between regulatory policies. To perform the cost-benefit analysis on regulatory policies in nonmonetary unit, the state preference method is used to ask individuals about their preferences as choice tradeoffs. This study also ensures that this market will be protected by a set of appropriately well-designed and effective regulations in a context of a developing country with its own particular economic and social problems, culture and institutional characteristics at specific time frame.

#### **5. Significance of Study**

With the consumers' perspectives, the research approach provides the supplement to the lack of explanation offered by policy-oriented approach and it can be applied in different domains in mobile telecommunications industry. It becomes an essential approach for a systematic and periodic process to assess the performance of suppliers and existing regulatory policies in relation to certain pre-established criteria or regulatory objectives. The findings of this study will produce a set of appropriately well-

designed and effective regulations, on the grounds of the adoption efficiency and the sustainable development of mobile telecommunications industry.

This first study is original in its nature by applying the consumer-centric approach in designing regulatory policy in the mobile telecoms industry. Various analytical tools, such as multiple regression, AMOS and Conjoint Analysis, are used to analyze the primary data, collected by the author at four provinces and cities of Cambodia, where the digital divide remains problematic and where there is a lack of technology innovation adoption.

## **6. Organization of the Dissertation**

The rest of the paper is organized as follows: the second chapter briefly reviews issues in some previous literatures debating on the solutions to the problem of unstable market in the mobile telecommunications industry in both developed and developing countries, before turning the experiences to the construct of the regulatory measures and an approach for the effective regulations for the Cambodia's telecommunications industry. Furthermore, the second chapter also discusses on the methodologies used to seek for the most applicable regulatory invention during the tradeoff conditions. In third chapter, the first empirical study deals with the efficiency in the supply of mobile telecoms products and services by exploring diffusion and motivational factors affecting the consumer adoption behavior. Similarly, the chapter four is devoted to the study on the equity and market performance on the grounds of consumer switching behavior and their satisfaction. The next chapter studies the consumers' preference for the regulatory invention during tradeoffs between the economic efficiency, fairness and sustainable development. Finally, the last chapter provides conclusion for the design of effective regulations in the context of Cambodia and research contributions.

## **CHAPTER II: LITERATURE REVIEW**

### **1. Overview of Regulatory Policies**

The rationale behind the regulatory intervention in one market is generally resulted from the market failure or unstable market while the intervention is more arguable and it lately becomes growing interest among academics, policy-makers and practitioners. Regulatory intervention takes many forms in developing countries and these forms vary across countries at different time frames. Following the failure of state-led economic planning and success of liberalized markets in some developed countries, this sector has been widely liberalized and privatized with the intention of promoting the development by reforming the regulatory frameworks and regulations (WorldBank, 1995). Generally, regulations have been used as an important government's tool and an integral part of a well-functioning economy to avoid market failure (WorldBank, 2001). Designing effective and appropriate regulatory policy in telecommunications sector in developing countries is not simply a matter of the technical design, but a matter of the regulatory quality to balances accountability, transparency and consistency (Parker, 1999). Moreover, it is designed for achieving social welfare goals which are usually set to improve economic efficiency, to achieve sustainable development, and to promote poverty reduction in developing countries (Paul & Sarah, 2007; Hossein, Colin & David, 2007).

Without government intervention, the primary rationale of the social regulation allows individual companies not to take the full social cost of their actions into account. In the U.S., the federal regulations have significantly increased over 10% of the contraction in the growth of labor productivity in the mid-1970s (Christainsen & Haveman, 1981). Similarly, a study on the private uses of public interest, conducted by Stiglitz (1998), illustrates that the public regulation is needed for developing countries where market failures might be more prominent. From one standpoint, a partial deregulation may lead to an improvement in developing countries, such as the cases of reducing entry regulation on long-distance telephone market by 50% in Chile, while in some Latin American countries waiting time for installation of new lines was reduced from a minimum of two years to a matter of weeks (Guasch & Hahn, 1999). In a different manner, a full deregulation may lead a market to a natural monopoly. Then, regulatory intervention is required in the early stage of competition to prevent the incumbent from using market power to crowd competitors out of market, although it may provoke a wide variety of issues and risks (Ben, 1997). In some cases, David (2002) claims that a partial deregulation is generally applied



when the competitive pressures are sufficiently to make price and service quality at a reasonable level. However, the liberalization of telecommunications industry in most countries has experienced a need for increasing regulation at least until the fair competitive market rules are firmly established (Aileen, 1997). Therefore, many countries have implemented different types of effective regulations to meet their specific contexts and requirements.

## **2. Challenges and Effective Regulations in Telecommunications Industry**

The telecommunications industry was traditionally considered as a national asset at the policy level linked with technological, economic and public service characteristics. The fact that the state owned enterprises had caused many obstacles for the government to implement some policies on transferring the operation to foreign investments. The transition from public to private ownerships generally started after there had been growing dissatisfaction with the performance of state-owned enterprises, the over-tightening national budgets and the explosion of investments in the telecommunications industry. Also, the significance of privatization has been extended to the developing world after the specious achievements of market liberalization in some developed countries and the evidences of the failure under the state-leading markets in some developing nations (WorldBank, 1995). In particular, the price in the monopoly infrastructure could be simply raised by reflecting to the U.S. model of rate-of-return or cost-plus regulation and the absence of competition (John U. , 2008). Therefore, over 60% of developing countries have privatized their incumbents by the end of 2009, according to the ITU's report (ITU, 2010a).

The rise of private ownership and the emergence of competitive markets are usually introduced into one market to serve the public interests from alternative suppliers which are competing with each other in terms of lower prices, more or better quantities and better qualities to attract consumers (Hank, 2000). By using the cross-country data of 166 countries between 1990 and 1998, the privatization has a significantly causal effect with competition (Li & Xu, 2004). These authors also found that the presence of competitive pressures in a market significantly impacts on the growth in the employment, the production outputs, the network expansion and the labor productivity. Therefore, the world development report of the ITU describes the development of recent telecommunications technology from the mid-1990s till the early of 2002 was mainly summed up by four key words, namely *Private*, *Competitive*, *Mobile*, and *Global* (ITU, 2002b). In short, the telecoms industry has developed through privatization and competition before the services are gradually mobile. Furthermore, this report emphasizes on the impressive effects of the privatization and competition policies which significantly enhance the advancement in telecommunications sector (ITU, 2002b).

Commonly, there are at least four models to open the telecommunications market to competition (William H. M., 1997). The first one is about the privatization with full competition by removing all restrictions on entry into all segments of the markets while the regulations and policies are established following the occurrence of some issues in the competition. On the other hand, some countries have privatized their national telecommunications carriers accompanied by a sustained period of exclusivity rights or limited competition in basic telephone services (William H. M., 1997). Under the third model, the telecommunications sector is, however, liberalized by allowing new private entries without the privatization of the national incumbent. According to William (1997), the reason for applying this approach is to gain the advantages of foreign investment, technology and management expertise, to avoid the loss of jobs due to the privatization of the state-owned firms, and to prevent the loss control and security over critical communications facilities. The last but not least model is related to the private participation without privatization or without introducing competition. This model allow the state-owned carrier to grants franchises or concessions to private firms in order to build and/or operate specific facilities or services (William H. M., 1997).

However, none of these approaches can lead to perfectly competitive market in practice and many markets are not really competitive due to some biases and inefficiencies, which may occur during the transition from the state-owned monopoly to private ownership, and from the increasingly competitive market structure in the sector (Smith & Wellenius, 1999). Indeed, the privatization with full competition may lower the prices and expand network infrastructures while some carriers may suffer small operating margins for a period of time and the market may become very inefficient. This is often caused by the lack of constraints on the privatized dominant carrier and the lack of clearly defined interconnection rules, particularly in assisting the carriers to come to interconnection agreement (Smith & Wellenius, 1999). These disputes have been in the courts for many years before the governments have considered policymaking roles and regulations to address such issues. Similarly, operating licenses or concessions under the privatization with phase-in competition are normally conditioned with some obligations to guarantee a certain level of network infrastructures and improvement of services quality, but the loss of efficiencies and poor integration of new innovations of some basic services may occur (Smith & Wellenius, 1999). In due time, the third approach may cause some risks for newly private competitors to compete against the state-own incumbent though the interconnection negotiations and the dominant market power while the last model may not bring out the infrastructure build-out and the full benefits of competition.

In a perfectly competitive market, there is no reason for the government intervention to implement any competition regulation or policy. On the contrary, no market is perfectly competitive in practice and the imperfect competition becomes a root cause of the market failure (Hank, 2000). Generally, the market failure is associated with a high level of monopolization deriving from the economies of scale or scope, information asymmetry, missing markets, externalities or income effects (John B., 2003; Martin, Sumit & Vogelsang, 2006; Hossein, Colin & David, 2007). Consequently, the privatized markets may dramatically increase the needs of regulatory intervention to effectively fulfil most social and economic goals while the fairness and the success of competition may depend on the specific approaches. In the same way, Smith and Wellenius (1999) summarize that the problems during the transition of telecommunications sector vary widely according to the relationships between operators and government (licensing), the relationships between operators (interconnection and access prices), and the relationships between operators and consumers (prices and complaints).

Licensing is a core element of privatizing telecommunications industry and it determines the degree of competition between operators, the revenues earned by the government from fees and the competition framework in which many cellular carriers operate and supply services. In general, a license is granted to a new entrant in order to provide telecommunications services or to operate telecommunication facilities by attaching some major rights and obligations. The governments of many countries, especially in the context of emerging and transitional economies, grant licenses by means of a competitive licensing process (Hank, 2000). Typical steps of a competitive licensing process are usually used to issue an authorization to a single service provider or to a limited number of them through a comparative evaluation process (so called a “beauty contest”), an auction, or a combination of the two (Theresa, 2007). The importance of licenses differs among countries while they share some common objectives, including the provision of an essential public service, the expansion of network and services, the privatization of the industry, the improvement of market competition, the establishment of competitive framework as anti-competitive safeguards, and the allocation of scarce resources. Moreover, the efficient license management may generate the government revenues, the consumer protection, and the increasingly significant confidence of investors (Hank, 2000).

For the provision of mobile telecommunications services, the regulator normally establishes two sorts of licensing. The first type permits firms to operate telecommunications services with their facilities (facilities-based competition), while the second one is granted to cellular carriers for offering the telecoms services without owning the network facilities (services-based competition). With the technological advancements, the operators may enter the market by relying partially or entirely on the

facilities or services of other carriers including resale of incumbents' wholesale of end-to-end products and by leasing of unbundled local loops. On one hand, the SBC may answer to the limited frequency spectrum. On the other hand, it reduces access barriers such as large sinks to build their own facilities, delays the installation of their network and allows new entrants to gain some experience in the industry without misinforming the market (Bourreau & Dogan, 2004). FBC is more effective for dynamic efficiency in finance investment for market growth and technological innovation while SBC is more effective for the static efficiency to promote the workable competition, the service quality and the consumer surplus by reducing production costs (Seo, Lee, & Kim, 2008).

In spite of the privatization and the grant of licenses to private entrants, some markets continue to change their certain characteristics on the concentration of market power in the hands of incumbents. These powers are associated with the strong network effects which implicitly make the customers to choose large networks over smaller ones (Nicholas, 2005). Then, the market may be dominated by a small number of large or well-established incumbents, which may exercise their market powers to the detriment of consumer welfare and overall industry performance (Hank, 2000). Indeed, many network industries usually exhibit increasing returns to scale and scope of productions. In some instances, the cellular carriers may create some specific market powers to the network through vertical integration, vertical corporation, merger and acquisition, or corporation between them (Nicholas, 2005). The author then adds that the abuse of their market powers may lead to the discriminations in interconnections, prices and quality. Especially, the early stages of privatization under the full competition in developing countries fundamentally requires three instruments of the behavioral regulations, namely the necessary control of retail prices where the dominant firm exercises their market powers at the retail level, the interconnections and the assess pricing between network operators (John U. , 2008).

Nicholas (2005) defines two common types of the interconnection issues in telecommunications industry, including one-side bottleneck and two-side bottleneck. One-side bottleneck usually occurs when the firm, with no long-distance network, interconnects with the network of a larger firm to complete long-distance calls. However, when both firms have their local networks or long-distance networks, the crossing network calls or off-net calls frequently provoke the interconnection issues of two-side bottleneck. In some circumstances, the unwillingness of the incumbents to provide perfect information of their networks, to allow network interconnections from newly entrants, or to offer interconnection at a price makes it hard for efficient entrants to compete (Andrew, 2004; Colin & Lara, 2011). For instance, New Zealand and Chili adopted the privatization with full competition by allowing many competing carriers to offer cellular services. Though the prices were lowered and network

infrastructures were expanded, the market became very inefficient due to the lack of constraints on the privatized dominant carrier and the lack of clear interconnection rules (William H. M., 1997). To solve the problem, the governments have considered the regulations on interconnection between operators, accompanied by some vital conditions.

As a matter of fact that the interconnection becomes one of the most significant challenges in telecommunications industry, especially in the early stage of competition, the regulatory intervention is required to enable the network interconnections on reasonable terms, relating to the prices, the revenue sharing, the access to information and the quality of services (Shapiro & Varian, 1996). William (1997) also claims the necessities of these adequate terms and conditions to ensure the growth of the market competition, while the interconnection price particularly is a critical feature which forces some incumbent operators to implement accounting separation. Operators are asked to provide information on the costs which interconnections are charged to avoid discriminatory prices or excessive charges (William H. M., 1997). Principally, the excessive interconnection charges probably evolve to become a major obstacle for the growth of mobile traffics and the increasing scale effects on the average revenues per user (ITU, 2003). By theoretically analyzing the unregulated network competitions in both the mature and the transition phases, a higher access charge definitely causes a higher off-net price which indirectly impacts on the on-net price (Laffont, Rey, & Tirole, 1997). Moreover, the authors have figured out that an increase in the access charges may alter at least two effects; a decrease in on-net prices, and a decline of average price and profits. A larger gap between on-net and off-net prices is even more harmful to the consumption efficiency and it probably intensifies the competition which makes the total welfare more ambiguous.

In some instances, the setting of excessive access charge, which enlarges the big gap between on-net and off-net prices, becomes one of the entry barriers because new entrants take some times obtain the positive return to scale (Laffont, Rey, & Tirole, 1997). Another study of Laffont and Triole (1994) identifies the deviations of the access prices in practice from the access prices to a network at marginal cost. The variations depend on some constraints and instruments, such as the provision of the fixed costs, the asymmetric information of the costs, the national taxation and the effectiveness of policy used to calculate the costs. To be more efficient, the ITU has set some principles for the pricing structures in which the interconnection charges should be based on costs, be sufficiently unbundled upon requests from other firms, be disaggregated between the costs of lines in rural and urban areas, not include hidden cross-subsidies which establish different access charges among network operators, and reflect underlying costs which include both fixed and variable costs while the variable costs can be more

flexible to different costs during peak and off-peak hours (Hank, 2000). The pricing structure to distinguish between peak and off-peak charges may also bring out some advantages in relation to the reduction of peak-hour congestion and the reduction of building new infrastructure to meet peak traffic loads. At the same time, it may enhance the growth of overall network utilization and the service quality.

In a competitive market, individual suppliers have limited market power and they cannot dictate the market but they respond to the arrival of their new competitive entries (Hank, 2000). Principally, products and their prices are set by the market. However, such perfectly competitive market is impossible to obtain in the real world since there are many deviations and undesired consequences from the providers' performances. Of course, effective competition is not possible in wholesale or retail markets. So, some dominant firms may change the prices of their services or products to maximize their profits, and this behavior may provoke some detriments to other competitors, customers and the national economy (Colin & Lara, 2011). Such a situation usually requires a justification of government intervention to improve the market competition and social welfare by avoiding market failure and misuse of market power. Additionally, many recent technologies have been introduced into the telecommunications market with sustainable changes in their costs and products. In response to these changes, the regulatory policies in the telecommunications industry have to change considerably (Martin, Sumit, & Vogelsang, 2006).

According to Colin and Lara (2011), price regulations are generally established in response to two types of pricing problems; the prices are set too high above the competitive levels, particularly during monopoly or misuse of market powers, and the prices are anti-competitive such as cross-subsidization, the price squeeze and predatory pricing. A cross-subsidization is the practice of increasing prices for one group of users or products to subsidize for lower prices of another group (Kenneth, 1981). Instead, a price squeeze refers to a pricing strategy used by a vertically integrated firm to squeeze the margin between a high wholesale price to rivals and a low output price to end users (Hovenkamp & Hovenkamp, 2009). By the way, predatory pricing is a strategy normally used by a dominant or well-established firm to eliminate competitors from the market by lowering the prices of some products or services below the costs, and by maintaining it until equally efficient competitors incur unsustainable losses and exit the market (Colin & Lara, 2011). The firm then secures its monopoly power and raises its prices to retrieve the past deficits. Though, this pricing strategy is risky for existing firms with high up-front losses and creates more barriers for new entry as incumbents are able to lower their market prices below the profit-maximizing levels at which new entrants have no prospect of making profits.

Based on Hank, 2000; Colin & Lara, 2011, a good price regulation will possibly lead to an efficient competition with respect to three conjoint objectives. Firstly, the financing objective ensures that the regulated operators possibly earn sufficient revenues. Then, the efficiency objective aims to achieve the economic efficiency and minimize regulatory cost, while the equity objective prevents the exercise of market power and ensures that the prices of telecommunications services are fairly set and that consumers receive a high service quality (Hank, 2000; Colin & Lara, 2011). Moreover, the pricing regulation can be used as a regulatory mechanism to give some incentives for improving the production efficiency and for encouraging cellular operators to meet regulatory targets. In practice, these objectives are always in controversy and it requires making trade-off between them. The regulatory approaches of price shall induce the regulated operators to obtain the most desirable social welfare (Hank, 2000).

Regardless of the development in the market competition and its well functions, it remains doubtful whether consumers are able to benefit from the competition caused by a particular type of the market failure which strongly correlates with network externalities and information perfection. In many developed countries, market competition has grown significantly and then consumers have more choices of providers and services. This is resulted from the implementation of effective regulations on privatization and competition laws. However, customers may not be able to get advantages from the law implementation (Patrick, 2008). For instance, some OECD members have introduced the MNP in order to facilitate the way customers demonstrate competence and choose between various suppliers. Nonetheless, the consumers cannot use their ability or power to make well-informed choices between competing suppliers (Patrick & Dimitri, 2008). Patrick (2008) also raises an argument that consumers sometimes cannot understand or cannot use the full information to their advantage.

It is, therefore, a broad manifestation of the purpose of competition policies to promote consumer protection. It is considered as essential components for the economic and social rationale. Such attention to demand-side has become questions whether the modification of regulatory policies has significant impacts on the consumers making decisions in their best interests. Hence, considerable effort has been also put into the empirical studies of the efficient and effective pricing policy which is all about the changes in consumer behavior (EC, 2014). To that end, understanding consumer behavior can underscore the enormous and comprehensive importance for policy decisions. Recently, both theoretical and empirical studies have generated a diverse picture of consumer behavior and bring various thoughts about the consequences of the insights into consumer behavior for the corporate strategies, the competitive dynamics, the challenges and the recommendations for competition policy as well as the consumer protection and innovation policy (Haucap, 2015).

Many empirical studies on consumer behaviors have been also conducted in developing nations and the insights have been interpreted and applied in various ways. For example, in the context of Thailand, the subscribers of larger mobile carriers had confronted higher switching costs than those of smaller ones and the MNP had been expected to cut back the switching costs before the implementation of MNP policy. These arguments are resulted from a binary logit model and individual survey data from the National Telecommunications Commission 2009 to estimate the consumer switching behavior in Thai cellular market (Pratompong, Mohammad, & Erik, 2011). However, after introduced in to the Thai market, the MNP is found to have statistically negative impacts on the consumer switching behavior but it is impacted by an expected reduction in monthly bills (Satitsamitpong & Mitomo, 2010). Similar to the approach used by Pratompong, Mohammad and Erik (2011), the later study applied the stated preference method for data collection and employed the mixed logit model. Despite different findings, authors of these studies apply insights of these findings for regulatory policies on the grounds of improving price and service quality for smaller carriers to compete against the larger ones with the efficient use of MNP.

### **3. Landscape of Telecommunications Regulations among the ASEAN Countries**

The early stage of government intervention is to privatize national suppliers from the time when there had been growing dissatisfaction with performance of the state-owned enterprise, the over-tightening national budgets and the explosion of investments. To some extent, liberalizing one market is one of main driving forces for the enhancement of the economic and social development, such as a case of the ASEAN. In essence, Mark and Meheroo (1991), who reviewed the development of telecommunications policies and markets in five ASEAN countries – namely Indonesia, Malaysia, the Philippines and Thailand – claimed that the needs of the liberalization and policies were confronting each nation to response to the high capitalization costs of telecommunications systems and the pressures to build higher-capacity and better-quality infrastructures for a strongly regional linkage. In particular, Malaysia and the Philippines have privatized the telecommunications industry with a full competition while Indonesia started to partially privatize the sector with phase-in competition. On the other hand, Thailand granted licenses to private participation without privatization or without introducing competition. The national operators in Thailand granted either franchises or concessions to private firms in order to build and/or operate some specific facilities and services before the full ownership is transferred to the state-owned company (William H. M., 1997).

However, the privatization of telecommunications industries in Indonesia, Thailand and Malaysia has met some public demonstrations against the foreign investors buying shares of the state-own



telecoms company because some issues were believed to arise after the telecoms industry was taken over by any foreign company. These concerns generally include the increases in the national security, an atavistic hangover from a pre-global national economy age and cultural barriers (John U. , 2008). In Indonesia, the protests against foreign investors buying telecoms companies happened while the partial privatization of the PT Telkom was subject to the competition after the expiration of a 15-year exclusivity on local service and a 10-year monopoly on long distance (William H. M., 1997). By the same token, an opposition was held by the labor union in Thailand in 1992 against the privatization of two state-owned enterprises, Telephone Organization of Thailand (TOT) and (Communications Authority of Thailand (CAT), owing to the political interests. Also, in 2006 there were street protests against the sales of Shin Telecom's assets to Singapore's state investment arm Temasek.

As a result of the public protests and their concerns, it took some further years to privatize the telecommunications sector after the promulgation of privatization guidelines under related laws, regulatory principles and practices. Indeed, the Malaysia's telecoms industry was partially privatized in 1990 with five-year retard while Indonesia spent four years to implement the telecommunications law 1989 on the privatization by firstly granting licenses to new private entrants to offer value-added services in 1993 (John U. , 2008). Singapore, by the way, went through many stages to end the monopoly power of SingTel in 1997. Though the liberalization of telecoms sector in Singapore started in 1989 by lifting the restrictions of the sales of telecoms consumer goods, the government had to re-decide on SingTel's monopoly services over the basic service as it was corporatized and granted a 15-year extension to its monopoly for the international and domestic services and a five-year license to provide the mobile phone and paging services in 1992. As one of the poorest countries, the Lao's national assembly adopted a new telecoms act in April 2001, as a way for the competition and liberalization. At the same time, Myanmar is still retaining a highly restrictive state-leading monopoly.

During the second wave of liberalization, the government usually grants various licenses to new private providers into markets and the regulatory reform was applied for addressing two common issues: the market failure which is associated with high levels of monopolization, and the social objectives of the nation. Members of the ASEAN community have also implemented different licensing policies for the needs and requirements under different jurisdictions. A high income country, such as Singapore where the state was a major stakeholder in the incumbent, was more reluctant to grant many licenses to competitors and the licensing policy seemed to involve national strategic interests (John U. , 2008). Conversely, some poor countries, like Laos and Cambodia, have provided licenses to foreign investors with the intention of improving their overseas development aids and the international relations with

their neighboring countries. In Indonesia and the Philippines where their currencies are vulnerably devaluated and where large national debts to services, the licenses have been strictly granted to resolve the financial debts by avoiding some unnecessary duplications of certain facilities of multiple networks and to reduce a highly imported network facilities (John U. , 2008). The licensing process has been simplified to increase incentives for new foreign investments, while it remains costly, time consuming and open to abuse in the Philippines and Myanmar.

Although the governments of different nations have tried to grant many licenses to resolve their political, social and economic problems, it requires an efficient allocation of the scarce resources, such as licensing, radio spectrums and numbering. Some countries, especially in the context of emerging and transitional economies, typically granted licenses by means of a competitive licensing process (Hank, 2000). At the same time, the General Agreement on Trade in Services (GATS) and the 1997 TWO Agreement on Basic Telecommunications (ABT) also released some regulatory and licensing rules towards open competitive markets and transparent licensing processes for signatories of the WTO and its members. This regulatory paper indicates the procedures of the efficient allocation and the use of scarce resources in an objective, timely, transparent and non-discriminatory manner (Hank, 2000). Notably, in Singapore, a market-based approach via auction was introduced for allocating 2G, Local Multiple Distribution Services (LMDS) and 3G. Malaysia has also used a combination of beauty contest and spectrum auction to grant two 3G licenses in 2004 and two additional licenses in 2006.

In Indonesia, the first winner at the auction under the beauty contest conditions was Telkomsel in 2006 since the Telecoms Act in 1999. In Thailand, the unused part of the spectrums was put up for auction after the abortion of launching 3G service in 2007. Nevertheless, the unused licenses in Cambodia are impossible to be modified or withdrawn due to the lack of regulation on an inefficient use of spectrums (Im, 2015b). Moreover, the licensing process is typically non-transparent in Cambodia and Laos where contracts and licenses are granted for long period at 35 years (John U. , 2008). Despite many foreign partners, the details of licensing policies are not yet promulgated in Laos and Vietnam, especially Cambodia where the license documents are confidential.

As a matter of fact, some ASEAN countries have issued another type of licenses to unbundle the network facilities of the incumbents or to establish virtual cellular operators. When Singapore provided licenses to services-based operators to lease the telecoms access from the facilities-based operators, Malaysia also encouraged mobile virtual network operators (MVNO) and its first Wimax licenses were granted in 2006 to four small enterprises as network-sharing partners (John U. , 2008). Fundamentally,

unbundling networks or services requires the arbitration on some common issues including the extent of unbundling; the opportunities for new entrants to combine network elements in order to create platforms for their services, the achieving parity of operations support systems and services, the costing methods and the pricing strategies (William H. M., 1997). In contrast, the incumbents have no incentive to open their networks to competitors. Many disputes over the appropriate charges of leasing networks usually occur. Actually, the network unbundling in Malaysia may lead to some conflicts between the incumbents and the regulator, or between the regulator and the government when the state was a major stakeholder of the incumbent operator (John U. , 2008). Also, Malaysia had phased out unbundling with a sunset clause before it has been re-introduced. Recently, an ongoing tension between the Malaysian Commission for Multimedia Communications and the ministry is continuing as a vague separation of policy making and regulation.

In particular, it possibly unbundle the provision of infrastructure and services under new technical innovations and this method is used as one of potential resolutions to reduce the interconnections issues. A consistency pattern to acknowledge the privatization in the telecommunications industry is network interconnection, a key to identifying the limits of telecoms services. Mobile operators have to comply with the interconnection policies on the grounds of the efficient, transparent, and non-discrimination manner, as clearly mentioned in the General Framework for Interconnection and Access (GFIA) in Malaysia, Reference Interconnection Offer in Vietnam, and Telecoms Act 1999 of Indonesia (John U. , 2008). Malaysia and the Philippines used to suffer from the network interconnection problems during the transition of privatizing their telecommunications industries with a full competition in which there was no clearly defined interconnection rules to assist the carriers to come to the interconnection agreement. In the Philippines, the lack of clear regulations on the network interconnections had restricted the telecommunications industry to competition before the policy guidelines for the interconnection issues were revised under the Ramos administration from 1993 to 1998. However, the fact that Cambodia has issued some ministerial orders or notifications is unable to resolve the interconnection problems under poor jurisdictional framework or lack of formal regulation and law.

In addition to the interconnection rules, Malaysia and Vietnam encourage bi-lateral negotiations between operators while the regulators are subject to intervene in the agreement when it cannot be reached. For example, some competitors in Vietnam, such as Viettel, had great difficulties in getting the network interconnections with Vietnam Posts and Telecommunications Corporation (VNPT) due to the request of different interconnection charges from the VNPT. The regulator had declined to get involved in the agreement until there was an official letter in which the Vietnamese prime minister

accused VNPT of limiting calls from Viettel customers and then he ordered the VNPT to comply with the 2002 Ordinance (John U. , 2008). In the context of Malaysia, without the underlying costs and tariffs in interconnection rules, the first commercial agreement in 1990 between Celcom and Telekom Malaysia made operators with smaller networks or without international gateway, like Mobikom, to receive a worse rate (John U. , 2008). This interconnection dispute was even more complicated in a state-owned monopoly or a state without proper regulations. The mutual agreement between cellular operators was hard to reach and the government intervention could not resolve the problem transparently. Another way to resolve rising problems of the network interconnection and unbundling to end its monopoly was that the Indonesian government compensated Rp 478 million to TelKom.

Lying at the heart of market liberalization and competition, the pricing strategies or tariffs become a common issue among mobile telecommunications operators for designing policies under the intense competition. As it happened in Singapore, SingTel tried to rebalance the tariffs in 2002 after its international wholesale revenues decreased from 40% to 15% of the total revenue between 1997 and 2001, but the attempt has been rejected by the Information and Development Authority on the ground that there was a miscalculation of some various costs and revenue items which were not directly related to the local telephone services. The regulatory philosophy of the pricing standards referred to a cost-based concept. Particularly, Indonesia, Thailand and Vietnam have applied this method for the interconnection charges with the top-down data, while Malaysia used the retail-minus market costs or the revenue sharing (John U. , 2008). The cost-oriented price in Vietnam is preferably used for the incumbent by using their historical costs rather than forward-looking costs, while the latter model is currently used by Singapore. By the way, the fixed network services are principally charged by the long-run-incremental-cost method and consequently they become ceiling prices for the network interconnections which have been adopted in Malaysia and Indonesia since 1999.

On one hand, the regulator plays a critical role in pulling the prices down when service operators are trying to increase the tariffs higher than the ceiling prices. On the other hand, the regulator has to ensure that none of suppliers is using the predatory pricing, even though the pricing downwards the competitive pressures are increasing. However, the government's efforts to rebalance the tariffs might be failed following some typically political instability and protests, such as the cases in Indonesia in 1999. Again, the attempts to raise the prices of local services in 2002 failed due to the government's retreat on utility price hikes.

#### **4. Analysis on Challenges in Cambodia's Telecommunications Market**

The review of some theoretical and empirical studies on the development of market competition in the telecommunications industry shows that Cambodia has implemented the privatization with a full competition or deregulation. Like Malaysia and the Philippines, Cambodia allows many competing carriers to offer cellular services by removing all restrictions on the entry into all segments of the markets. As a consequence, these countries have experienced the expansion of network infrastructures and the decrease in price substantially. However, this privatization approach has caused some common issues in the telecommunications industry and the market competition even becomes very inefficient due to the lack of constraints on the privatized dominant carrier and the lack of some essential regulations. Most issues are resulted from the way in which the dominant firms exercise their market powers including the interconnection issues and the pricing strategies. In another instance, the effective competition in the Philippines was delayed by the strength of the dominant carrier on a completely integrated national network, although the country had over 50 telephone suppliers in the 1990s (John U. , 2008). Finally, Malaysia and the Philippines had considered the policymaking/regulatory roles and regulations to address such issues.

In the same manner, Cambodia has faced many challenges which possibly lead to a failure of its telecoms market due to the deficiency of regulatory policies and then these problems are known as a constant stream of the business disputes and the accusation of the unfair business practices between mobile carriers such as the price dumping and the access pricing. Nevertheless, the MPTC and TRC has no legal authority to settle the disputes (Im, 2019). Moreover, the TRC added other issues related a misallocation of the scarce resources, the unfair competition, the interconnection issues, the sustainable development and the business dispute resolutions between the service providers (Im, 2015b). The challenges are the consequences of excessive competition within an overcrowded market where seven to nine mobile cellular operators had been granted licenses to offer mobile cellular services under an unclear picture of licensing policy and procedure in Cambodia. The problems become even more severe when the alternative suppliers are unfairly competing in the telecommunications market by misusing their market powers in terms of price setting and interconnections while some suppliers have enlarged their market powers through an unclear condition of the merger and acquisition. Regardless of the inter-ministerial circulars, the proclamations and the orders issued by the royal government, these directions have been halted as a result of public demonstrations. Hence, the challenges remain unresolved and the operators still adopt the regime of the predatory pricing and the interconnection blocks.

The intense competition may cause various types of risks for the consumers and suppliers as well as the national economy. Although many alternative carriers are available to offer telecoms services in the market, some entrants and consumers have suffered from this inefficient market on the grounds that most of the scarce resources, such as numbering, are controlled by the dominant firms and the grounds that these dominant firms are unfairly competing against others through the block of network interconnections and the predatory pricing. The exits of some mobile carriers, including Applifone, Mfone and Beeline, had affected on the loss benefits of their users who were forced to move to the remaining firms. Moreover, the unfair competition has increasing the consumer dissatisfaction of the service quality and the network service coverage, and majority of them have faced both difficulties of both on-net and off-net calls (Vong, Lee, & Zo, 2012). As a consequence, many Cambodian people simultaneously register mobile services at different mobile carriers to reduce the off-net congestion. These issues lead to an inefficient adoption of the basic telecommunications services and value-added services in Cambodia's market.

Therefore, this paper aims to solve the problems by firstly improving the efficiency in adopting the basic service and new innovation and the efficient supply of all carriers to reflect to the needs of current market. This paper also improves efficiency of the market competition with the enhancement of consumer power and protection. As a final point, this study discusses on the establishment of appropriate and effective regulations to bring the best interest to all players with a sustainable development of the telecommunications industry. Designing appropriate and effective regulations is not simply a technical matter of obtaining efficiency objectives. It is also to achieve social welfare goals and sustainable development as well as to promote poverty reduction in developing countries. As well, though the government and regulator are playing a critical role in establish regulatory policies, it requires involvement from other parties, such as the public. Because the government efforts failed to resolve some issues in business performance including interconnection block and pricing predatory, the ADB technical assistance also suggests that the draft laws should be discussed with the public before passing the national assembly.

## **5. Related Literature**

In the light of market failure, it is important to consider whether the problems are likely to correct themselves. If not, regulator is also required to consider other market forces with the likes of unbundling local loop, price controls, access pricing, and so forth (John U. , 2008). As an example of a policy of reducing entry barriers for new suppliers and reducing sunk costs and production costs, SBC is introduced to be more efficient in order to improve operational competitiveness, service quality, and

performance. Consumer surplus. (Seo, Lee, & Kim, 2008). Other authors also support the ideas of unbundling which possibly reduce asymmetric information of interconnection between operators' networks and imperfect information of demands and markets (FCC, 1999; Cave, Majumdar & Vogelsang, 2002; Bourreau & Dogan, 2004). However, interconnection and unbundling encompass not only technical design, but also terms and access pricing. As well, they create switching costs which consequently determines equilibrium strategies such as pricing scheme, marketing devices and investment plans (Farrell & Klemperer, 2007). By using a four-period complete model of a market, switching costs which new entry faces in the second period, possibly cause price war in equilibrium (Klemperer, 1989). Solving the inefficiency of rate-of-return regulation, the rate of productivity improvement in price-caps has been developed along with economies of scale and scope, allocative efficiency, and technical advancement.

Regardless of development in competition and well-functioning markets, it remains doubtful whether consumers have benefited from the competition due to market failure which strongly correlates with network externalities and information perfection. In many developed countries, market competition is growing and consumers have more choices of service providers after implementing effective regulations on the privatization and liberalization of supplies. Strengthening alternative suppliers competing in the exclusive market and successful introduction of competitive policies. Nevertheless, customers may not be able to benefit from the competition (Patrick, 2008). For example, OECD members focus on well-functioning markets by introducing MNPs in order to facilitate the way consumers demonstrate capacity and choose between competing suppliers. MNP is believed to increase consumer empowerment and encourage companies to innovate, improve quality and compete on price. Yet, customers may not use their ability to make informed choices between competing suppliers (Patrick & Dimitri, 2008). Patrick (2008) also raises an argument that despite full information, consumers sometimes cannot understand or cannot use the information to their advantage.

Following developed countries, more empirical research in some developing countries has been also conducted on the effect of the MNP on consumer switching behavior (Shin & Kim, 2008; Yadav & Dabhade, 2013; Simon, Benjamin, & Anthony, 2014), reduction of switching costs (Kitano & Ohashi, 2011), factors influencing the MNP adoption (Kuramesh & Praveena, 2012; Winfred, Ansong, Dominic, & Abandoh-Sam, 2012; Kagwathi, Kamau, Njau, & Kagiira, 2013) and consumer benefits gained from efficient MNP administration (Singer, 2014). Among the ASEAN countries, Singapore, Malaysia and Thailand have already introduced MNP. In the context of Thailand before the implementation of the MNP policy, subscribers of larger mobile carriers confront higher switching costs than those of smaller

ones and the MNP is expected to cut back the switching costs of smaller mobile operators rather than of larger operators (Pratompong, Mohammad, & Erik, 2011). With the MNP, consumer switching behavior is significantly impacted by an expected reduction in monthly bills while it is negatively affected by the MNP (Satitsamitpong & Mitomo, 2010). However, these authors have applied the insights of these findings for regulatory policies on the grounds of improving price and service quality for smaller carriers to compete against the larger ones. Accordingly, ex-post regulation and competition policy are considered as trends for future development of the telecommunications sector as they drive new emerging technologies, some of which possibly reduce production costs, increase efficiency, improve quality of services, and the like (John U. , 2008).

Both theoretical and empirical studies have recently generated a diverse picture of consumer behavior which brings various thoughts about the consequences of insights into consumer behavior for corporate strategies, competitive dynamics, challenges and recommendations for regulatory and competition policy as well as consumer protection and innovation policy (Haucap, 2015). Many researchers increase their interest in studying consumer behavior to find out factors or choices affecting adoption of services and products in telecoms industry such as mobile basic services (Rahman, Haque, & Ahmad, 2011; Ruchita & Karuna, 2015), the mobile number portability (Winfred, Ansong, Dominic, & Abandoh-Sam, 2012; Kagwathi, Kamau, Njau, & Kagiira, 2013; Yadav & Dabhade, 2013; Simon, Benjamin, & Anthony, 2014; Singer, 2014; Kaur & Sambyal, 2016), mobile phones or handsets (Sirajul & Grönlund, 2011; Mesay, 2013; William L. , 2016), internet or broadband services (Lee, Cheung, & Chen, 2005; (Suda & Vajirasak, 2013), E-commerce or banking (Xiao & Kwok, 2003; Joey, 2004; Pedersen, 2005; Taweerat, Settapong, Navneet, & Jesada, 2014), and so forth. There are also increasing empirical studies on the extent to which markets well function through switching behavior (Satitsamitpong & Mitomo, 2010; Pratompong, Mohammad, & Erik, 2011; Kuramesh & Praveena, 2012; Ning & Feng, 2014), switching costs (Patrick & Dimitri, 2008), consumer satisfaction (Oliver, 1981; Rusbult, Martz, & Agnew, 1998; Kim, Park, & Jeon, 2004; Turel & Serenko, 2006; Leelakulthanit & Hongcharu, 2011), and consumer complaints (Garín-Muñoz, Pérez-Amaral, Gijón, & López, 2015).

Considerable effort has been put into empirical studies of the efficient and effective pricing policy which is all about change in consumer behavior (EC, 2014). To that end, understanding customer behavior emphasizes the importance and scope for policy decisions. The paper aims to investigate the market performance and development in Cambodia during the absence of the overarching framework and telecoms law. This is devoted to the efficiency and fairness in supplying telecoms services.



Efficiency in this paper is narrowed down to the diffusion and motivational factors affecting the consumers' adoption behavior, while fairness is expressed by a well-functioning market on the grounds of consumer switching behavior and their satisfaction. As Cambodia's telecoms law is still lacking more specific regulatory policies, this paper is also keen to examine the tradeoffs of regulatory policies in nonmonetary unit, the state preference method is used to ask individuals about their preferences as choice tradeoffs. Based on the research methodologies used in some previous studies, a consumer-oriented approach, incorporating with the consumer perspectives, would be a tool for a systematic and periodic process to assess the performance of suppliers and existing regulatory policies for certain pre-established criteria or regulatory objectives. Though previous studies have applied a variety of research analytical models, the consumer-oriented approach differs in concentrating on the mixture of both adoption theory and choice model.

Based on the research methodologies used in some previous studies, a consumer-oriented approach, incorporating with the consumer perspectives, would be a tool for a systematic and periodic process to assess the performance of cellular suppliers and existing regulatory policies for certain pre-established criteria or regulatory objectives. Even though previous studies have applied a variety of research analytical models, the consumer-oriented approach differs in concentrating on the mixture of both adoption theory and choice model. Consumers in Cambodia's mobile telecoms market are randomly selected in order to express their points of view on mobile telecommunications service and the tradeoffs in regulatory policies with several dimensions as presented in table-6. Then, the research problems and their related questions are distinguished according to the background of each case which will be explained in following corresponding chapters. Taking into consideration, scope of research questions, various research models, analytical methods, and sampling population are applied to form the significance of this study.

Table-6: Summary of Research Scheme

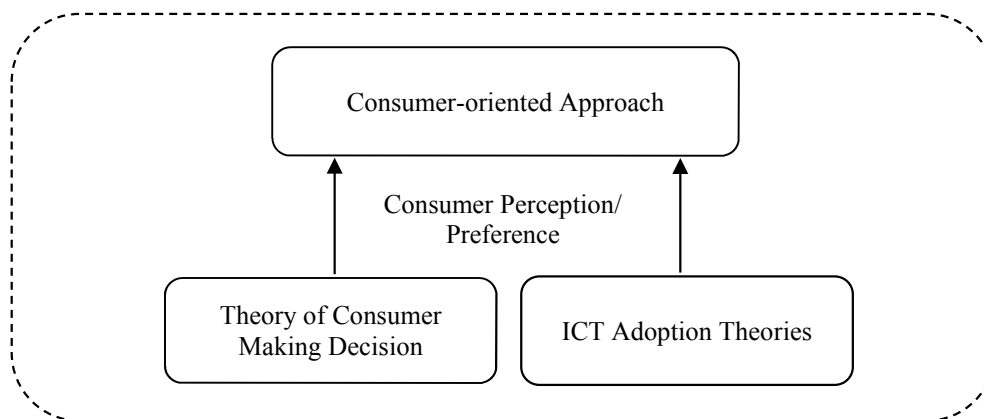
<b>Mobile Telecoms Industry</b>	<b>Measures and Findings</b>	<b>Objectives</b>
<b>Case 1: Basic Services</b> - Consumer adoption behavior	- Adoption factors - Consumer demands	- Increases the efficiency in adopting mobile telecommunications services
<b>Case 2: Market Conditions</b> - Consumer switching behavior	- Satisfaction factors - Switching barriers	- Improves market competition and exertion of customers' ability and power
<b>Case 3: Regulatory Policy</b> - Cost-benefit of regulatory policies	- Consumer preference	- Ensures a set of appropriately well-designed and effective regulations

Source: Made by Author

## 6. Research Methodology

This part of the paper drafts the research approach, analytical methods and data collection applied in this study. Because the scope of this paper focuses on three different case studies, they are conducted with different theoretical approaches and different analytical tools. Then, their related statistical techniques will be briefly explained to analyze the collected data. The theoretical approaches are used to be research frameworks and backgrounds in each case. Additionally, the proposed research approach is the integration of ICT adoption theories and theory of consumer decision making. This approach intends to measure consumer perception on mobile telecommunications services and its related regulatory policies, from the mixture of theories, each of which has been selected in accordance to the specifications and objectives of each case. More specific explanations are given in the respective cases.

Figure-17: Consumer-Oriented Approach



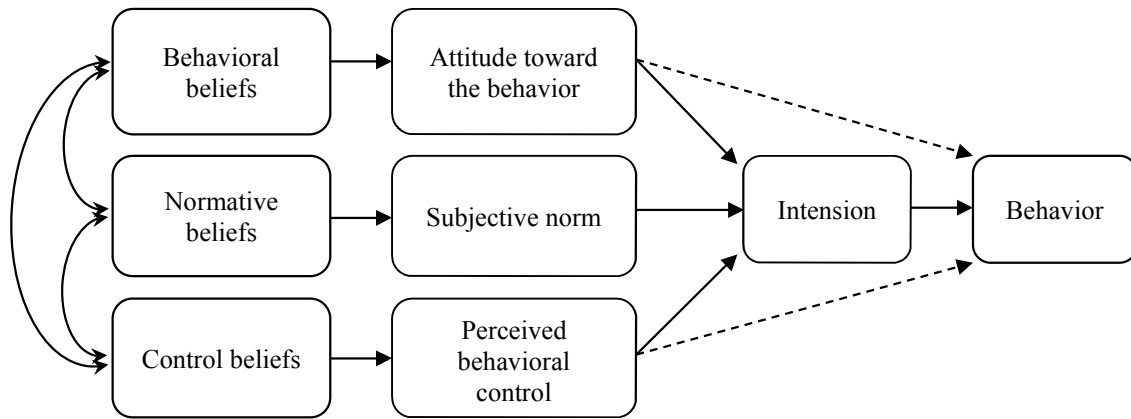
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### 6.1. Theoretical Approach

#### 6.1.1. Theory of Planned Behavior (used in case study of chapter III)

Theory of Planned Behavior (TPB) was initiated by Ajzen (1985) to deal with individual behaviors over which people had incomplete volitional control. The individual intention has been added as a central factor of the theory before performing a given behavior to capture all motivational factors that influence an actual behavior. TPB explains that the intentions indicates how hard people are willing to try, how much of an effort they plan to exert, and then the performance will mostly be taken place under the volitional control. TPB is composed of personal evaluation of a behavior (attitude), socially conducted mode of conduct (subjective norm), and self-efficacy with respect to the behavior (perceived behavioral control).

Figure-18: Theory of Planned Behavior (Ajzen I. , 1985)



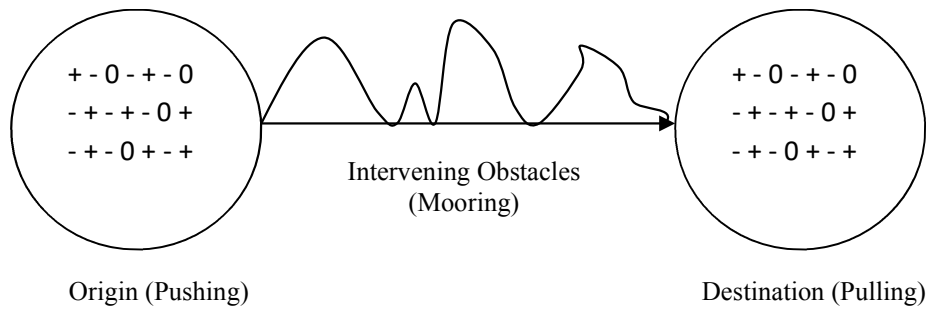
Source: Made by Author

The basic assumptions of TPB are the fact that human beings are rational and make systematic use of information available to them, and that they consider the implications of their actions in the sense that it takes into account the like consequences of the considered behavior before they decide to engage or not engage in certain behaviors. Because of the strengths in predicting individual behavior under non-volitional behavior, the TPB is applied for the research purposes of studying the factors affecting on adoption behavior in mobile telecommunications service in Cambodia, which exits in the chapter III of this paper.

### 6.1.2. Migration Theory (used in case study of chapter IV)

The Push-Pull-Mooring model (PPM) of migration theory is an alternative model to explore both significant direct and indirect effects on switching intention from all variables (Bansal, Taylor, & James, 2005). Migration is result from three crucial factors; pushing at the origin, pulling at the destination, mooring between the origin and destination (Lee S. E., 1966). Negative influences learnt at origin push people to move out and they include satisfaction, perceived service quality, perceived value, trust, commitment, and price perception (Nimako & Ntim, 2013). At the destination point, pulling factor is similar to pushing and it is one of positive factors to attract people. Attractive alternatives affectively cause people to move away to another destination. The mooring factor refers to situational constraints influenced from both personal and social factors and which includes subjective norms, attitudes toward switching, past behavior and variety-seeking tendencies (Nimako & Ntim, 2013). According to (Bansal, Taylor, & James, 2005), customers are pushed by quality, satisfaction, low value, trust, commitment, or price perception, pulled by alternative attractiveness, and moored by attitude towards switching, subjective norm, switching costs, infrequent switching behavior, and variety seeking.

Figure-19: Push-Pull-Mooring Model (Lee S. E., 1966)



Source: Made by Author

Some researchers have used the PPM in order to study the consumers' switching behavior in service market. It is an alternative model to explore both significant direct and indirect effects on switching intention from all variables (Bansal, Taylor, & James, 2005). Zhang, Cheung and Lee (2012) also apply PPM in their study on online service switching behavior. Later on, Chang, Liu and Chen (2013) find out that the virtual migration behavior of social network sites are significantly pushed by regret and dissatisfaction, pulled by alternative attractiveness, and blocked by sunk costs, setup costs and continuity costs through the migration theory. Therefore, the chapter IV applies this migration theory to study the consumer switching behavior in mobile telecommunications service in Cambodia, by combining all above factors from previous papers and categorize them into four; switching barriers (mooring), satisfaction (pushing), alternative attractiveness (pulling) and MNP.

### 6.1.3. Theory of Consumer Decision Making (used in chapter V)

This is about the standard economic model of rational choice in decision-making while this rational choice model is considered an optimization-based approach, represented by one of maximizing a real-valued utility function. This utility approach is not directly observable it can be estimated from observed choice. It has been defined as the individuals' judgments or impressions or evaluations of any product or service. According to Jonathan & Paul (2004), as the idea of utility maximization relates to human choice behavior, it brings some special characteristics in the economic analysis; (1) the government policy making and welfare criteria derived from choice data in the workable practice, (2) the qualitative predictions about the environmental changes, (3) a wide scope of personal, household, business, project, regulatory policies, and the like, and (4) the empirical predictions from a relatively sparse model of the choice problem.

The strengths of this method can force respondents to consider tradeoffs between attributes and to make the frame for reference explicit to respondents. It also estimates the price of attributes, welfare impacts, and level of customer demand for alternative products or services in non-monetary terms (Ross, 2001). The application of the model is depending on the assumptions, theoretical foundations, and scientific methods used in modeling, data collection and analysis. Consumer preference can be elicited by using either revealed or stated data. Revealed preference method is for an observation of an action that has already taken place while stated preference approach is to observe the measures what individuals say they would do in a given context. In other words, modeling the preference from observations of individuals' choices which is in form of actual choices made by consumers in a market setting (so called revealed preference, RP) or which may be elicited from survey responses to hypothetical but realistic choice scenarios (referring to stated preference method, SP).

### **Stated Preference Method (used in case study of chapter V)**

Stated preference method refers to a set of techniques used to measure the preference and to estimate a utility function from individual responses to any survey of a set of alternatives or options (Kroes & Sheldon, 1988). Some various reasons why the SP method is more preferred to an analysis preference that are revealed in actual choices. According to Louviere, Hensher, and Swait (2000), these compelling reasons include the estimation of demand for new products with new features or attributes, the explanation of variables with little variability in market place, the explanation of variables with highly collinear in market place, the introduction of new variables and choices, and the time and budget constraint of data collection. Similarly, Kroes and Sheldon (1988) focus on the easy control, application, and flexibility of the SP method.

This method is originally adopted Thurstone (1931) to examine the indifference curve from the experimentation of each option between the combination of jacket, hat and shoes. It has become wider and wider in transportation field and others since 1970s; Hoinville (1971) measures the respondents' concepts of the trade-off preference for electronic devices, Lerman and Louviere (1978) study the utility expression in travel demand models, Hensher and Stopher (1979) study the behavioral travel choices, Kocur, Adler, Hyman and Aunet (1982) forecast the travel demand with the direct utility assessment, Kroes and Sheldon (1988) introduce the SP method in the field of transportation with the supplement of revealed preference method, Wardman (1988) compares reveal preference and stated preference models in travel behavior, Beaton, Meghdir, and Carragher (1992) evaluate the effectiveness of

transportation measurements for travel, and Hensher (1994) studies travel behavior by determining behavioral responses to situations.

Moreover, it is broader in other various fields such as marketing, economics and environment. The SP approach has been used to observe consumer preference in real markets for the new designs and strategies (Jordan & Harry, 1990). Bateman, et al. (2002) also study money values by using the SP technique to study a set of choices and their willingness to pay for particular benefits. Furthermore, Irágüen and Ortúzar (2004) use the SP to measure the consumer willingness to pay for the reduction of fatal accident risk in urban areas, and Stephane, Thomas and John (2007) estimate the choice behavior on airport and airline in the US. Consumer wishes and preference for acceptable product and attributes of drinking water were also analyzed by the SP method (Techneau, 2007).

This economic evaluation technique is not only for marketing research, but also policy decision-making tool. It is to describe the situations or contexts which respondents are supposed to face, by constructing the purposed-designed survey. This direct approach is to observe the consumer preference in a hypothetical situation where there is too much uncertainty in stating behavior in new situations. This suggests that thus far the SP approach has becomes widely adopted in various sectors, particularly to understand the behavioral responses of individuals to government's new policies or regulations, or to estimate demands or preference for new products in the business world.

## **6.2. Analytical Method**

### **6.2.1. Multiple Regression (used in chapter III and chapter IV)**

Regression analysis is a method to assess the relationship between observed variables which are called dependent variable (DV) and independent variables (IV). One dependent variable can be regressed from several independent instruments. This commonly used technique is practical in much of social science and business research. The regression is to predict the variances in an interval dependent based on linear combinations of interval, dichotomous or dummy independent variables which are scaled in ratio interval and are in term of normal distribution. The correlated prediction between DV and IVs are calculated as regression coefficients which are either unstandardized or standardized coefficients (Gaur & Gaur, 2009). The unstandardized coefficients of IVs are to predict the DV with the constant term, while the standardized ones are used in the standard deviations. The later coefficient is equal to the correlation between variables. However, in order to conduct multiple regression analysis, Nancy, Karen and George (2005) raise some essential assumptions.

Firstly, the sample is required to be representative of the population for the inference prediction. Then the error is assumed to be a random variable with a mean of zero conditional on the explanatory variables. The relationship between predictors is linearity, no error, and normal distribution. Moreover, it is required for non-existence of perfect correlation between any pair of independent variables, which causes multicollinearity. Multicollinearity occurs when there is a high inter-correlation between any pair of predictors which contain similar or the same information. The simple form of general linear regression is  $y_i = \sum_{j=1}^n \beta_j \cdot x_{i,j} + \varepsilon_i$ , where  $x_{i,j}$  is the  $i^{th}$  observation of the  $j^{th}$  independent variable and the first independent variable takes the value 1 for all  $i$ .  $y_i$  is the dependent variable to be observed from  $x_{i,j}$ , and  $\beta_j$  are the regression coefficients.  $\varepsilon_i$  is an error term, based on the measurement errors in  $y$  and errors in the specification of the relationship between  $y_i$  and  $x_{i,j}$ . The value of is assumed as following: (1)  $E(\varepsilon_i) = 0$  , (2)  $V(\varepsilon_i) = \sigma^2$  for all  $i$  , (3)  $\varepsilon_i$  and  $\varepsilon_i$  are independent for all  $i \neq j$  , (4)  $\varepsilon_i$  and  $x_j$  are independent for all  $i$  and  $j$ , (5)  $\varepsilon_i$  are normally distributed for all  $i$ .

### **6.2.2. Structured Equation Modeling (used in chapters III and IV)**

Structural equation modeling (SEM) is a statistical methodology used to predict relationships among variables (latent and observed variables). Latent variables, so called constructs or factors, are variables that are not directly observable or measured while the observed variables are a set of variables that are used to define or infer the latent variable or construct (Schumacker & Rechar, 2004). SEM becomes so popular among researcher and practitioners because of the complexity of hypothesis, multidimensional and highly interrelated relationships amongst numerous theoretical constructs. This model will allow users to test hypothesized relationships among several concepts. Analysis of Moment Structures (AMOS), which is commonly regarded as more user-friendly, will be used for performing SEM, by modifying the model graphically on a path diagram.

### **6.2.3. T-test Analysis (used in chapter III)**

T-test was firstly introduced in 1908 by William Sealy Gosset, a chemist working for the Guinness brewery in Dublin, Ireland<sup>9</sup>. A T-test is a statistical hypothesis analysis to determine if two sets of data are significantly different from each other in performing any specific task. This test is normally applied by following the normal distribution. It should be use in many real life problems when the population mean is known and the exact population standard deviation cannot be calculated (Gaur & Gaur, 2009). Moreover, t-test does not require a large size of sample to be tested. Three common types of t-test are

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<sup>9</sup> [http://en.wikipedia.org/wiki/Student%27s\\_t-test](http://en.wikipedia.org/wiki/Student%27s_t-test)

one-sample t-test, independent sample t-test, and paired (or dependent) samples t-test. One sample t-test is to compare the mean of a single sample with the population mean, and independent sample t-test is used for the comparison of two independent groups of population by using a random sample from each, while the paired sample t-test refers to the test of the difference between means from the observations of the same sample at two different times. In this study, independent sample t-test is used to study the significant difference in adoption behavior in mobile telecommunications industry, and these two samples are categorized by their ages.

#### **6.2.4. Conjoint Analytical Method (used in chapter V)**

The states preference method has been commonly applied under a wide variety of approaches, based on the answers to carefully worded survey questions. It can be either single general approach for the design of experimental procedure to generate options for appraisal by respondents, or a different approach of a number of responses. These responses are usually in the form of monetary amounts, choices rating, or ranking. Valuating the preference is to order the preference among goods and attributes, whether in term of raking or interval scale. Therefore, the characteristics of the SP nonmarket valuation methods are contingent valuation, attribute-based method and paired comparison. Contingent method is commonly used to evaluate a single good or attribute while the attribute-based method and paired comparison are used to predict the preference from several goods and attributes which are similar or different with their different levels of attributes, including monetary and nonmonetary terms (Thomas, 2003). However, this paper focuses only on attribute-based methods for analyzing consumer preference.

According to Kroes and Sheldon (1988), the single general approach includes conjoint analysis, functional measurement, and tradeoff analysis while the last approach refers to the transfer price method. Conjoint analysis is also called multi-attribute compositional model in which the statistical technique is used to examine developed surveys. It is assumed that the data are collected from multiple respondents in multiple data points of layered model, dependent variable shows the choices or tradeoffs, and that independent variables are categorical and coded. The analysis of these tradeoffs is traditionally administered as ranking or rating exercises. Also, it is commonly to present the tradeoffs as choices where participants are required to choose the most preferred alternative from selection of competing alternatives. At the same time, different econometric and statistical methods have been used to examine the utility function.

The conjoint analysis is the determination from the main effects analysis-of-variance model to decompose the judgment data into components based on qualitative attributes of alternatives (Kuhfeld,



2010). The conjoint analysis will produce the part-worth utility for each level of each attribute. Large part-worth utilities imply the most preferable, while the small value of part-worth utilities refer to the least preferred levels. So, the attributes with larger part-worth utilities become more important in predicting preference. The part-worth utility function takes form as  $y_i = \sum_{j=1}^k \alpha_j \cdot x_{i,j}$ , where  $y_i$  is the preference for the alternative  $i$ ,  $\alpha_j$  the function representing the part-worth of each of the  $L$  different levels of alternatives,  $x_{i,j}$  the level of the  $j^{\text{th}}$  attribute of the  $i^{\text{th}}$  alternative. This part-worth function defines different part-worth utility value for each of the  $j$  levels of a given attribute.

### **CHAPTER III:**

## **CONSUMER ADOPTION BEHAVIOR IN CAMBODIA'S MOBILE TELECOMMUNICATIONS MARKET**

### **1. Background of Consumer Adoption Behavior**

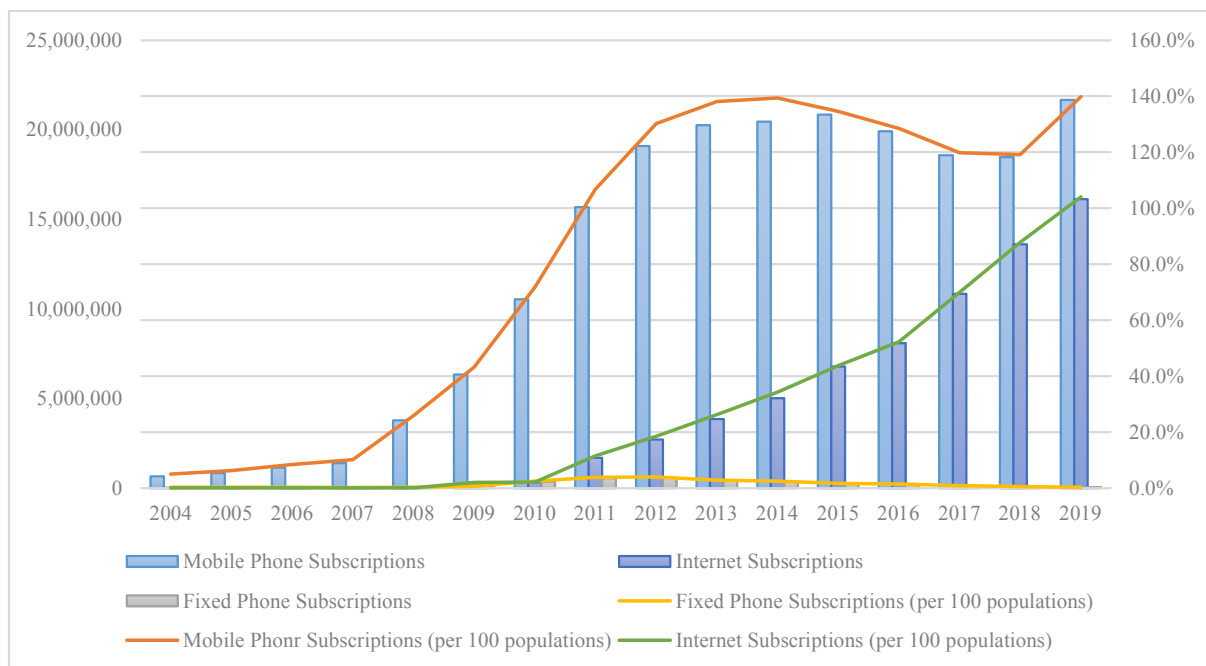
The Paris Peace Agreement in 1991 has brought significant development of Cambodia's telecoms industry after a mass destruction of infrastructures during genocide and civil wars in the 1970s (John T. , 2005). Although many licenses are granted to mobile telecom investors, the license agreement is a form of foreign direct investment law. In recent time, there were between seven and nine mobile operators, including those which are currently in operation and those which are not in the operation (Im, 2015a). By the middle of 2015, the total number of mobile registered simcards in Cambodia almost reached 21 million, compared to 19 million in 2012 and 10 million in 2010 (Im, 2019). The market continues to grow based on the following of the basic voice network expansion of 90% of total population and about 60% of the total territory of Cambodia.

However, there are still some differences in the development of mobile telecommunications among countries (ITU, 2006). There are many providers in Cambodia, but majority of users are satisfied. The market survey in 2010 shows that more than 56% of mobile users had difficulties during within-network communications and over 73% faced the same difficulties during across-network communications (Vong, Lee, & Zo, 2012). Hence, majority of the users possessed more than one simcard from different mobile operators. It is not uncommon to hold three mobile handsets in Cambodia and some handsets can be used with multiple simcards (Simon, 2012). Increasing number of entrants still cannot bring acceptable service quality and network coverage as well as innovative services to their customer satisfaction and the unique mobile penetration rate remains low at 52.2% regardless of high mobile penetration. This implies an inefficient control of license which allows mobile operators not to compete in quality and innovations, rather than increasing number of subscriptions.

Phone number has become popular as status symbols in Cambodia while the suppliers use them to lock their users. Some phone numbers which define users' fame and power have been purchased and used mostly by the high class people to show off their wealth and power. The so-called special or unique numbers are defined as a good Feng Shui (based on Chinese belief) or ordering number such as 012-345678, 012-333444 and 012-888168. The demand of these numbers inflates the prices and some

possibly cost higher than US\$1,000. As it is lack of the overarching framework and regulatory policies in Cambodia’s telecommunications sector, many licenses of different number segments have been provided at a very low fee, which allows each service provider to purchase many number segments and to make business with those numbers in inefficient ways (Moa, 2019). Based on the report of the telecommunications regulator of Cambodia, the number of the registered simcards of Metfone is about 26% of their total licensed numbers, compared to Smart Axiata at 50% and CamGSM at 23% (Moa, 2019). Inefficient control of scarce resources becomes an obstacle for the future expansion of the mobile network and further investments in the industry because those licenses cannot be modified or withdrawn.

Figure-20: Number of Subscribers in Cambodia



Source: Telecommunication Regulator of Cambodia (Im, 2019)

In addition, the new entrant, Metfone, had become the largest after three years in its operations, while many incumbent operators hold a small market shares and merged with other carriers, reported the MPTC. The imbalance between aging and market share may be due to the competitive advantage of each company to meet the needs and requirements of consumers. More interestingly, Metfone declared itself the largest supply of mobile networks to 98% of the population in 2012, while others occupied smaller networks. Besides, the major mobile operators have offered their customers the most competitive applications and promotions. In contrast, some incumbents who have brought innovative services into the market had gone bankrupt, such as Mfone and Star-Cell. Another viewpoint is that there becomes an inefficient supply of innovative services, in addition to basic services, to the

telecommunications market. In Cambodia, consumers may have a variety of choices to choose between alternative suppliers with their various types of services, products, and promotion.

This chapter aims to improve the efficiency in adopting basic services and new innovative services as well as licensing controls in terms of entry licenses and numbering plans in Cambodia's mobile telecommunications industry by examining the adoption and motivational factors driving to the subscription. Furthermore, it monitors whether the business operations and the activities of the mobile carriers in Cambodia reflects to the real adoption factors and consumers' requirements. Finally, this case study would like to apply the insights for regulatory policies for increasing efficiency of the adoption of the basic and additional services and improving customer satisfaction.

The following part will review related previous studies by starting from the general information about mobile telecommunications services and their impacts. It also gives a strong indication on the usage of theory of planned behavior in information and communications technology, on which the proposed research model is based. Next, it explains about the overall methodologies applied in this chapter, including proposed research specification, analytical procedure, and data collection. The results and findings of the empirical study will be explained in term of demographic of respondents, factor analysis, descriptive statistics, correlation analysis, validity and reliability test, multiple regression analysis, T-test analysis, and qualitative explanation. Then, it comes to the discussion on the real findings and their implications. The final part will make concrete conclusions and recommendations for suppliers and regulator.

## **2. Literature Review of Consumer Adoption Behavior**

In recent years, many studies have been conducted to measure the human behavioral intention on adopting new technologies by using different theoretical backgrounds and methodologies as well as time frames. In traditional economics, effective decision making requires comparison between additional costs of alternatives and additional benefits. Moreover, most choices may involve in doing a little more or a little less of something while few choices are "all or nothing" decisions. Choices are influenced by both internal and external influences (William L. W., 1994). Internal influences include consumer motivation, information processes, perceptions, learning, and attitudes while the external influences are more broadly caused by cultural influences, referring to economic, technological and political differences. Cultural factor refers to life-style, language and belief differences. Some other causes are talking about social and situational influences which are related to consumer network, power of recommendation, social integration (friends, colleagues, and other people) and folklore. Then,

William (1994) states some important elements affecting on the adoption behavior, namely situational influences (product depletion and failure, usage situation, and special case of gift giving), household influences (family's members), sale-person influences, and finally promotions or advertisements.

Various types of ICT innovations have been diffused with different influential factors from country to country, including economic and social characteristics, culture, users' knowledge and technological availabilities. Indeed, according to Ajzen and Fishbein (1975), the necessity of resources opportunities available to person are the musts, to some extent, dedicated the likelihood of consumer behavioral achievements. They also add two more essential factors – so called network availability and service quality which cause consumer values and consequently behavioral intention to subscribe to mobile telecommunications service. Similarly, Turel and Serenko (2006) support that technological availability was really important and must be included. Their argument is successfully proved by an empirical study on consumer satisfaction on mobile services in Canada while the findings also imply that younger generations or other early innovators might become the most users of additional services. In Skog's study (2002), the findings argue for additional availability of suitable and low-cost mobile handsets to be a key for the success of 3G services while mobile handsets are a symbolic capital.

Mobile phone has also played an important role in accessing market information on the selling price of some agricultural products. From a survey of 160 rice farmers carried out in 20 villages in four provinces to access the post-harvest technology interventions, Shimamoto, Yamada and Gummert (2015) have found that an increase in the selling price of rice is significantly impacted by access to market information through mobile phone use in rural areas of Cambodia. The respondents are household heads who has the average age of 49 years while 81.9% of them are contributed by male. Before selling their harvest rice, 82% of the respondents usually use mobile phones to access market information. Regarding to the ownership of mobile phone among Cambodian people, aged from 15 to 64 years old, urban areas have higher penetration rate rural areas at ratio 95.9% and 93.5% respectively (Phong & Solá, 2015). In aggregation, 81.5% uses one phone, some (12.2%) uses two phones while 0.9% has three phones.

Nevertheless, mobile technology adoption is probably affected by other significant driving forces including human and physical factors (Neil, 2004). The author has used the actor-network theory to study the process by which mobile telecommunications services had been adopted within different countries. These two factors consist of government policies and culture. Government policies are used to inhibit and encourage technology adoption, current physical infrastructures to facilitate rapid

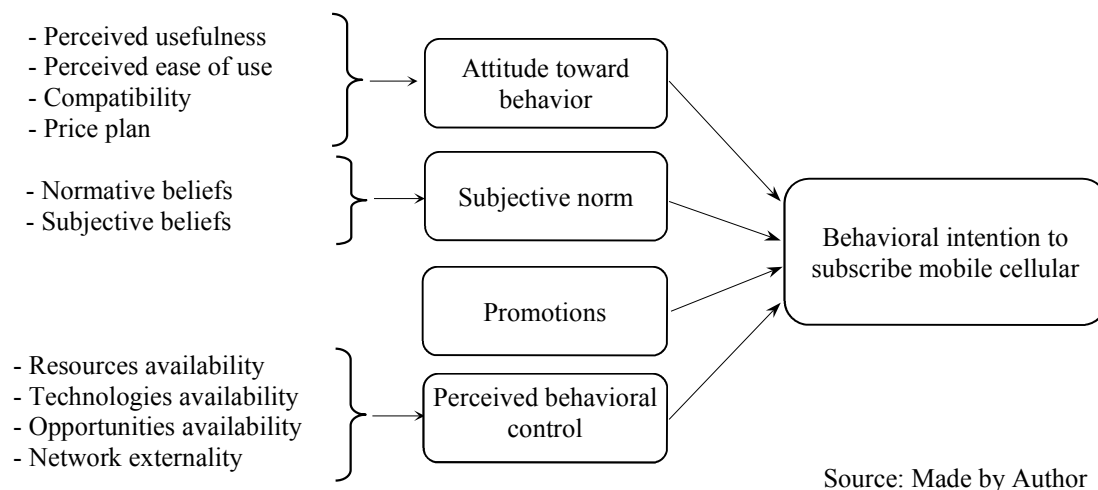
establishments of wireless networks with lower costs, technology availability and ease of use, economic models in which mobile users economized their payments on communication. By the way, culture could promote or influence the resistance of technology. A report of the ITU on the digital divide in least developed countries illustrates a number of different key factors influencing the mobile subscription (ITU, 2006). They include availability (easy to connectivity and deployment of infrastructure, even in rural areas), frustration at long wait for fixed-line connection, introduction of prepaid cards and gradual reduction of mobile phone call charges.

Furthermore, Karahanna, Straub & Chervany (1999) explain that users and potential adopters of information technology (IT) differ in their behavioral intention, attitude and subjective norm when attitude towards adopting the IT is impacted by behavioral belief and normative belief. This cross-sectional study compares pre-adoption and post adoption beliefs on information technology adoption across time in America by examining the Windows technology in a single organization. Over the past years, many other studies are also conducted by applying theory of planned behavior (TPB) to measure an individual planned use of innovation. Some authors try to understand people's perceptions/intentions engaging or not engaging in various activities such as ICT-based learning instructions (Siragusa & Dixon, 2009), the adoption of broadband internet in developing countries (Dwivedi, Williams, & Lal, 2008), promotion of whole-grain foods (Chase, Reicks, & Jones, 2003), prediction of leisure participation (Ajzen & Driver, 1991), perceptions of political person (Abel, kinder, Peters, & Fiske, 1982), correspondence between health attitudes and behaviors (Ajzen & Timko, 1986), and other predictability of intention in various health-related fields such as condom use, exercise, diet and so forth.

The TPB has been widely used in much social science research because of its strengths in predicting individual's behavior under non-volitional behavior by adding one determinant of behavioral intention, which cannot be explained by theory of reasoned action. This also describes relationship between behavioral intention and actual behavior. Social norm is also added into the TPB to predict an individual social behavior (Ajzen I. , 1991). While an individual behavioral intention cannot be the exclusive determinant of behavior's control, perceived behavioral control can clarify the relationship between behavioral intention and actual behavior. Thus, the TPB is useful to predict consumer perceptions as to whether or not to subscribe to mobile telecommunications services. At the same time TPB has its own limitations. Since it is mostly based on cognitive processing and the level of behavior changes, it overlooks emotional variables such as threat, fear, mood and negative or positive feelings. This limits the accurate results from the uses of the TPB in some research fields related to emotions such the prediction of health-relation behaviors.

Integrated with intrinsic characteristics of diffusion of innovation theory, all independent factors in this proposed model can perfectly discover consumer perceptions over mobile telecommunications services in Cambodia. This study suggests that intentions to take an action are influenced by four main factors, three of which are adopted from the TPB. The ATB indicates an individual positive or negative feeling about their behavior and is composed of perceived usefulness (PU), perceived ease of use (PEU), compatibility and price plan. The PBC is an individual adoption of new ideas that one can control a particular behavior (Ajzen I. , 1991). By compiling with factors from diffusion of innovation (Roger E. M., 1983), the PBC in this chapter consists of four components, including resources availability (network availability, technological support, and customer services), technologies availability (types of technologies, service quality, congestion and up-to-date services), opportunity availability (knowledge or ability, time and resource to subscribe an innovation) and network externality (value of product or network to users is changed by changing number of users).

Figure-21: Factors Affecting Consumer Adoption Behavior



Promotion factor is adopted from 4p marketing mix strategy (product, price, place, and promotion), and it can explain how suppliers persuade consumers to purchase their products (Dave, Fiona, Richard, & Kevin, 2006). Furthermore, this study covers five aspects of promotion, including advertising, personal selling, sale promotion, public relation, and direct marketing. This model can measure the driving forces behind consumer decision on whether or not to adopt mobile telecommunications services in Cambodia. These driving forces identify competitive advantages, weaknesses of all carriers and consumers' needs. By decomposing the TPB, the research model requires few assumptions; respondents of the research sample are required to be rational and make systematic use of information available to them. They are able to consider the implications of their actions by taking into account the consequences of the behavior in which they decide to engage/not engage (Ajzen I. , 1985).

### **3. Methodologies Used for Studying Consumer Adoption Behavior**

#### **3.1. Model Specification**

The research focuses on the discussion framework from the decomposition of theory of planned behavior (Ajzen I. , 1991), some main factors/drivers of diffusion of innovation theory (Roger E. M., 1983) and some findings of previous researches (Bandura, Adams, & Beyer, 1977) and (Bandura, Adams, Hardy, & Howells, 1980). Reasons for choosing or subscribing one mobile carrier and consumers' requirements are stepping stones for the drivers to discovering competitive advantages of existing mobile telecommunications providers. Main factors in this study are the ATB, PBC, SN, and promotions. This questionnaire has been prepared with 7-point likert-scales (1: strongly disagree, 7: strongly agree) to measure all constructs, adopted by Fornell, Johnson, Anderson, Jaesung and Bryant (1996) and one part of qualitative method. The use of high scale categories with the same increment of each score point will permit a strong confidence of responses.

#### **3.2. Analytical Procedure**

The mixture of both quantitative and qualitative methods is used. The first part of quantitative method uses some analytical methods such as multiple regression analysis and Structured Equation Modelling, with Analysis of Moment Structures (AMOS). Multiple regression analysis will be used to assess the strength of the relationship between each factor and its related questions (independent variables). This can provide the highest possible multiple correlation of questions with each factor. Some necessary assumptions are required before multiple regression analysis is conducted. First of all, the relationships between dependent and questions have to be linear, and then the sampling can be a representative of the population for inference prediction. Moreover, questions are continuous and accurately measured with zero error and finally all independent variables are not linearly dependent or not perfectly correlated (Nancy, Karen, & George, 2005). Finally, there is no problematic condition of multicollinearity among some sets of the questions.

The structural equation modeling approach, with AMOS graphics, will be used identify direct and indirect relationships among latent and observed variables. This method has the ability of taking in to the account of the measurement errors and the relationships between errors in the observed variables. Regression weights for the independent predictor variables will be generated (Schumacker & Rechar, 2004). All four factors (ATB, PBC, Pro, and SN) will be used as observed variables which together construct the BI while their relationships are also measured.



In addition to the quantitative method, a qualitative approach was adopted with three open-ended questions used to further explore respondents' opinions about their currently subscribed carriers and switchover options. Their responses were examined through a text mining or text analysis method, which often includes qualities of appearance like color, texture and textual description. Hence the use of the mixed method approach allows this study to examine the competitiveness of mobile telecommunications carriers. Overall, this study's samples were randomly selected from the whole population and questionnaire covered all of most important factors adopted from both above theories.

### **3.3. Data Collection**

To validate instrument and ensure that error is negligible, a pilot test had been conducted prior to the initial data collection phase. Twenty people were selected from one city and one province in Cambodia and fifteen of them fulfilled the survey questionnaire and face-to-face interview, while the rests were interview through e-mail and chatting. Ajzen (2006) suggests that a formal research is required to construct a questionnaire which is suitable for the behavior and interests of population. Therefore, this research has been conducted in one city and other three provinces of Cambodia to capture behavior of consumers' adoption. The questionnaire was distributed according to the proportionality between Cambodian population distribution and geographical areas of Cambodia which include plain region, Tonle-sap region, coastal region, plateau, and mountain region. One city or province was randomly selected from each geographical area.

## **4. Empirical Findings on Consumer Adoption Behavior**

### **4.1. Respondents' Information of Consumer Adoption Behavior**

After spending one and half month for data collection, 330 valid respondents were obtained with a responding rate of 73.33%. Among them, 46.36% were male ( $n = 153$ ) and 53.64% were female ( $n = 177$ ). This appropriates with the Worldbank's data in which female reached 51.05% of total population of Cambodia in 2011<sup>10</sup>. From table-7, the majority of respondents (current mobile telecommunications subscribers) were two age groups of between 19 and 28 years old (46.36%) and between 29 and 38 years old (25.15%). This majority of the respondents is proportionally to the statistics of US consensus in 2012 that 64% of Cambodian population was under the age of 30, 6% were older than 60 years and average of mobile subscriptions was about 1.3. However it is common for people in urban areas to own three or four mobile phones while one household in rural community owns only one mobile phone.

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<sup>10</sup> World Bank's data. Retrieved on June 13, 2012.  
[api.worldbank.org/datafiles/KHM\\_Country\\_MetaData\\_en\\_EXCEL.xls](http://api.worldbank.org/datafiles/KHM_Country_MetaData_en_EXCEL.xls)

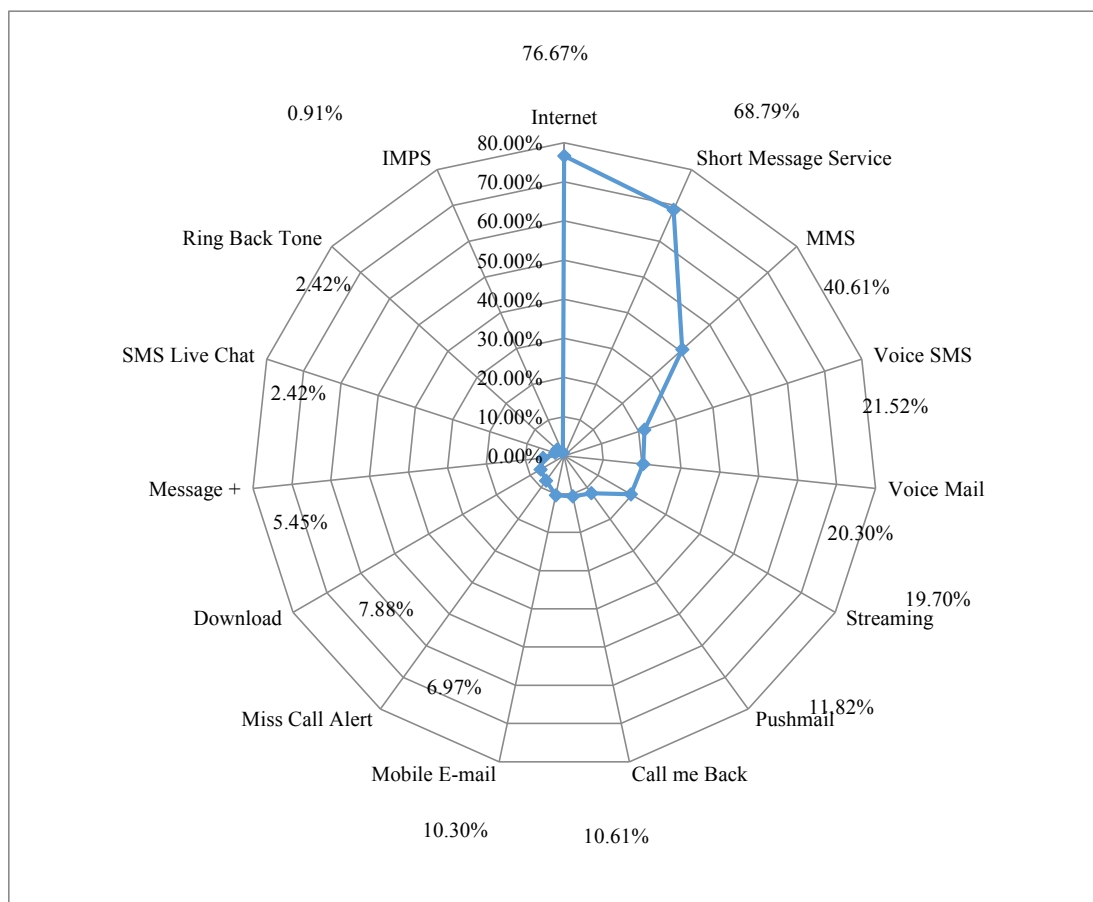
Table-7: Respondents of Adoption Behavior

<b>Description</b>	<b>Items</b>	<b>Sampling (330)</b>	<b>Percentage (%)</b>
Age	Below 18 years	45	13.64%
	19 - 28 years	153	46.36%
	29 - 38 years	83	25.15%
	39 - 48 years	25	7.58%
	49 - 58 years	13	3.94%
	Above 58 years	11	3.33%
Education	PhDs	4	1.21%
	Master	37	11.21%
	Bachelor	176	53.33%
	High school	89	26.97%
	Below high school	24	7.27%
Job	Student	112	33.94%
	Government officer	44	13.33%
	Employee	120	36.36%
	Self-employed	31	9.39%
	Agriculturalist	18	5.45%
	Others	5	1.52%
Salary	Below 100 US\$	98	29.70%
	101 US\$ - 200 US\$	82	24.85%
	201 US\$ - 400 US\$	78	23.64%
	401 US\$ - 600 US\$	44	13.33%
	601 US\$ - 800 US\$	11	3.33%
	801 US\$ - 1000 US\$	4	1.21%
	Above 1000 US\$	13	3.94%
payment for mobile phone (monthly)	Below 5 US\$	71	21.52%
	5 US\$ - 10 US\$	164	49.70%
	11 US\$ - 15 US\$	40	12.12%
	16 US\$ - 20 US\$	19	5.76%
	20 US\$ - 50 US\$	28	8.48%
	Over 50 US\$	8	2.42%
Source of payment	Myself	201	60.95%
	Parents	84	25.37%
	Spouse	15	4.48%
	Company	26	7.96%
	Others	4	1.24%

Source: Made by Author

The result also indicated that 65.76% of respondents were those with an education level higher than a bachelor's degree. Moreover, the study revealed that they were employed in many different occupations. 36.36% were employees in any private or non-profit organization, and 13.33% were government officers. 9.39% were self-employed or had their own business and 5.45% were farmers, while 33.94% were students who were studying in all education levels. 54.55% of the participants showed that their monthly incomes were less than 200 US\$ and other 40.30% of respondents could earn between 201 and 600 US\$. However, only 5.15% had their monthly incomes more than 800 US\$. At the same time, respondents who had paid for monthly payment of using mobile phone less than 5 US\$ was 21.52%, between 5 and 10 US\$ was 49.70%, between 10 and 20 US\$ was 17.88%, and more than 20 US\$ was 16.66%. These monthly payments for mobile phone were mostly paid themselves (60.95% of total samplings) and other 25.37% were paid by their parents or guardians. Other sources contained small percentages of mobile payment, such as spouse (4.48%), employers (7.96%) and other sources (1.24%).

Figure-22: Subscription of Additional Services



Source: Made by Author

Besides subscription of basic voice service, respondents showed their personal current subscriptions and past experiences of additional services. Internet service was the most popular one and subscribed by 76.67%, short message service 68.79%, multimedia service 40.61%, voice sms 21.52%, voice mail 20.30%, streaming 19.70%, push mail 11.82%, call me back 10.61%, mobile E-mail 10.30% and other value added services with less than 10% (Figure-22). However, if talking about the rate of current users, the total number of internet users is about 44% of the total population in 2015 while 40% are mobile internet users and 4% is from fixed network (Im, 2019). According to another study (Phong & Solá, 2015), mobile phone users access to internet in order to gain some pieces of information related to entertainment (27%), news (14.8%) and various topics such as health, agriculture, etc. (10.9%).

## 4.2. Factors of Consumer Adoption Behavior

### 4.2.1. Attitude toward Behavior

The model summary of the table-8 reports the strength of the relationship between the model and the dependent variable (Attitude toward Behavior) with the multiple correlation coefficient of 0.960. It also shows that 92.3% of the variation in time is well explained by the model. The table as well shows that the independent variables (Q8, Q9, Q10, Q11, Q12) statistically significantly predict the dependent variable,  $F(5, 324) = 771.527, p < 0.0005$ .

Table-8: Model Summary of Attitude toward Behavior

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1 <sup>a</sup>	0.960	0.923	0.921	0.280	(5, 324)	771.527	0.000

a. Predictors: (Constant), Attitude toward Behavior (Q12), Attitude toward Behavior (Q10), Attitude toward Behavior (Q9), Attitude toward Behavior (Q8), Attitude toward Behavior (Q11)

Source: Made by Author

The result from multiple regression analysis shows the statistical influences of Q8, Q9, Q10, Q11 and Q12 on Attitude toward Behavior at 99% with standardized coefficients of 0.322, 0.191, 0.158, 0.288 and 0.310 respectively, according to the Table-9. With 92.1% of variation on the ATB, the linear equation can be written as:  $ATB = 0.322*Q8 + 0.191*Q9 + 0.158*Q10 + 0.288*Q11 + 0.310*Q12$ .

Table-9: Multiple Regression Result for Attitude toward Behavior

Model	Coefficients <sup>a</sup>			t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	-6.593	0.112		-58.797	0.000
Attitude toward Behavior (Q8)	0.278	0.016	0.322	17.029	0.000
Attitude toward Behavior (Q9)	0.188	0.018	0.191	10.276	0.000
Attitude toward Behavior (Q10)	0.124	0.014	0.158	8.817	0.000
Attitude toward Behavior (Q11)	0.253	0.020	0.288	12.853	0.000
Attitude toward Behavior (Q12)	0.274	0.019	0.310	14.132	0.000

a. Dependent Variable: Attitude Toward Behavior

Source: Made by Author

#### 4.2.2. Promotion

Four questions (Q13, Q14, Q15 and Q16) have been used as independent variables for predicting Promotions factor (Pro). As shown in the Table-10, the relationship strength between the model and the dependent variable (Pro) is ensured by the multiple correlation coefficient R of 0.926. The model is statistically explained by 85.8% of the variation in time, while the independent variables significantly predict Promotions variable at  $F(4, 325) = 491.871, p < 0.0005$ .

Table-10: Model Summary of Promotion

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1a	0.926	0.858	0.856	0.379	(4, 325)	491.871	0.000

a. Predictors: (Constant), Promotions (Q16), Promotions (Q13), Promotions (Q14), Promotions (Q15)

Source: Made by Author

As stated by the Table-11, four questions (Q13, Q14, Q15 and Q16) share their significant impacts on Promotions variable at 99% with standardized coefficients of 0.419, 0.122, 0.258 and 0.363. With 92.1% of variation, the linear equation of Promotions variable can be written as:  $Pro = 0.419*Q13 + 0.122*Q14 + 0.258*Q15 + 0.363*Q16$ .

Table-11: Multiple Regression Result for Promotion

Model	Coefficients <sup>a</sup>			t	Sig.
	Unstandardized Coefficients		Standardized Coefficients		
	B	Std. Error	Beta		
(Constant)	-5.010	0.122		-41.102	0.000
Promotions (Q13)	0.350	0.020	0.419	17.437	0.000
1 Promotions (Q14)	0.103	0.025	0.122	4.211	0.000
Promotions (Q15)	0.229	0.027	0.258	8.350	0.000
Promotions (Q16)	0.276	0.021	0.363	13.057	0.000

a. Dependent Variable: Promotion

Source: Made by Author

#### 4.2.3. Subjective Norm

Subjective Norm (SN) has been estimated and regressed from four questions (Q17, Q18, Q19 and Q20). The R value of 0.964 shows a strong relationship between SN and all predictor variables, as displayed in Table-12. This suggests our model is a relatively good predictor of the SN. So, the multiple regression model with all four predictors produces  $R^2 = 0.929$ ,  $F(4, 325) = 1067.806$ ,  $p < 0.0005$ .

Table-12: Model Summary of Subjective Norm

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1 <sup>a</sup>	0.964	0.929	0.928	0.268	(4, 325)	1067.806	0.000

a. Predictors: (Constant), Subjective Norm (20), Subjective Norm (19), Subjective Norm (17), Subjective Norm (18)

Source: Made by Author

As can be seen in the Table-13, the four predictors have their significant and positive regression weights of 0.354, 0.243, 0.210 and 0.326 respectively at 99% of significant confidence. Then, the linear equation of Subjective Norm variable can be written as:  $SN = 0.354*Q17 + 0.243*Q18 + 0.210*Q19 + 0.326*Q20$ .

Table-13: Multiple Regression Result for Subjective Norm

Model	Coefficients <sup>a</sup>				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-3.444	0.055		-62.423	0.000
Subjective Norm (17)	0.231	0.014	0.354	16.922	0.000
1 Subjective Norm (18)	0.154	0.014	0.243	11.077	0.000
Subjective Norm (19)	0.143	0.014	0.210	9.969	0.000
Subjective Norm (20)	0.211	0.015	0.326	14.293	0.000

a. Dependent Variable: Subjective Norm

Source: Made by Author

#### 4.2.4. Perceive Behavioral Control

The multiple regressions illustrates that the predictor Perceive Behavioral Control (PBC) regressed from five independent variables constructs a multiple coefficient correlation of  $R = 0.998$  and goodness of fit model between observed values and expected values of  $R^2 = 0.997$ . This implied that the regression has reduced the error of data up to 99.7%. The regression can also be transcribed that 99.7% of variance in the achievement of the PBC can be predicted from the integration of independent variables which is given by the value of adjusted  $R^2 = 0.997$ .

Table-14: Model Summary of Perceived Behavioral Control

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1 <sup>a</sup>	0.998	0.997	0.997	0.059	(6, 323)	15747.051	0.000

a. Predictors: (Constant), Perceived Behavioral Control (Q25), Perceived Behavioral Control (Q22), Perceived Behavioral Control (Q21), Perceived Behavioral Control (Q24), Perceived Behavioral Control (Q23)

Source: Made by Author

Based on the result from the analysis of multiple regressions, five independent variables share their statistical influence on the PBC at 99% of significant confidence. These five variables are marked as Q21, Q22, Q23, Q24 and Q25, which have correlation standardized coefficients of 0.226, 0.225, 0.248, 0.245, 0.215, and 0.205 respectively. With 99.7% of variation on the PBC, the linear equation can be written as:  $PBC = 0.226*Q21 + 0.225*Q22 + 0.248*Q23 + 0.245*Q24 + 0.215*Q25 + 0.205*Q26$ .

Table-15: Multiple Regression Result for Perceived Behavioral Control

Model	Coefficients <sup>a</sup>				
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-7.260	0.024		-298.140	0.000
Perceived Behavioral Control (Q21)	0.221	0.004	0.226	57.584	0.000
Perceived Behavioral Control (Q22)	0.204	0.004	0.225	52.794	0.000
1 Perceived Behavioral Control (Q23)	0.225	0.004	0.248	50.438	0.000
Perceived Behavioral Control (Q24)	0.238	0.004	0.245	53.753	0.000
Perceived Behavioral Control (Q25)	0.182	0.003	0.215	54.694	0.000
Perceived Behavioral Control (Q26)	0.187	0.004	0.205	52.232	0.000

a. Dependent Variable: Perceived Behavioral Control

Source: Made by Author

#### 4.2.5. Behavioral Intention

The below Table-16 expressions a model summary of Behavioral Intention predicted from two independent variables (Q27 and Q28) which construct a multiple coefficient correlation of  $R = 0.890$  and goodness of fit model between observed values and expected values of  $R^2 = 0.791$ . The table shows that the independent variables statistically significantly predict the dependent variable,  $F(2, 327) = 619.995$ ,  $p < 0.0005$ .

Table-16: Model Summary of Behavioral Intention

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1a	0.890	0.791	0.790	0.458	(2, 327)	619.995	0.000

a. Predictors: (Constant), Behavioral Intention (Q28), Behavioral Intention (Q27)

Source: Made by Author

The dependent variable of Behavioral Intention is statistically influenced by Q27 and Q28 at 99% of significant confidence with standardized coefficients of 0.565 and 0.444. Therefore, the linear equation of BI, with 99.7% of variation, can be shown by  $BI = 0.565*Q27 + 0.444*Q28$ .



Table-17: Multiple Regression Result for Behavioral Intention

		Coefficients <sup>a</sup>			t	Sig.
Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta		
	(Constant)	-4.161	0.121		-34.247	0.000
1	Behavioral Intention (Q27)	0.407	0.022	0.565	18.741	0.000
	Behavioral Intention (Q28)	0.334	0.023	0.444	14.716	0.000

a. Dependent Variable: Behavioral Intention

Source: Made by Author

### 4.3. Descriptive Statistics of Consumer Adoption Behavior

The descriptive statistics present the total numbers of respondents, means and standard deviations of all items (questions) related to all constructs included in the study. The means and standard deviations of aggregated measures for each construct are also illustrated in table-18. As the 7-likert scale is used, all constructs are discovered to be above the neutral point, over value of 4. The table gives the response rates to the ATB, Pro, SN, PBC and BI. Most of questions are supported by respondents. In fact, approximately 90% of participants indicated that they intended to engage in subscribing mobile telecommunications service because of its usefulness (ATB-Q8), perceived ease of uses (ATB-Q9), loyalty and reputation of carriers (ATB-Q10), lifestyle (ATB-Q11), and attractive price plan (ATB-Q12). Aggregately, it is strongly agreed with the ATB with the mean of 5.89 (Std.=1.11), which score from ATB-Q10 of (M=5.60, Std.=1.28) to ATB-Q9 of (M=6.16, Std.=1.02).

From the same table, a total of 60% respondents thought that their behavioral intention to engage in mobile phone services can be influenced by attractive advertisement, while a further 87.27% valued the positive influence of public relationship between the mobile carriers and their working institutions or communities. Recharge bonus promotions and sales discounts were believed by 83.94% and 70.61% of participants to have positive beneficial and economic impacts on their subscriptions. In total, the promotions factor was also supported by sampled respondents to have aggregate mean of 5.37 (Std.=1.16) with the minimum responded score of (M=4.83, Std.=1.20) to the maximum score of (M=5.86, Std.=1.19), while the SN was slightly agreed with the mean scoring 4.66 and standard deviation of 1.23, where the SN-Q19 scores the minimum of (M=4.62, Std.=1.46). Approximately half

of respondents (57.88%) believed that family had a big influence to engage in mobile telecommunications and 58.88% believed in the positive impacts of colleagues and friends.

Table-18: Descriptive Statistics of Consumer Adoption Behavior

Items	Percentage of each score (%)							Mean	Std. Deviation
	1	2	3	4	5	6	7		
ATB								5.89	1.11
ATB (Q8)	0.91	1.21	2.42	6.06	15.15	42.73	31.52	5.88	1.16
ATB (Q9)	0.00	0.61	2.12	5.15	10.61	36.06	45.45	6.16	1.02
ATB (Q10)	0.30	2.73	4.85	10.00	18.48	38.18	25.45	5.60	1.28
ATB (Q11)	0.61	1.21	1.82	8.18	19.09	38.48	30.61	5.82	1.14
ATB (Q12)	0.91	1.52	0.30	6.36	14.85	38.18	37.88	5.99	1.13
Pro								5.37	1.15
Pro (Q13)	0.61	2.73	8.48	26.36	32.12	22.42	7.27	4.83	1.20
Pro (Q14)	0.00	1.82	3.33	7.58	17.27	35.15	34.85	5.85	1.18
Pro (Q15)	0.00	1.21	3.94	10.91	23.64	39.09	21.21	5.59	1.13
Pro (Q16)	0.61	3.33	5.15	20.30	25.15	29.09	16.36	5.19	1.31
SN								4.66	1.23
SN (Q17)	3.33	7.27	11.21	20.30	23.94	24.85	9.09	4.66	1.53
SN (Q18)	3.33	6.97	12.73	18.48	22.42	23.94	12.12	4.70	1.58
SN (Q19)	2.42	6.97	11.82	22.42	25.76	21.82	8.79	4.62	1.46
SN (Q20)	3.94	7.27	10.00	20.30	24.55	25.15	8.79	4.65	1.54
PBC								5.77	1.15
PBC (Q21)	0.00	0.61	3.33	6.06	16.36	42.73	30.91	5.96	1.03
PBC (Q22)	0.30	0.61	4.55	12.12	22.12	42.73	17.58	5.60	1.10
PBC (Q23)	0.00	1.82	2.12	9.39	19.70	39.70	27.27	5.81	1.10
PBC (Q24)	0.30	0.30	2.42	9.39	18.79	46.36	22.42	5.77	1.03
PBC (Q25)	0.30	1.52	5.76	10.61	18.79	43.33	19.70	5.57	1.19
PBC (Q26)	0.00	0.61	3.33	8.18	11.21	41.21	35.45	5.93	1.10
BI								5.52	1.24
BI (Q27)	0.30	0.30	0.30	4.24	18.79	36.67	39.39%	5.62	1.39
BI (Q28)	1.52	2.42	2.42	10.00	20.30	37.27	26.06%	5.42	1.33

Source: Made by Author

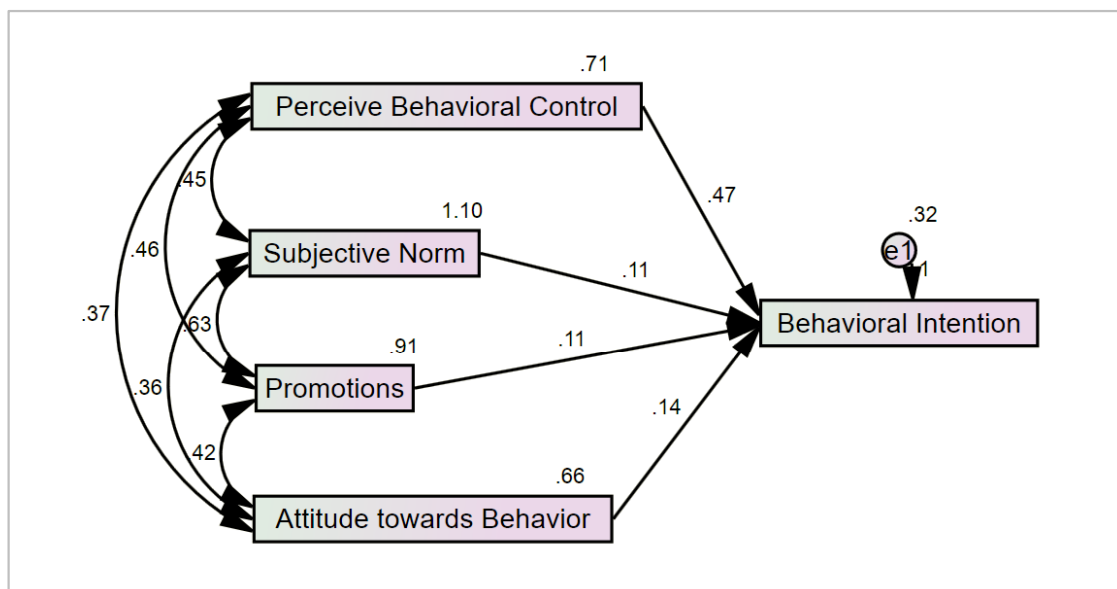
At the same time, the respondents also agree with all items of the PBC to give the min mean score to PBC-Q25 of 5.57 (Std.=1.19) and max mean score to PBC-Q21 of 5.96 (Std.=1.03). The majority (approximately 90%) really agreed with hug impacts and requirements of big coverage areas of service, good customer service centers, up-to-date services, stable good service quality, time and resources, and huge network externalities. Finally, the respondents showed their strong agreement for both BI items

with the mean scores of 5.415 (Std.=1.33) and 5.62 (Std.=1.40), which produce the aggregated mean of 5.52 (Std.=1.24). This was supported by majority of participants (94.85%) to show their intentional to engage in mobile communication and 83.64% to suggest others to follow their actions.

#### 4.4. Outputs of AMOS

The below diagram shows pictorial representation, along with regression weights, of Perceived Behavioral Control (PBC), Subjective Norm (SN), Promotions (Pro) and Attitude toward Behavior (ATB) leads to the overall Behavioral Intention to subscribe mobile telephone services. It shows the correlation value of dimensions and their corresponding regression weights are mentioned in the above diagram. The analysis constructs a goodness of fit model between observed values and expected values of  $R^2 = 0.537$ . PBC, SN, Pro and ATB account for 53.7% of the variance of BI.

Figure-23: Unstandardized Regression Coefficients in Predicting Behavioral Intention



Source: Made by Author

From the below table, the most influential factor is the PBC on the BI with correlation coefficient of 0.470 at the 99% of significant confidence. The correlation coefficient suggests a strong relationship between PBC and BI. One point change on the PBC will give a significant impact to the BI by 0.470 controlling for other predictors. Secondly, the ATB had 99% of significant confidence with the correlation coefficient of 0.143. This statistical result indicates that the ATB has a positive significant influence on the BI. Hence, it can be concluded that one point change in the ATB will lead to change in the BI of 0.143, controlling for other independent factors.

Table-19: Regression Weights

			Estimate	S.E.	C.R.	P	Label
BI	<---	Pro	0.109	0.048	2.280	0.023	
BI	<---	SN	0.106	0.040	2.681	0.007	
BI	<---	ATB	0.143	0.049	2.931	0.003	
BI	<---	PBC	0.470	0.049	9.619	***	

\*\*\* Significant at 1% level of confidence

Source: Made by Author

Moreover, the Pro and SN were found out to have similar statistical significant impact on the BI of correlation coefficient of 0.109, and 0.106 respectively. Promotions were indicated to have a positive statistical significant influence on the BI at 95% level of significant confidence to have a slightly weak relationship; however, there was still statistical significance between them. The SN had 99% of significant confidence with a positive statistical significant influence on the BI. With 53.1% of variation on the BI, the linear equation can be written as:  $BI = 0.320 + 0.470 \cdot PBC + 0.143 \cdot ATB + 0.109 \cdot Pro + 0.106 \cdot SN$ .

#### 4.5. Comparison of Adoption Behavior between Groups of Incomes

T-test analysis was conducted to discover if any statistically significant difference occurs between different sample sizes of incomes on the BI to subscribe mobile telephone services. From the Table-7, the respondents are classified into seven different group of incomes. 29.70% have their monthly incomes less than USD100\$. Respondents with monthly incomes between 101 US\$ and 200 US\$ share a distribution of about 24%, similar to those whose incomes are between 201 US\$ and 400 US\$ per month. At the same time, 13.33% is shared from respondents whose monthly incomes range between 401 US\$ and 600 US\$ while the three remaining groups contribute 3.33%, 1.21% and 3.94% respectively. From the outputs (Table-20), there is no statistically significant difference between those income groups on the BI to adopt or subscribe mobile telecommunications services within 95% of confidence interval ( $p > 0.05$ ). This suggests that the result of whole sample is strongly reliable and each income group of different sample sizes gives no any significant difference in consumer behavior to adopt this mobile service.

Table-20 Comparison between Groups of Monthly Incomes

<b>Behavioral Intention</b>					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.921	6	0.653	0.935	0.470
Within Groups	225.754	323	0.699		
Total	229.675	329			

Source: Made by Author

#### 4.6. Qualitative Results

Upon the completion of questions, all participants were asked to answer three open-ended questions to give their opinions about the reasons why they had decided to use mobile service, their additional requirements and suggestions to all carriers and plan to change their existing mobile telephone suppliers. Through text mining analysis, the majority of respondents (61%) mentioned that major reason for using one mobile carrier was related to daily communications. It was important to keep in touch with their business's partners, families, friends, colleagues or others. Mobile telecommunications was therefore convenient, economical, time saving and not complicated to use. About one third of the sample showed their interests in subscribing additional services to the basic voice ones such as the Internet and updated news through social networks or search engines. Other reasons for adopting mobile telecommunications services included the ease of communication with more economic efficiencies, the enlargement of daily interactions and the access of additional value added services to search for needed information.

90% of participants gave suggestions for better service quality, larger network coverage areas and better promotions/discounts. As mentioned in their responses, there were still problems with limited service quality for all carriers; poor sounds during calls, congestions of both within-network and cross-network calls, or poor services for accessing additional services such as the Internet. These problems mostly occurred at peak hours and public holidays or the places where some special events took place<sup>11</sup>. At the same time, network coverage was still a big problem. It was said that this problem happened in rural and remote areas while services were mostly available in urban places. It means the existence of digital divide in the country. Mobile networks were recommended to be spread throughout cities and provinces of the country as users met the problem of lack of network coverage when travelling from one province to another or to remote areas of each province<sup>12</sup>. The last essential suggestion was about

<sup>11</sup> More promotions when recharge next account. Very good in communication although there are ceremonies

<sup>12</sup> Please enlarge network coverage to cover whole country and increase signal strengths inside buildings, elevators and remote areas.

decrease in call rates. Almost 50% said that there should be a price reduction for calling (within-network and cross-network alike), as well as SMS and VAS.

Regarding customers' satisfactions with current mobile telecommunications carriers and plan to switch to another carrier, about half of participants have answered to the question, with 95% of these responses (47.5% of total sample) showed positive feelings towards their current provider with no intention to switch to a different service<sup>13</sup>. They implied their correct selections of mobile phone provider which comparatively provided a better service quality with less congestions and better connections with other mobile telecommunications operators. Furthermore, 43% did not want to change to other operators or they did not to change their phone number. As they explained, changing to a new number made them difficult to inform their family, friends or colleagues<sup>14</sup>. However, the rest 5% planned to change their providers because their current mobile service provider was quite expensive. They also wanted to find a new supplier which could offer bigger network coverage with better network service quality<sup>15</sup>.

#### **4.7. Interpretation of Consumer Adoption Behavior**

The results above indicate that constructs were appropriated with all predictors of the theory of planned behavior (Ajzen I. , 1991) and diffusion of innovation (Roger E. M., 1983). The PBC was the biggest challenge and the most diffusive and motivational factor for subscribing mobile telecommunications carriers. The PBC had an incredible impact on mobile telephone subscription with the regression coefficient factor of 0.470 at 99% level of significant confidence. Engagement in mobile telecommunications industry depends on the key factor of the PBC which consists of resources availability, networks availability, opportunities availability, network externality and service quality (Bandura, Adams & Beyer, 1977; Roger E. M., 1983; Ajzen I., 1991). The results of both quantitative and qualitative questions found that the first and big motives for mobile telecommunications were mobile network coverage, service quality and resource availability.

Like other developing countries, Cambodia still had limited network coverage areas of mobile services. Mobile network, updated services and other resources mostly existed in urban areas while some remote communities had big problems of accessing the service. In the context of improper government's regulation, carriers would set up their network infrastructures in places where profits

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<sup>13</sup> I don't want to change my current mobile network provider because its network cover larger areas of country and this number is mostly known by my relatives and friends.

<sup>14</sup> I don't want to change as most of my friends or relatives always contact me through this phone number.

<sup>15</sup> Yes, I want to change it because if compared to other carriers, I have higher payments.

could be made. As participants suggested, mobile networks should be improved with stable service quality. Also new services should be spread throughout the country accessible by everyone as well as with acceptable quality. One respondent indicated: *"I will change my current mobile service supplier in case there is problem of slow network service or congestions."* This result is consistent with the report (2010) by the MPTC which showed 56% of mobile users had some difficulties in communication within a network and 73% of users expressed their difficulties in communication across networks. In addition, because of enormous increases of internet users through mobile phones, updated services and VAS services have to be accessible throughout the country.

The second problem in the PBC was related to the limited knowledge, time and resources of users. It was required for all carriers to simplify features in mobile services in order less educated people to adopt. Also, as mobile communication in Cambodia was prepaid, the availability of costumer centers, simcards, and recharge cards was essential to be nearby. This can reduce the cost of adopting mobile telecommunications (price, time and procedures). The last attractive point of each carrier was the effect of their network externality, the effect that increases the number of users of one product or service when the value of the product or service to other user changes (Martin, Sumit, & Vogelsang, 2006). With a huge network effects, subscribers can enjoy basic mobile services (call and sms) with less paid because cross-network rates were much higher than within-network rates. Some mobile carriers can increase their network effects by using horizontal marketing strategies with combination of more services such as fixed wireless networks, public switch telephone network (PSTN), internet service provider (ISP) and other complimentary services. The effects of network externality can also be enlarged by merging between small carriers. In short, the PBC is considered main diffusive and motivational factors for all mobile telecommunications providers and it can be a competitive advantage for incumbents of big network coverage and network effects or a big issue/barrier for new entrants or small carriers to enter the competitive market.

The ATB was also found out to be an essential factor influencing an individual's intention to adopt mobile telecommunications with the coefficient factor of 0.143 at 99% significant confidence, which is similar to the results of previous researches and studies of the theory of reasoned actions (Ajzen & Fishbein, 1975), technological acceptance model and theory of planned behavior (Ajzen I. , 1991). Also, text mining analysis also presented that more than half of the participants subscribed mobile telecommunications carrier which can facilitate their daily communication with home, school or workplace with less complexities. This study has discovered the importance of its components such as perceived usefulness, perceived ease of use and compatibility (Ajzen & Fishbein, 1975; Ajzen I., 1991;

Davis, 1989). This statistical significance is quite appropriated with the study of (Puro, 2002) which illustrated that women in Finland generally kept their cell phones for social purposes such as communicating with children, friends or family, as well as using as mean of personal security. However this factor was no longer a main barrier for this adoption as there were only 5% of participants suggesting to all carriers to simplify their features or services; *"I would like my current mobile supplier to provide better network services, less complexities and good customer services."* Therefore, the ATB is a significant factor for the first diffusion stage of mobile telecommunications service while most subscribers have already adapted and were satisfied with the current features.

Thirdly, promotion was, as well, a significant factor with the coefficient factor of 0.109 at 95% level of confidence. The content analysis showed the high positive advantage of promotion factor on individual's intention to subscribe one mobile carrier. Almost half of the respondents were not satisfied with the current measured rates which were relatively high compared to their incomes. Both within-network and cross-network prices were cited as the problems. As more than 95% of subscribers in Cambodia were prepaid users, they could reduce the charging rate by enjoying discounts and promotions. Most of mobile prepaid carriers provided some special discounts from mid-night to dawn time and promotions for first registration and recharges. 50% of participants suggested for further discounts and recharge promotions whilst other 5% planned to switch to any mobile operator with cheaper rates and more promotions. *"I request to my current operator to provide better charging rates, including calls, sms, internet, and download. Or I want to change operator because my present supplier gives an expensive rate but high congestions."* Hence, promotion also plays an essential role in retaining existing subscribers and attracting new subscriptions.

Finally, individual's intention to adopt mobile telecommunications services was also significantly influenced and motivated by the SN with regression coefficient factor of 0.106 at 99% confidence interval. The coefficient is slightly low for users to follow their friends, family or colleagues to subscribe mobile telecommunication. Providers have used this SN to promote their services by providing some special promotion programs with special discounts within the groups, such as familiarity-number package (family members), closed-user-group package (friends up to 15 persons) and virtual-private-number package (hundreds of employees). Throughout the text mining, the SN was a barrier to retaining existing subscribers. Each mobile carrier has a license for their own separated segments of phone number mainly because mobile number portability did not exist in Cambodia. Also, some people believe that changing phone numbers may negatively impact on the communications with their friends, clients



and so on. *"I don't want to change because this number has been known by many of my friends. I don't want to change as I am a businessman/sole proprietor"*

## **5. Insights into Consumer Adoption Behavior**

This study would like to establish a concrete conclusion that the main diffusion and motivational factors of mobile telecommunications carriers to retain existing users and to provide incentives for incoming subscribers were perceived behavioral control, attitude toward behavior and promotion factors. Network coverage, network service quality, resource availability and network effects were recognized as the first prioritized requirements from subscribers and also barriers to some users to adopt new technologies where those do not exist. Mobile telecommunications companies with bigger networks will have more competitive advantages of network externality over their smaller counterparts. Meanwhile carriers must ensure the ease of use and usefulness of their products. After the products were available to target customers with useful benefits, promotional discounts could be applied during the first subscription or recharging accounts as prepaid service. However the last essential subjective norm was the sigh effect of lower costs in using services within the same network or group and impact of changing a phone number which is mostly suitable for retaining users not to switch to other carriers. Its influence will be decreased in case mobile number portability exists in the country which allows users to keep the same mobile phone number when they change from one to another supplier.

This study proposes following recommendations for carriers and related policymakers to improve the competitiveness, and the diffusion of mobile telecommunications services in Cambodia, as well as welfare of both the consumers and suppliers. Firstly, the government shall focus on the Universal Service Obligations, which impose some essential requirements to mobile carriers when the license is granted. The basic requirements shall clearly mention the efficiency in frequency allocation, numbering license, network size, network service quality and basic services. The second set of regulation shall be concentrating on Interconnection and Network Unbundling, which allow small mobile carriers with less investment budgets to enlarge their network coverage.

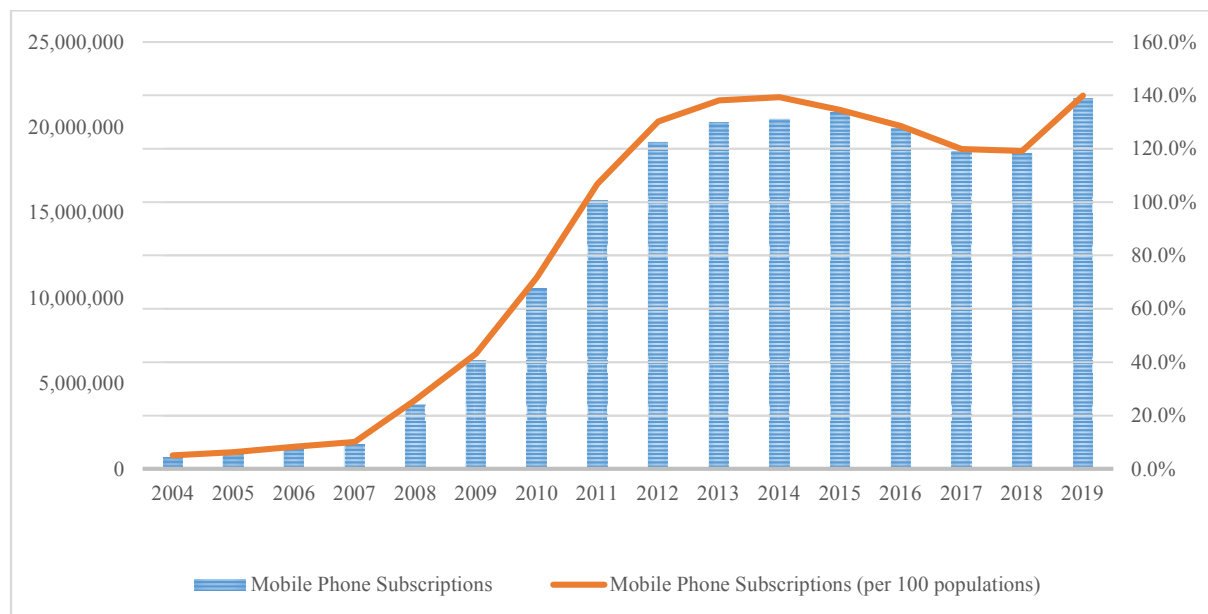
At the same time, the government or the policy maker shall issue a competition law in telecommunications industry. It shall include the price settings and access pricing, M&A (merger and acquisition) and the use of market power, interconnection obligation, and competition in the local network and the long distance market. This law will ensure that predatory pricing and monopoly will not existing by well controlling the M&A. Access pricing and interconnection obligations shall be imposed to all mobile carriers to avoid the creation of monopoly and competitive entry.

**CHAPTER IV:**  
**CONSUMER SWITCHING BEHAVIOR IN CAMBODIA’S MOBILE TELECOMMUNICATIONS MARKET**

**1. Background of Consumer Switching Behavior**

Diffusion of mobile telecommunications services has been exceptionally rapid in most parts of the world. In Cambodia, between seven and nine mobile operators are currently in operation and not in the operation (Im, 2015a). By the middle of 2015, the total number of mobile registered simcards in Cambodia almost reached 22 million, compared to 19 million in 2012 and 10 million in 2010, according the Figure-24. The market still continues to grow following the basic voice network expansion of 90% of total population and about 60% of the total territory of Cambodia.

Figure-24: Mobile Telecommunications Subscriptions in Cambodia



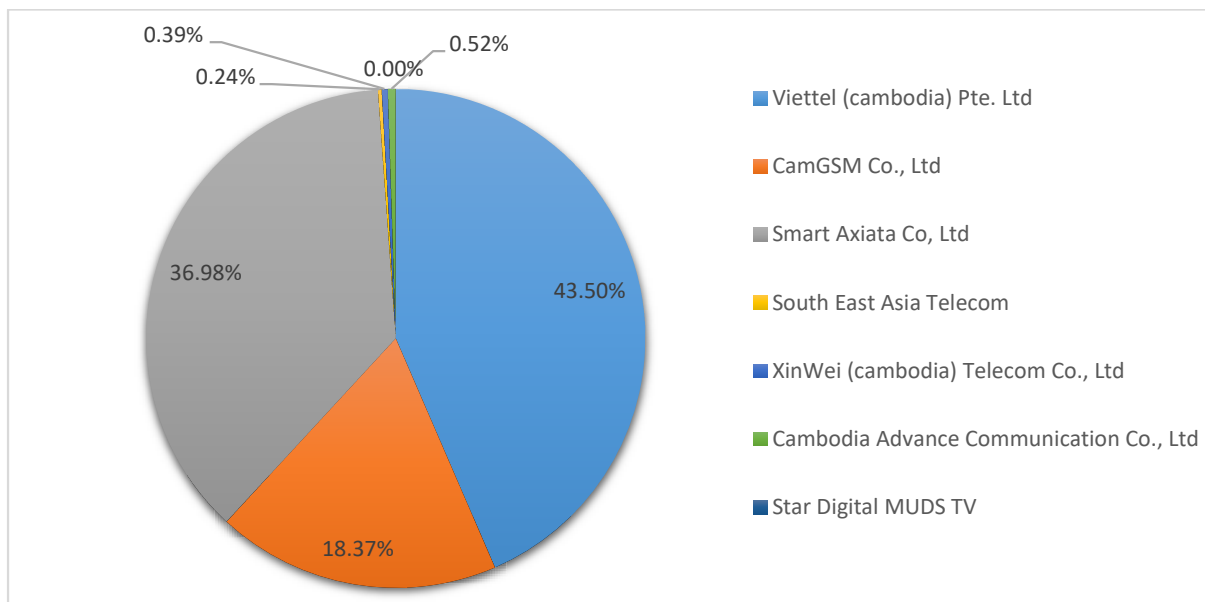
Source: Telecommunication Regulator of Cambodia (Im, 2019)

However, competition in Cambodia's telecommunications market seems to be overwhelming with a large number of suppliers (Moa, 2019). For instance, since 2008 the mobile phone carriers, on one hand, use the promotions for on-net calls as predatory pricing for attracting users. The incumbents also block the interconnections from other competitors. Still, the MPTC has no legal power to decide whether the business performances are illegal and whether any of mobile carriers should be punished.

Due to the lack of regulations and legal framework, this issue remains unresolved and all mobile operators continue to apply predatory pricing and network connection policies (Moa, 2014).

According to the report of the telecom regulator of Cambodia (TRC), unfair competition among suppliers may be resulted from the exercise of their market power and the incumbent’s control over the scarce resources. For example, after the merger and acquisition of some mobile service operators, the Figure-25 shows that Metfone remains the leading mobile operator with the biggest market share of 43.60% by the August 2015 (Im, 2015b). Smart Axiata has taken over the CamGSM to be the second market leader in the number of mobile phone subscribers with market share of 37% while the market share of the CamGSM has decreased to 18.4% and other four operators hold less than 1%. These few dominant suppliers cause the market high concentrated, by applying the Herfindahl-Hirschman Index (HHI) which is widely accepted in the competition law, antitrust law and technology management to measure the concentration level in a particular industry (William & Alan, 2009). The HHI of mobile telecommunications industry in Cambodia is about 3600 in 2015, compared to 2310 in the early of 2010 (Im, 2015c and Phun, 2010). This implies the market competition is moving toward the duopoly or even monopoly.

Figure-25: Market Share of Mobile Operators in Cambodia, July 2015

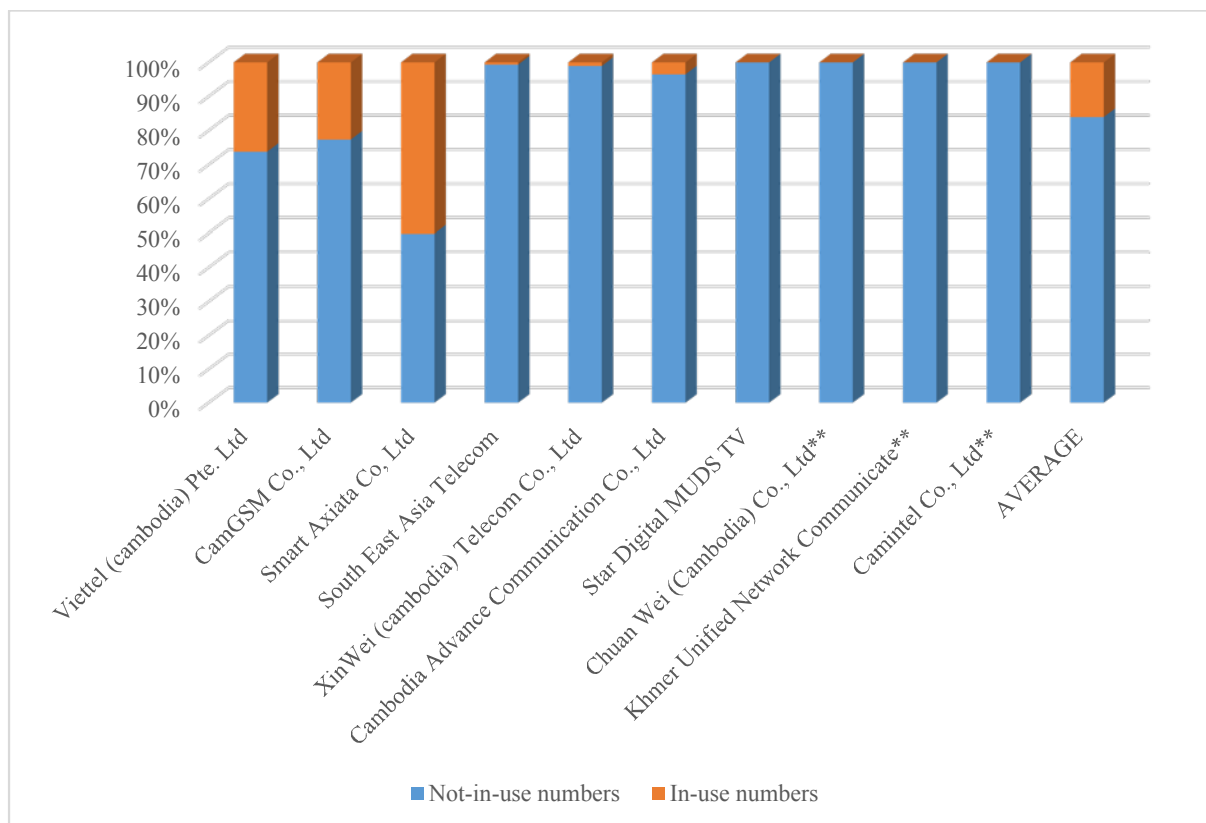


Source: Telecommunication Regulator of Cambodia (Im, 2019)

The TRC also raises growing concerns on the incumbents’ control over the scarce resource such as numbering plan. Linking with the Chinese beliefs in lucky numbers and special numbers which are as

status symbols used by high class people to show off their wealth and power, the prices of some phone numbers has risen higher than one thousand US\$. As a result, mobile carriers have purchased many exclusive licenses on mobile numbering segments at a very low price, and it consequently becomes a big business to sell special mobile phone numbers in inefficient ways (Moa, 2019). For instance, after the merger and acquisition of some mobile service operators, Mefone has received licenses on nine number prefixes while Smart Axiata has 11 and CamGSM possesses 13. Based on the report of the TRC (Figure-26), the number of the registered simcards of Metfone is about 26% of their total licensed numbers, compared to Smart Axiata at 50% and CamGSM at 23% (Moa, 2019). When one mobile carrier has an exclusive license on many number prefixes, it also possesses a large number of special and lucky numbers. Therefore, mobile carriers with fewer licensed number prefixes are not able to compete against the incumbents, and then it causes an unfair competition in the supply of the phone numbers and creates some difficulties for future development of the industry.

Figure-26: Percentage of Used and Unused Phone Numbers in Cambodia



\*\* not in operation

Source: Telecommunication Regulator of Cambodia (Moa, 2019)

In addition, users prefer subscribing to more than one mobile carrier rather than completely switching suppliers regardless of low satisfaction and difficulties during both within-network and across-network communications at over 50% and 73% respectively (Vong, Lee, & Zo, 2012). Still, it becomes a norm for prepaid users in Cambodia to subscribe at three different mobile carriers while most postpaid subscribers in some developed countries normally subscribe at most two mobile carriers in average (Simon, 2012). On one hand, mobile telecommunications subscribers in Cambodia may be locked by the effects of special mobile phone numbers since they could not port the numbers from one to another carrier caused by the absence of mobile number portability (MNP). On the other hand, they may face other switching barriers or costs which are resulted from the lock-in strategies used by some mobile carriers. This turns into questions on what extent the market well functions and the market competition in Cambodia.

Therefore, this chapter intends to improve the competitive market and the exertion of their ability and power to switch between mobile telecommunications suppliers in Cambodia. It also aims to remove switching barriers and to enhance fair competition between mobile carriers. It firstly seeks for factors significantly contribute to consumer switching intention, secondly identifies variables contribute to switching barriers and costs, and finally evaluates the relative effects of the MNP on customer switching behavior.

This study is divided into five parts and the first part already explained general backgrounds and objectives of the paper. This will be followed by the review of many previous researches and studies with the aim of comparing different factors causing the switching intention in different ICT markets and detecting the most appropriate theory to apply as research-based model. The third part will explain methodologies which include the composition of proposed research model, the construction of questionnaire and the data collection and analysis method. Then, the fourth part will present the research's results from the regression analysis while the last part will finally conclude the possibility to resolve the problems.

## **2. Literature Review of Consumer Switching Behavior**

### **2.1. Influences on Switching in Telecommunications Market**

The growing number of mobile subscriptions becomes challenges and concerns among service providers to retain users from moving to competitors, and consequently many scholars have studied consumer switching intention from many barriers (Czajkowski & Sobolewski, 2013; Chang, Liu & Chen, 2013; Dick & Basu, 1994; Farrell & Klemperer, 2007; Jones, Mothersbaugh & Beatty, 2000).

Malhotra and Malhotra (2013) have explored the significant impacts of service quality, innovation and lock-in on switching intention of mobile services in the U.S. Similarly, another empirical study finds out important factors on customer switching in the U.S. market from switching barriers, customer satisfaction, and demographics (Shin & Kim, 2008). In Jordan, mobile service users are intended to switch suppliers because of price, inconvenience, service quality, customer service, attraction of competitors, innovation and switching costs (Awwad & Neimat, 2010). More recently, a comparative study between Brazil's and German's mobile markets (Martins, Hor-Meyll, & Ferreira, 2013) shows that customer satisfaction, service performance and perceived values have significant influences on switching intention while switching barriers were found out no statistical significance.

Total switching cost may occur for both customer and new suppliers (Shapiro & Varian, 1996). So, the more often users switch suppliers, the more costs users and carriers bear. Mobile carriers will face some costs of retaining users due to the existence of low switching barriers which become customers' lock-in strategies (Shapiro & Varian, 1996). Moreover, switching behavior could negatively impact on market share and profitability of firms (Rust & Zahorik, 1993). In the same manner, the cost of acquiring one new subscriber is five times higher than the cost of retaining one subscriber (Martins, Hor-Meyll, & Ferreira, 2013). Consequently, lock-in strategy becomes the norm in the network industry because of users' information stored at each carrier. Thus, effects of switching barriers turn into the adjustment of variables to change customer satisfaction and then customers' retention strategies (Kim, Park, & Jeon, 2004). Lock-in strategies result in many types of switching costs amongst firms. Conversely, a comparative study on factors affecting users' switching intentions between Brazilian and German markets show insignificant effects of switching barriers on switching behavior (Martins, Hor-Meyll, & Ferreira, 2013). Various studies at different places and times give varieties of findings and significant relationships between switching barriers and switching behavior. Then, switching barrier is an essential factor influencing on switching intention in some previous researches but it is insignificant in others.

Another empirical study on mobile consumers' switching behavior towards MNP in India signifies that the availability of MNP becomes crucial issues and challenges for providers to retain subscribers and the switching behavior is significantly impacted by promotional offers, family orientation and service affordability (Kuramesh & Praveena, 2012). This is also supported by the findings of another study (Sathish, Kuma, Naveen, & Jeentharam, 2011) in which switching behavior is affected by customer service, quality of service, usage costs and others (innovations, family, and offers by competitors). The findings indicate the necessities of understanding consumers' switching behavior and the factors affecting on the switching decision.

Furthermore, Push-Pull-Mooring model was used by many researchers to study the consumers' switching behavior in service market. PPM model is better than an alternative model as it explores both significant direct and indirect effects on switching intention from all variables (Bansal, Taylor, & James, 2005). This argument is also supported in the study on online blog service switching behavior which is elicited from push, pull, and mooring factors (Zhang, Cheung, & Lee, 2012). In social network sites migration, three categories of antecedents are empirically examined and they had varying effects on switching intention (Chang, Liu, & Chen, 2013). In Kenya, with the effects of the MNP, there is a strong relationship between switching intention and push determinant (duration and costs of porting) and swayer determinant - period of use, age and average spend on airtime (Nzomoi & Mumo, 2014). The MNP is also studied to have significant effects on switching behavior in Ghana's market through switching efficacy, switching costs and attitude toward switching (Nimako, Ntim, & Mensah, 2014). This empirical study will apply the PPM model of the migration theory for understanding consumers' switching behavior of mobile service providers.

## **2.2. Migration Theory and Measures of Switching Behavior**

Migration is resulted from three crucial factors; pushing at the origin, pulling at the destination, mooring between the origin and destination (Lee, 1966). Negative influences learnt at origin push people to move out and they include satisfaction, perceived service quality, perceived value, trust, commitment, and price perception (Nimako & Ntim, 2013). On the other hand, at the destination point, pulling factor is similar to pushing and it is one of positive factors to attract people. Attractive alternatives affectively cause people to move away to another destination. The final essential driver is the mooring factor which refers to situational constraints influenced from both personal and social factors and which includes subjective norms, attitudes toward switching, past behavior and variety-seeking tendencies (Nimako & Ntim, 2013). According to Bansal, Taylor and James (2005), customers are pushed by quality, satisfaction, low value, trust, commitment, or price perception, pulled by alternative attractiveness, and moored by attitude towards switching, subjective norm, switching costs, infrequent switching behavior, and variety seeking. In another study on online service switching, pushing and pulling factors are estimated from the same items including service quality, price, privacy, functionality, culture, storage capacity and ease of use while mooring consists of sunk costs, descriptive and subjective norm, learning and bored (Zhang, Cheung, & Lee, 2012). Similarly, the virtual migration behavior of social network sites was strongly pushed by regret and dissatisfaction, pulled by alternative attractiveness, and blocked by sunk costs, setup costs and continuity costs (Chang, Liu, & Chen, 2013). However, Nzomoi and Mumo (2014) studied switching intention in Kenya from pushing and swaying

determinants; pushing is about duration and costs of porting, and swaying is of period of use, age and average spent on airtime. So, this chapter combines all factors from previous papers and categorize them into four; switching barriers, satisfaction, alternative attractiveness and the MNP.

Switching barrier is also considered significant costs or sets of surmounting obstacles - situational constraints (Lee, 1966). Users bear these costs, effectively locking one user to one service provider, if they decide to change service suppliers (Shapiro & Varian, 1996). According to these authors, the present discounted value to a supplier of a lock-in customer is the total of customer switching costs and values of other advantages. Small switching costs are still critical and this lock-in, as a result, becomes a norm due to the storage, manipulation and communication of information by using a system made of various pieces of hardware and software. Consumers and suppliers significantly face different levels of switching costs (Kim, Park & Jeon, 2004; Jones, Mothersbaugh & Beatty, 2000; Valenzuela, 2012; Shin & Kim, 2008). Switching barriers are also defined as difficulty in switching providers in terms of financial, social and psychological burdens (Murray, 1991; Fornell, 1992; Dick & Basu, 1994; Farrell & Klemperer, 2007). Switching costs include losses from cancelling service contracts, adaption costs, searching costs, learning costs, and move- in costs involved in subscription of new services and its complementary services and devices (Kim, Park, & Jeon, 2004). Similarly, mooring effects are empirically studied from attitude towards switching, subjective norm, switching costs and past switching experiences, and they were found out statistically significant on consumer switching behavior (Bansal, Taylor, & James, 2005). These barriers are the most significant factors to influence switching intention with the effectiveness of the MNP in the U.S. market where subscribers perceive high switching barriers (Shin & Kim, 2008). Moreover, switching behavior in Kenya's mobile market was successfully predicted from main factors such as duration and cost of adoption (searching and leaning costs), and minor determinants of usage period, age and average amount spent on airtime (Nzomoi & Mumo, 2014). Accordingly, switching costs are significantly measured from different items (move-out costs, move-in costs, and adaption costs) to be the driving force for studying switching behavior.

Also, pushing effects are related to factors associated with the area of origin (Lee, 1966) and factors motivating people to leave or stay at the origin (Stimson & Minnery, 1998). Some prior studies define satisfaction with current supplier a pushing factor of origin point based on the migration theory (Lee, 1966; Nzomoi & Mumo, 2014; Zhang, Cheung & Lee, 2012; Chang, Liu & Chen, 2013; Nimako & Ntim, 2013) and it is a combination of negative factors existing at the origin point such as satisfaction, quality, value, trust, commitment and price perceptions (Bansal, Taylor, & James, 2005). As an important concept in many research fields, satisfaction is also defined as a combination of psychological



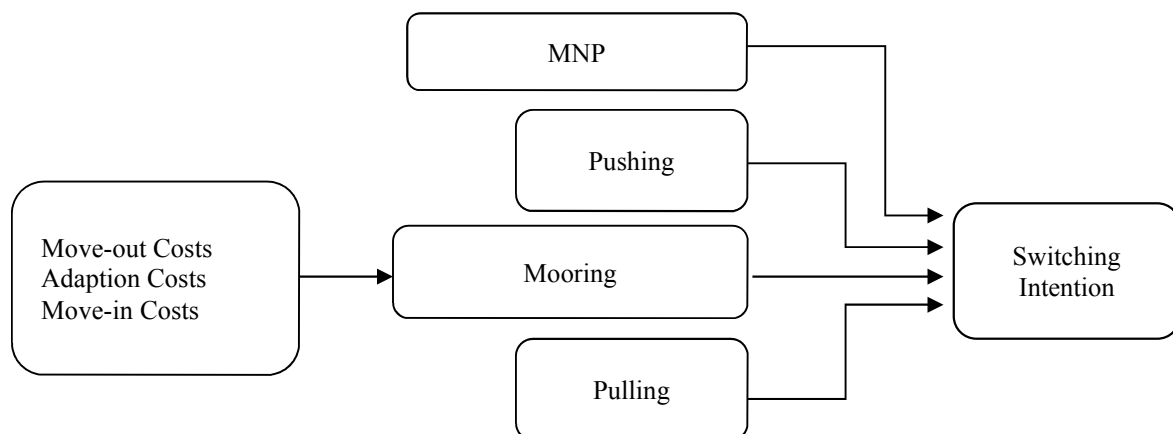
states from surrounding emotions and used to measure the relationship buildings between consumers and suppliers in online and offline markets (Oliver, 1981). As well, customer satisfaction and market share provoke changing levels of annual customer satisfaction barometer in different industries (Fornell, 1992). Eight types of dissatisfaction could cause switching intentions and they are from both intrinsic and extrinsic influences (Keaveney, 1995). Customer satisfaction significantly influences on switching behavior in mobile market (Shin & Kim, 2008; Awwad & Neimat, 2010; Martins, Hor-Meyll & Ferreira, 2013). Satisfaction with service quality, money charge, privacy issue, functionality, readership, storage capacity and ease of use is firmly investigated and illustrated to be a significant factor affecting on switching intention of online blog's users (Zhang, Cheung, & Lee, 2012). By the way, most of mobile subscribers in Cambodia are not satisfied with their providers but they do not show their intention to change suppliers (Leng, 2014). So, switch behavior in Cambodian mobile telecommunications market is not simply a matter of customer satisfaction, but a matter of other related factors. Statistically measuring significant impacts of satisfaction on switching intention from the empirical analysis in Cambodia is crucial in academic purposes.

Besides pushing and switching barrier, perceived behavioral control at the destination point, in some extent, attracts migrants from the origin, according to PPM paradigm. Merits and demerits at both origin and destination are distinguishably defined for every migrant (Lee, 1966). Pulling effects at the destination may take a form of alternative attractiveness, according to a prior study on switching behavior in mobile telecommunications industry (Bansal, Taylor, & James, 2005). Likewise, higher attractive level of alternativeness may lead to greater tendency of switching suppliers (Kim, Shin, & Lee, 2006) while attractiveness of competitors is one of the main driving forces causing switching intention (Keaveney, 1995). Attractive alternativeness is perceived desirability and perceived variable of the best alternative to relationship (Rusbult, Martz, & Agnew, 1998). It consists of reputation, image and service quality while the interpersonal relationship refers to psychological and social relationship (Kim, Park, & Jeon, 2004). In addition, attractive alternativeness is an important determinant of online service users' switching behavior (Zhang, Cheung, & Lee, 2012). On the other hand, both customer satisfaction and attractive alternatives are studied from the same components, including service quality, customer service, usage costs, and promotional offers (Sathish, Kuma, Naveen & Jeenantham, 2011; Kuramesh & Praveena, 2012). Thus, attractive alternatives are used as pulling factors at the destination which is another important part to study the switching behavior in this chapter.

Since firstly introduced by Singapore in 1997, the MNP has been studied to have significant impacts on users' intention to adopt innovation, to switch suppliers, and the like. The MNP allows users to

reduce switching costs of losing existing phone numbers and teaching new numbers to others (Reinke, 1998). Derived from conditional and random parameters multinomial logit model to analyze hypothetical choices, the MNP and status quo are two important types of switching costs which impact on switching intention (Czajkowski & Sobolewski, 2013). In the studies of Anjum & Dua (2012) and Kagwathi, Kamau, Njau & Kagiira (2013), the MNP is beneficial to reduce switching costs, to increase market competitiveness and to decrease misdialing rates. It also increases switching intention in India's, Kenya's and Ghana's mobile cellular markets (Suthar, Sharmar & Gwal, 2012; Nzomoi & Mumo, 2014; Nimako, Ntim, & Mensah, 2014). In addition, the MNP is known to facilitate the exit of unsatisfied subscribers and to require more competitiveness between mobile operators with greater efforts of providing better services to retain existing users and attract new subscriptions (Yadav & Dabhade, 2013). However, the MNP brings some demerits to users, including no ability to determine the particular network which causes higher average bills (Buehler & Haucap, 2004; Anjum & Dua, 2012). Subscribers have also to pay for porting numbers such as porting fee, long waiting time and effort.

Figure-27: Factors Influencing on Studying Consumer Switching Behavior



Source: Made by Author

For these reasons, this chapter will include the MNP to study switching behavior in Cambodia's mobile market. To study switching behavior, the MNP cannot be excluded from the analysis of this chapter. Also, it becomes critical challenges for mobile carriers to retain subscribers (Kuramesh & Praveena, 2012). This article applies the PPM and other related literatures as unifying framework to understand switching behavior, as well as other aspects of switching such as demographics of migrants (Bansal, Taylor & James, 2005; Zhang, Cheung & Lee, 2012; Nimako & Ntim, 2013; Chang, Liu & Chen, 2013). Furthermore, the MNP has been also added into the framework for the purpose of reducing

switching costs and of estimating its statistical significance on consumer switching behavior in mobile telecommunications market.

### **3. Methodologies used for Studying Consumer Switching Behavior**

#### **3.1. Research Model Specification**

Methodologies in this chapter are based on the proposed research model which is composed of switching behavior in the PPM model and results or suggestions from some previous studies. Three considerable factors of switching costs include move-out costs, move-in costs and adaption costs (Shapiro & Varian, 1996) meanwhile switching intention is measured by pushing, pulling, and mooring factors (Lee, 1966), aggregated with the MNP. Measurements of switching costs in mobile telecommunications service are stepping stones for the drivers to discovering consumers' switching behavior and improving competitive market. A self-administered, structured questionnaire is developed with 7-point likert-scales (1: strongly disagree and 7: strongly agree) to measure all constructs, and questions are adopted by integration of previous researches and studies. To ensure the confidence of responses, a fairly high number of scale categories with the same increment of each score point are used.

#### **3.2. Analytical Tools**

Both multiple regression analysis and structure equation modelling will be used to study the consumer switching behavior. Multiple regression analysis is the most useful technique in social science and used by many researchers since it is mostly suitable for predicting a scale dependent variable from several independent predictors and it can provide the highest possible multiple correlations of variables with dependent variable (Gaur & Gaur, 2009). Multiple regression method requires some important assumptions; linear relationship between dependent and independent variables, reliability of random sample to predict the whole population, continuity of variables with the accuracy of zero error to gain non-linear and non-perfect correlation between independent variables and no problematic condition of multicollinearity (Nancy, Karen, & George, 2005). The multiple regression model is used to estimate the significant coefficients between questions and each respective factor.

Once the significances of all factors have been ensured, AMOS Graphics adopts a graphical interface, by which the analysis works directly from a path diagram using the drawing tools designed with SEM conventions. This method will produce regression weights between latent and observed variables (Pushing, Pulling, Mooring and MNP) while predicting the estimated correlations between them (Schumacker & Rechar, 2004).

### **3.3. Data Collection**

Questionnaire has been adjusted to get much more effective instrument and to neglect any error, as a result of the pre-test of online sample of 33 current users of mobile carriers in Cambodia. The questionnaire is, therefore, sent to mobile phone subscribers in Cambodia and 393 valid samples have been obtained from the randomly selected population of 600 mobile telecommunications subscribers who were residing in one city and three different provinces in Cambodia at the time of survey. The distribution of the survey is in the proportionality to the population distribution and density of Cambodia which has been divided into plain region (48.8%), Tonle-sab region (32.52%), coastal region (7.1%), and plateau and mountain region (11.43%), according to General Population Census of Cambodia 2008<sup>16</sup>. With the valid responses of 393 from the total 600 questionnaires, the response rate of the survey is about 65.5%.

## **4. Findings on Consumer Switching Behavior**

### **4.1. Participants' Information of Consumer Switching Behavior**

Table-21 displays the characteristics of respondents in the paper. In terms of gender, 50.4% of the respondents are males and 49.6% are females. Majority of respondents 57.0% are aging between 19 to 28 years old, 21% of them are between 29 and 38, 11.5% are younger than 18, and the rest 10% are older than 39. This implies that this technological innovation has been mostly adopted by young adults and by respondents with single marital status 71.5%. Most of respondents are educated and about 0.8% are doctors, 9.4% possess master degree, and 60.1% hold bachelor degree while 22.6% of them have high school degree, 5.3% are educated lower than high school, and 1.8% do not mention their education. Amongst respondents, 39.7% are employed at private firms or organization, 38.9% are still students, 11.2% are working as government officers, and 7.9% are self-employed as agriculturalist or sole proprietorship, while other 2.3% have unspecified occupation.

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<sup>16</sup> General Population Census of Cambodia 2008, retrieved from [http://www.stat.go.jp/english/info/meetings/cambodia/pdf/pre\\_rep1.pdf](http://www.stat.go.jp/english/info/meetings/cambodia/pdf/pre_rep1.pdf)

Table-21: Participants' Information of Consumer Switching Behavior

Description	Items	Frequency	Percent	Cumulative Percent
Gender	Male	195	49.6	49.6
	Female	198	50.4	100.0
Age	Under 18 years old	45	11.5	11.5
	19-28 years old	224	57.0	68.4
	29-38 years old	83	21.1	89.6
	39-48 years old	25	6.4	95.9
	49-58 years old	13	3.3	99.2
	Above 59 years old	3	0.8	100
Marital Status	Single	281	71.5	71.5
	Married	112	28.5	100
Education	PhDs	3	0.8	0.8
	Master	37	9.4	10.2
	Bachelor	236	60.1	70.2
	High school	89	22.6	92.9
	lower than high school	21	5.3	98.2
	Others	7	1.8	100
Occupation	Student	153	38.9	38.9
	Government officer	44	11.2	50.1
	Employee	156	39.7	89.8
	Self-employ	31	7.9	97.7
	Others	9	2.3	100

Source: Made by Author

## 4.2. Factor Loadings of Consumer Switching Behavior

### 4.2.1. Pushing

The model summary of the Table-22 displays the strength of the relationship between the model and the dependent variable (Pushing factor) with the multiple correlation coefficient of 0.955. The table also illustrates that 91.3% of the variation is well explained and predicted by the model. Nine independent variables (Pushing\_1, Pushing\_2, Pushing\_3, Pushing\_4, Pushing\_5, Pushing\_6, Pushing\_7, Pushing\_8, and Pushing\_9) statistically significantly predict the Pushing factor,  $F(9, 383) = 445.113, p < 0.0005$ .

Table-22: Model Summary of Pushing Factor

Model	R	R2	Adjusted R2	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1	.955a	0.913	0.911	0.285	(9, 383)	445.113	.000b

a. Predictors: (Constant), Pushing\_9, Pushing\_5, Pushing\_2, Pushing\_8, Pushing\_1, Pushing\_3, Pushing\_7, Pushing\_6, Pushing\_4

Source: Made by Author

Meanwhile, the result from multiple regression analysis reports the statistical influences of all independent variables on Pushing factor at 99% with standardized coefficients of between 0.116 and 0.163. With 92.1% of variation on the Pushing factor, the linear equation can be written as: Pushing = 0.152\*Pushing\_1 + 0.143\*Pushing\_2 + 0.148\*Pushing\_3 + 0.116\*Pushing\_4 + 0.155\*Pushing\_5 + 0.16\*Pushing\_6 + 0.163\*Pushing\_7 + 0.162\*Pushing\_8 + 0.142\*Pushing\_9.

Table-23: Multiple Regression Result for Pushing Factor

		Coefficients <sup>a</sup>				
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-0.053	0.093		-0.574	0.566
	Pushing_1	0.111	0.014	0.152	7.691	0.000
	Pushing_2	0.123	0.018	0.143	6.948	0.000
	Pushing_3	0.109	0.014	0.148	7.511	0.000
	Pushing_4	0.095	0.017	0.116	5.504	0.000
	Pushing_5	0.118	0.015	0.155	7.642	0.000
	Pushing_6	0.117	0.015	0.160	7.693	0.000
	Pushing_7	0.118	0.015	0.163	8.073	0.000
	Pushing_8	0.117	0.013	0.162	8.699	0.000
	Pushing_9	0.106	0.015	0.142	6.924	0.000

a. Dependent Variable: Pushing

Source: Made by Author

#### 4.2.2. Pulling

Nine questions (Pulling\_1, Pulling\_2, Pulling\_3, Pulling\_4, Pulling\_5, Pulling\_6, Pulling\_7, Pulling\_8, and Pulling\_9) have been used as independent variables for predicting Pulling factor. As shown in the Table-24, the strength of the relationship between the model and Pulling factor is ensured by the multiple correlation coefficient of 0.978. The model is statistically explained by 95.7% of the variation, while the independent variables significantly predict Pulling variable at  $F(9, 383) = 939.908$ ,  $p < 0.0005$ .

Table-24: Model Summary of Pulling Factor

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1	.978a	0.957	0.956	0.280	(9, 383)	939.908	.000b

a. Predictors: (Constant), Pulling\_9, Pulling\_3, Pulling\_8, Pulling\_6, Pulling\_1, Pulling\_7, Pulling\_5, Pulling\_2, Pulling\_4

Source: Made by Author

As displayed in below table, the Pulling factor is well estimated from the nine questions by using multiple regression analysis. All variables share significant impacts on Pulling factor with at 99% with lowest standardized coefficients of 0.108 and highest one of 0.171. With 95.7% of variation, the linear equation of Promotions variable can be written as:  $\text{Pulling} = 0.142*\text{Pulling}_1 + 0.171*\text{Pulling}_2 + 0.149*\text{Pulling}_3 + 0.147*\text{Pulling}_4 + 0.166*\text{Pulling}_5 + 0.108*\text{Pulling}_6 + 0.128*\text{Pulling}_7 + 0.148*\text{Pulling}_8 + 0.108*\text{Pulling}_9$ .

Table-25: Multiple Regression Result for Pulling Factor

Coefficients <sup>a</sup>						
Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1 (Constant)	0.125	0.052			2.398	0.017
Pulling_1	0.104	0.012	0.142		8.511	0.000
Pulling_2	0.133	0.014	0.171		9.693	0.000
Pulling_3	0.114	0.013	0.149		8.496	0.000
Pulling_4	0.114	0.014	0.147		8.181	0.000
Pulling_5	0.127	0.012	0.166		10.258	0.000
Pulling_6	0.083	0.012	0.108		7.045	0.000
Pulling_7	0.103	0.012	0.128		8.530	0.000
Pulling_8	0.120	0.012	0.148		9.904	0.000
Pulling_9	0.081	0.012	0.108		6.819	0.000

a. Dependent Variable: Pulling

Source: Made by Author

### 4.2.3. Mooring

Mooring factor is estimated from eight questions (Mooring\_1, Mooring\_2, Mooring\_3, Mooring\_4, Mooring\_5, Mooring\_6, Mooring\_7 and Mooring\_8). The R value of 0.966 shows a strong relationship between Mooring factor and all of the predictor variables (eight questions) combined at 96.6%. It suggests that the model is a relatively good predictor of the Mooring factor. As shown in the Table-26, the multiple regression model with all eight predictors produces  $R^2 = 0.933$ ,  $F(8, 384) = 666.625$ ,  $p < 0.0005$ .

Table-26: Model Summary of Mooring Factor

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1	.966a	0.933	0.931	0.295	(8, 384)	666.625	.000b

a. Predictors: (Constant), Mooring\_8, Mooring\_3, Mooring\_2, Mooring\_4, Mooring\_5, Mooring\_7, Mooring\_6, Mooring\_1

Source: Made by Author



From the below result from the multiple regression analysis, four predictors have significant positive regression weights between 0.129 and 0.181 at 99% of significant confidence. Then, the linear equation of Mooring factor can be written as:  $\text{Mooring} = 0.18 \cdot \text{Mooring}_1 + 0.181 \cdot \text{Mooring}_2 + 0.129 \cdot \text{Mooring}_3 + 0.14 \cdot \text{Mooring}_4 + 0.145 \cdot \text{Mooring}_5 + 0.162 \cdot \text{Mooring}_6 + 0.146 \cdot \text{Mooring}_7 + 0.151 \cdot \text{Mooring}_8$ .

Table-27: Multiple Regression Result for Mooring Factor

<b>Coefficients<sup>a</sup></b>					
<b>Model</b>	<b>Unstandardized Coefficients</b>		<b>Standardized Coefficients</b>	<b>t</b>	<b>Sig.</b>
	<b>B</b>	<b>Std. Error</b>	<b>Beta</b>		
1 (Constant)	0.037	0.075		0.494	0.622
Mooring_1	0.137	0.017	0.180	8.161	0.000
Mooring_2	0.146	0.015	0.181	9.773	0.000
Mooring_3	0.104	0.014	0.129	7.677	0.000
Mooring_4	0.115	0.015	0.140	7.950	0.000
Mooring_5	0.115	0.017	0.145	6.762	0.000
Mooring_6	0.140	0.018	0.162	7.594	0.000
Mooring_7	0.120	0.016	0.146	7.290	0.000
Mooring_8	0.123	0.015	0.151	8.136	0.000

a. Dependent Variable: Mooring

Source: Made by Author

#### 4.2.4. Mobile Number Portability

The model summary of multiple regression analysis indicates that the predictor of Mobile Number Portability (MNP) regressed from four independent variables has constructed a multiple coefficient correlation of  $R = 0.974$  and goodness of fit model between observed values and expected values of  $R^2 = 0.948$ . The regression can also be interpreted that 94.8% of variance in the achievement of the MNP can be predicted from the integration of all independent variables,  $F(4, 388) = 1766.342$ ,  $p < 0.0005$ .

Table-28: Model Summary of Mobile Number Portability

Model	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1	.974a	0.948	0.947	0.287	(4, 388)	1766.342	.000b

a. Predictors: (Constant), MNP\_4, MNP\_1, MNP\_2, MNP\_3

Source: Made by Author

According to the result from the analysis of multiple regressions, all independent variables share their statistical influence on the MNP at 99% of significant confidence. These variables have correlation standardized coefficients of 0.388, 0.277, 0.294 and 0.186 respectively. With 94.8% of variation on the MNP, the linear equation can be written as:  $MNP = 0.388 * MNP\_1 + 0.277 * MNP\_2 + 0.294 * MNP\_3 + 0.186 * MNP\_4$ .

Table-29: Multiple Regression Result for Mobile Number Portability

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-0.030	0.065		-0.461	0.645
	MNP_1	0.314	0.015	0.388	21.391	0.000
	MNP_2	0.242	0.014	0.277	16.762	0.000
	MNP_3	0.271	0.017	0.294	15.837	0.000
	MNP_4	0.182	0.015	0.186	12.505	0.000

a. Dependent Variable: MNP

Source: Made by Author

#### 4.2.5. Switching Intention

The below Table-30 shows a model summary of Switching Intention predicted from two independent variables (Intention\_1 and Intention\_2) which have constructed a multiple coefficient correlation of  $R = 0.975$  and goodness of fit model between observed values and expected values of  $R^2 = 0.950$ . The table shows that the independent variables statistically significantly predict the dependent variable,  $F(2, 390) = 3741.653, p < 0.0005$ .

Table-30: Model Summary of Switching Intention

Model	R	R2	Adjusted R2	Std. Error of the Estimate	ANOVA		
					df	F	Sig.
1	.975a	0.950	0.950	0.250	(2, 390)	3741.653	.000b

a. Predictors: (Constant), Intention\_2, Intention\_1

Source: Made by Author

The dependent variable Switching Intention is statistically influenced by Intention\_1 and Intention\_2 at 99% of significant confidence with standardized coefficients 0.736 and 0.371. Therefore, the linear equation of BI can be shown by  $\text{Switching} = 0.736 * \text{Intention}_1 + 0.371 * \text{Intention}_2$ .

Table-31: Multiple Regression Result for Switching Intention

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	0.056	0.057		0.969	0.333
	Intention_1	0.654	0.012	0.736	56.577	0.000
	Intention_2	0.338	0.012	0.371	28.508	0.000

a. Dependent Variable: Switching\_Intention

Source: Made by Author

### 4.3. Descriptive Statistics of Consumer Switching Behavior

The descriptive statistics explains the necessary frequency of related constructs, including standard deviation (Std.), average score (M) and percentage of supporting each item. Table-32 also contains the aggregated mean and standard deviation of all factors; pushing, mooring, pulling, MNP and switching intention. Respondents support each item with average mean over the neutral value of 4. The table illustrates that nine items of pushing factor are supported by the sampling population with the average means which are higher than five (slightly agree) and standard deviation of 0.901. The highest mean of this factor is given by the Pushing\_9 (M=5.870, Std.=1.286) while Pushing\_5 contains the lowest mean of 5.272 with standard deviation of 1.262.

Table-32: Descriptive Statistics of Consumer Switching Behavior

Items	Percentage of each items							Std. Deviation	Mean
	1	2	3	4	5	6	7		
Pushing Factor								0.901	5.587
Pushing_1	1.02	1.27	4.58	8.40	13.74	33.84	37.15	1.300	5.827
Pushing_2	0.51	0.51	2.29	8.40	20.36	36.90	31.04	1.112	5.824
Pushing_3	1.27	2.54	4.07	12.98	22.39	37.91	18.83	1.299	5.417
Pushing_4	0.76	0.76	4.33	6.36	17.81	41.22	28.75	1.174	5.784
Pushing_5	1.02	2.04	5.85	15.78	24.17	37.40	13.74	1.262	5.272
Pushing_6	1.27	2.04	3.82	13.23	19.85	37.91	21.88	1.298	5.496
Pushing_7	2.04	1.27	4.58	14.50	19.85	39.95	17.81	1.313	5.399
Pushing_8	1.02	2.29	7.63	12.72	21.37	38.68	16.28	1.319	5.323
Pushing_9	1.02	2.29	3.31	6.36	12.72	37.66	36.64	1.286	5.870
Mooring Factor								1.087	5.304
Mooring_1	2.29	3.56	3.31	8.14	14.76	33.08	34.86	1.472	5.682
Mooring_2	1.78	3.05	7.12	15.27	21.12	36.13	15.52	1.392	5.214
Mooring_3	2.29	6.11	10.69	25.70	28.75	18.32	8.14	1.398	4.601
Mooring_4	1.78	2.29	5.60	16.28	24.17	31.30	18.58	1.366	5.270
Mooring_5	1.27	3.05	6.11	7.89	16.28	33.33	32.06	1.423	5.631
Mooring_6	1.53	2.04	4.33	11.70	23.66	36.64	20.10	1.302	5.443
Mooring_7	1.27	3.82	7.63	21.88	25.45	26.97	12.98	1.366	4.992
Mooring_8	1.78	2.04	5.34	14.76	18.58	35.37	22.14	1.380	5.410
Pulling Factor								1.331	4.495
Pulling_1	12.72	10.94	9.16	16.79	23.66	19.85	6.87	1.819	4.148
Pulling_2	6.87	11.20	12.21	15.78	23.41	22.39	8.14	1.708	4.374
Pulling_3	1.27	2.54	4.07	12.98	22.39	37.91	18.83	1.744	4.117
Pulling_4	6.36	13.74	14.25	13.49	23.66	20.61	7.89	1.722	4.277
Pulling_5	4.58	6.11	8.40	7.12	12.47	34.86	26.46	1.741	5.272
Pulling_6	4.33	8.91	7.38	10.69	15.52	33.08	20.10	1.743	5.038
Pulling_7	8.14	9.41	11.70	21.63	23.92	19.34	5.85	1.646	4.252
Pulling_8	8.91	11.70	17.30	22.14	19.59	15.78	4.58	1.640	3.975
Pulling_9	5.34	7.89	5.09	8.65	17.05	30.53	25.45	1.776	5.176
MNP Factor								1.190	5.112
MNP_1	3.31	4.07	5.34	12.72	19.85	31.81	22.90	1.547	5.288
MNP_2	2.04	5.09	6.36	16.79	26.46	29.77	13.49	1.431	5.038
MNP_3	2.54	1.78	5.60	15.27	26.46	32.82	15.52	1.360	5.219
MNP_4	0.76	4.83	8.65	20.87	31.55	26.21	7.12	1.281	4.847
Switching Intention								1.080	4.785
Intention_1	2.54	2.80	6.87	20.61	33.59	29.26	4.33	1.260	4.850
Intention_2	1.78	3.31	10.69	21.88	33.59	26.21	2.54	1.230	4.710

Source: Made by Author

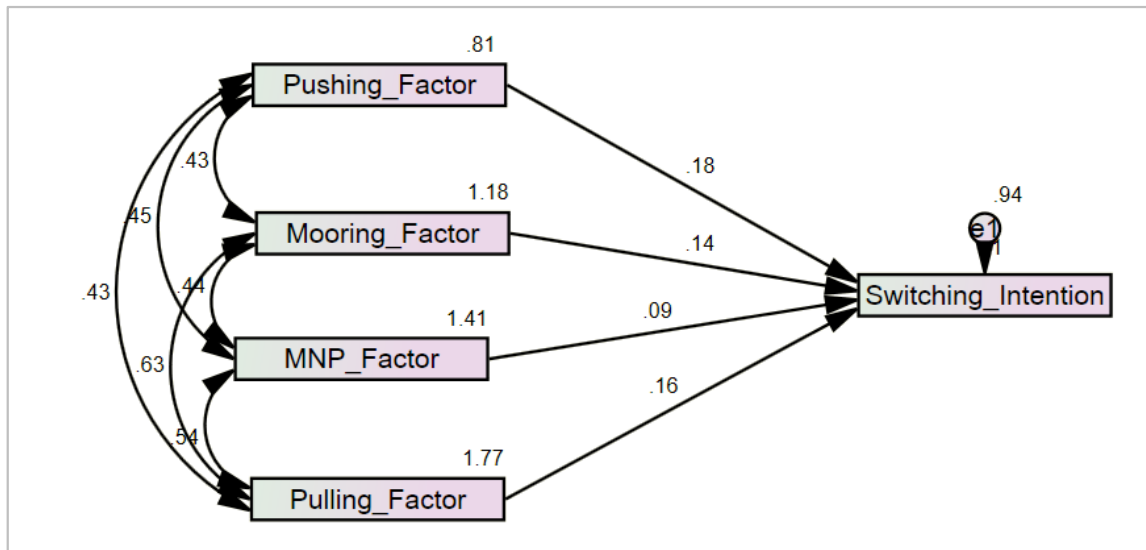
Similar to the pushing factor, the mooring factor receives supports from users with a mean of 5.304 and standard deviation 1.087. Furthermore, most items of this factor are agreed by majority of respondents (over 70%), except two items (Mooring\_3 and Mooring\_7) which are supported by between 60% and 70% of responses. The item with lowest mean of 4.601 (Std.=1.398) of mooring factor is Mooring\_3, followed by Mooring\_7 with mean of 4.992 (Std.=1.380). However, Mooring\_1 has the highest mean 5.682 with standard deviation of 1.472. The second highest factor mentioned in table-17 is Pulling factor which has less support (M=4.495, Std.=1.331). The aggregated means of this factor is given from 3.975 (Std.=1.640) to 5.272 (Std.=1.741). The smallest mean of Pulling\_8 implies the slight disagreement from interviewees as it is lower than the neutral score (3.975).

As well, table-32 indicates the last independent factor, mobile number portability. Subscribers are influenced by the expected presence of MNP with mean of 5.112 and standard deviation of 1.190. MNP\_1 scores the highest mean (5.288) at Std.=1.547 and MNP\_4 holds the minimum average score of 4.847 with Std.=1.281. Finally, switching intention has average agreement of 4.785 and standard deviation of 1.080. Two constructs of intentional factor contain the means of 4.850 and 4.710 while majority of responses (90.33% and 92.37% respectively) scores between 3 and 6. In aggregation, the average score of switching intention is 4.785 and the standard deviation is 1.080.

#### **4.4. Statistical Influences on Consumer Switching Behavior**

The pictorial representation shows the correlation values of dimensions and their corresponding regression weights between variables and predictor. The analysis results in a goodness of fit model between observed values and expected values  $R^2$  of 0.193. Therefore, 19.3 percent of error was reduced by the regression analysis and this also implies that the data do not spread so closed to the fitted regression line. Regardless of the low value of  $R^2$ , the significant coefficients still represent the change of means in the response for one unit change in the predictor as the switching intention can be significantly predicted from four independent variables. Hence, the analysis is still significant and there is also important correlation between individual variable with the dependent variable.

Figure-28: Unstandardized Regression Coefficients in Predicting Switching Intention



Source: Made by Author

The result of AMOS in the Table-33 shows that dependent variable is statistically and significantly influenced by the three factors at 99% level of confidence; Pushing, Mooring, and Pulling factors, while the MNP displays its statistical significance on the switching intention at 90% confidence level. Pushing factor is mostly influential on switching intention with the correlation coefficient 0.180 at 99% of confident interval. This implies a significant relationship and change of one point in pushing factor could result in significant change of 0.80 with the control for other factors. The second significant factor is pulling factor which holds significant impact on switching intention with the coefficient 0.163 at 99% level of significant confidence.

Table-33: Regression Weights on Switching Intention

			Estimate	S.E.	C.R.	P	Label
Switching_Intention	<---	Pushing_Factor	0.180	0.065	2.778	0.005	
Switching_Intention	<---	Mooring_Factor	0.142	0.054	2.651	0.008	
Switching_Intention	<---	MNP_Factor	0.088	0.047	1.880	0.060	
Switching_Intention	<---	Pulling_Factor	0.163	0.042	3.834	***	

\*\*\* Significant at 1% level of confidence

Source: Made by Author

Another important one is mooring factor or switching barrier which suggests strongly statistical influence on switching intention. Similar to pulling factor, switching costs play an important role in

controlling the mobile carrier switching intention with the score of 0.142 within 99% of confidence interval. Meanwhile, intention to switch mobile operators is statistically impacted by the likely presence of the MNP (0.088) within 90% of confidence level ( $P=0.060$ ). Consequently, switching intention between mobile suppliers in Cambodia can be modeled from these four main causes including pushing, pulling and mooring, and it can be written as following:  $SI = 0.939 + 0.180*Pushing + 0.163*Pulling + 0.142*Mooring + 0.088*MNP$ .

#### **4.5. Interpretation of Consumer Switching Behavior**

The implications and interpretations of this model can be drawn from the results of the above analysis which investigates the relative importance of each attribute change. The relative importance between variables changes is measured in term of ratio of the coefficients by using multiple regression analysis to capture each respondent's individual intention to switch mobile carriers in Cambodia. Thanks to the distributions of these ratios, the chapter can draw the implications that all attributed components have statistically significant impact on switching intention while pushing, pulling and mooring factors are significant at 99% confidence interval and the MNP is at a lower confidence level of 90%. The result discovers the necessity of all predictors appropriated with the theory of migration (Lee, 1966), and the findings of prior research (Bansal, Taylor & James, 2005; Zhang, Cheung & Lee, 2012; Chang, Liu & Chen, 2013; Nzomoi & Mumo, 2014; Nimako, Ntim & Mensah, 2014), while the importance of MNP to reduce the switching barrier similarly to some prior studies (Reinke, 1998; Suthar, Sharmar & Gwal, 2012; Yadav & Dabhade, 2013; Nimako, Ntim & Mensah, 2014).

The analytical model illustrates the first essential attribute of pushing on switching intention with the coefficient 0.180 at 99% of confidence interval. This factor refers to users' satisfaction with the current mobile carrier in terms of functionality of service, availability of product/service, large network coverage, service quality, network externality, information security, pricing plans, bonus plans, customer services and company's loyalty. The underlying structure implies satisfaction becomes merits and demerits for subscribers to remain with their current supplier or to leave for another one. As average scores of all items of this factor consists are higher than five (slightly agree-agree-strongly agree), respondents strongly agree with the significant influence of satisfaction level on switching intention. Users are mostly satisfied with easy functionalities of services such as process of registering services, querying balance, recharging balance or related useful services. They are also satisfied with a larger network coverage, service quality and huge network users. At the same time, products' availability to the customers and their representative customer offices are strongly required. These findings also

suggest the satisfaction with price and bonus plans. Therefore, customer dissatisfaction becomes the main pushing factor for users to switch operators. In contrast, they will not migrate if they are satisfied.

In the theoretical aspect of migration theory, the paper finds the significant contribution from the pulling on switching intention of mobile telecommunications carriers in Cambodia. This claim is given by the correlation coefficient 0.163 at the confidence interval 99% (Table-33). The attractive aspects of switching behavior refer to functionalities of services, availability of services/products, service quality, price and bonus plans, and loyalty program. The dissatisfaction of the current supplier with the more attractive programs at other carriers will increase the intention of subscribers to switch. So, many entrants try to use many attractive programs with special promotions as their competitive advantages in gaining market share from others. Without any pulling factor, new entrants might not be able to attract users of incumbents.

Switching barriers or switching costs which were studied by many previous researches are also found out to be statistically significant in this article with 0.142 coefficient at 99%. Users might hesitate to change suppliers because of unexpected switching costs including costs of terminating contract at incumbent, costs of searching for new supplier, and costs of subscribing services or related products of new supplier. Costs of terminating the contract is one of lock-in strategies to retain users and they can be in the form of loss of compensating to contract termination before its expiration, loss of mobile telephone numbers, and finally loss of personal information and data stored at the carrier. Then, users will also bear more costs to search for better suppliers, related to financial, time, and effort. Passing through these move-out costs and searching costs, switching users will have to accept further costs from registering services at new supplier and costs of learning new system (money, time and effort). As well, they have to face costs (money, time, and effort) of teaching new numbers to friends and registering related-new-number services such as Viber, Line, Wechat, and so on.

Besides the aspects of PPM model, the presence of the MNP is another significant factor to influence users' intention to change mobile carriers and the necessary effect of the MNP has been estimated in many different previous studies (Shin & Kim, 2008; Suthar, Sharmar & Gwal, 2012; Yadav & Dabhade, 2013; Nimako, Ntim & Mensah, 2014). The MNP does not exist yet in Cambodia's market; this chapter, however, estimates the influence of the future expected MNP on the switching intention. Respondents positively expect reduction of switching costs from the MNP to avoid changing phone numbers. Therefore, the MNP provides significant impact on switching intention by scoring 0.088 within 90% of confidence interval. It implies that the MNP will reduce the barriers to switch, that users



would increase the satisfaction level of adopting mobile phone service and that they finally find the most satisfied mobile carriers. Switching intention is already expected to increase from the introduction of the MNP. Additionally, the study on the effect of MNP adoption on consumer switching intention in Ghana after its introduction to the market (Nimako, Ntim, & Mensah, 2014) discovers similar impacts of the MNP on switching intention through switching efficacy, perceived switching costs and attitude towards switching. The paper finally would draw the estimation of successful adoption of the MNP in Cambodia's after its availability.

## **5. Insights into Consumer Switching Behavior**

In summary, this chapter successfully measures the extent to which switching intention in Cambodia's mobile telecommunications industry is influenced from three factors of migration theory (pushing, pulling, and mooring) and the MNP. This study would like to establish a concrete conclusion that the proposed theoretical model is significantly validated from all factors of PPM model and MNP factor in mobile telecommunications industry in a developing country where the MNP does not exist or where it is at its introduction stage. Moreover, the findings indicate that dissatisfaction is the main cause for mobile telecommunications subscribers to switch suppliers and satisfactions are mostly measured by the functionality of service, availability of service, large network coverage, service quality, availability of products, big network externality, information security. Also, attractiveness from competitors is the second influential factor on switching intention. When attractiveness at other carriers is relatively higher than satisfaction level at the current supplier, users might decide to change to new suppliers. This switching intention might also be locked from another essential factor, called switching barriers. Users with switching intention always face some costs of terminating contract with incumbent, costs of searching for new supplier, and costs of subscribing services or related products of new supplier. Additionally, PPM model alone is not enough to examine the behavior in telecommunications industry. The introduction of the MNP shows significant impacts on consumers switching intention in the industry in context of Cambodia. The findings of this chapter empirically suggest the additional factor besides three items of PPM model and this suggestion is also supported from results of previous empirical studies.

With their respective meanings, all factors indicate the extent to which the market is functioning well and consumers are using the ability to select and switch competitors that compete in Cambodia. Consumers are not really satisfied with any of current mobile carriers in Cambodia and they have no intention to change from one to another operator due to service quality and cross-network connections as well as availability of services. Although the government has granted many licenses to new entrants

to improve the market competition and consumer benefits, the market competition does not well function as expected but it has increased concerns on their business performances and the use of scarce resources. For instance, mobile phone numbers, which become status symbols used by high class people to show off their wealth and power, have been used as customer lock-in. Switching users have to bear such switching costs of losing phone numbers and their costs.

Therefore, the government has to improve the efficiency of licenses with some common objectives such as regulating provision of an essential public service, expansion of networks and services, quality of service, consumer protection and so on. There should be also a clear regulation to allocate resources, and to withdraw them in case that the operators do not respect to the conditions and law. Accordingly, the study would provide the theoretical explanation for the existence of the MNP and would illustrate the implications of the MNP to reduce switching costs and the customer lock-in. It also becomes driving forces of improving competitions amongst mobile telecommunications suppliers, especial in countries of similar context.

This case study would give recommendations that the government or the policy maker shall a set of regulations on universal service obligations, frequency and number allocation and management. The policy shall focus on network size, network service quality, basic services and other essential services. The findings suggest that there shall be government intervention to facilitate how customers use their capabilities and choose between competing suppliers. Policy on new innovations, such as mobile number portability, shall be in place to reduce switching costs and the customer lock-in. Competition law in telecommunications industry is inevitable for the government to ensure the performance of all mobile carriers, by enforcing the price settings and access pricing, M&A (merger and acquisition) and the use of market power, interconnection obligation, and competition in the local network and the long distance market. This will ensure that main mobile carriers in Cambodia will not use access pricing and interconnections as a tool for the creation of monopoly and competitive entry.

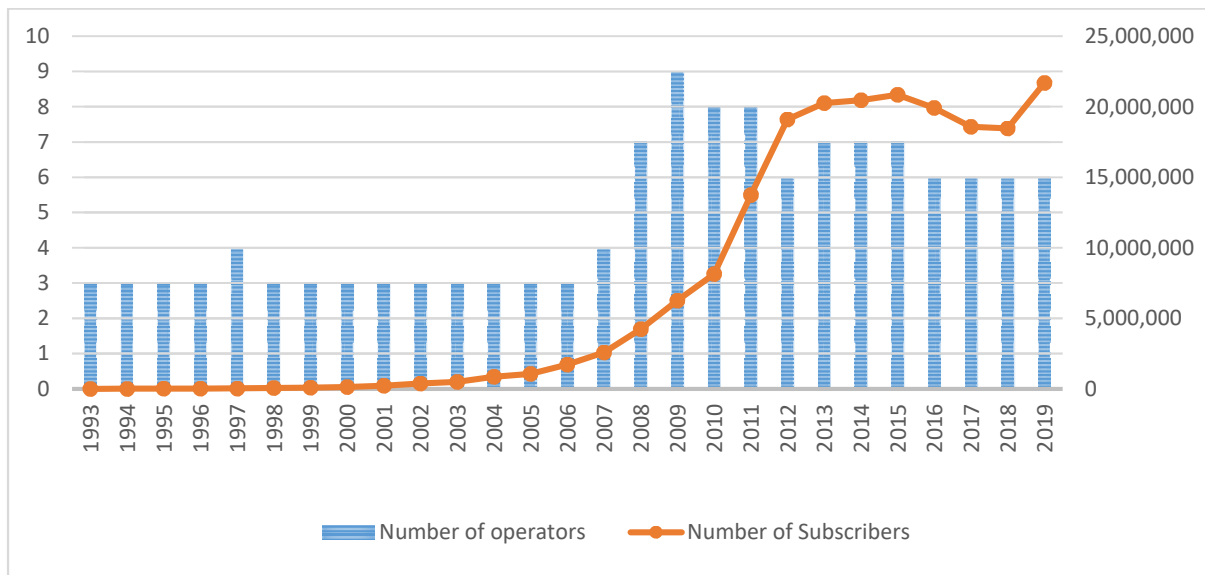
## **CHAPTER V: REGULATORY TRADEOFFS IN CAMBODIA'S TELECOMMUNICATIONS INDUSTRY**

### **1. Background of Regulatory Policies**

Cambodia's telecommunications system has been secured and the media has been supported by UNTAC communications after the Paris Peace Agreement in 1991. In Phnom Penh, however, there were only 3,000 telephone lines in the capital, and very limited capable radios were used to connect these networks from Phnom Penh to other provinces (Sum, 2008). Number of fixed-line connections had increased to 4,000 as of the end of 1992, based on a case study on Internet in Cambodia (ITU, 2002a). Camintel became a joint-venture company between PT Indosat of Indonesia and Cambodia (ITU, 2002a).

Since then, the development of telecommunications industry in Cambodia has been characterized by a high level of foreign and private investments, while most of which has been invested in the mobile telecommunications services. For instance, the government of Cambodia permitted few foreign investors to invest in the industry in 1992 and these companies had been licensed to launch the telecommunications services taking forms as joint-ventures with the Cambodian government, such as CamTel launched in October 1992, Casacom in November 1992, Tricelcam in October 1993 (ITU, 2002a). Later, CamGSM entered the market in March 1997 and Camshin came in April 1998. However, since 2007, the government has allowed all mobile operators to be fully owned by either local or foreign private investors when Applifone's Star-Cell began to provide GSM service. One year later, the MPTC granted various licenses (2G, 3G and CDMA) to five more players, namely Cadcomms, Excel, Metfone, Smart Mobile and Beeline. Since its inception in 1993, on behalf of the Cambodian government, the MPTC has worked as a policy maker, lawmaker and service provider, according to Im (2015a). The number of operators has been fluctuating from 1993 and peaked at nine in 2009 while the total subscriptions dramatically increased to 21 million in 2015, compared to 2.6 million in 2007 and 0.04 million in 1993 (Figure-29).

Figure-29: Number of Mobile Operators and Subscribers from 1993 to 2019



Source: Telecommunication Regulator of Cambodia (Im, 2019)

In spite of many foreign private investments, firstly in partnership with the MPTC and later in forms of fully private ownership, it was remarkably a lack of transparency during the implementation of the foreign investment policies contributing to telecommunications development and expansion of the communication network (ITU, 2002a). It has also created a confusing mix of government shareholdings and agreements. In some cases, the market entry was restricted by some agreements which were signed by the MPTC and operators, such as contract with Telstra for establishing an international gateway. However, the government granted another license on international gateway to Tele2, a sister’s company of CamGSM, in 2000.

Also, the overcrowded and unstable market has caused some deficits and issues arising from the absence of an overarching regulatory framework and precise policy. Some of the challenges from their business activities include predatory prices, unfair competition, network connection, poor SIM card management, online gambling, etc. (Moa, 2019). During the ITU international training program held on 26-28 August 2015 in Kuala Lumpur, Malaysia, Mr. Im Vutha summarized some dispute resolutions and these remaining challenges in Cambodia’s telecoms market (Im, 2019). These disputes usually are related to the fact that some mobile carriers keep accusing one another of the unfair business practice such as the price dumping and the unpaid liabilities of the interconnection fees. Additionally, another report of the TRC divides these remaining challenges into four categories, namely the allocation and management of numbering plans, the license management, the problems in market competition, the misbehaviors of mobile carriers, and the problems in managing licenses on internet café (Moa, 2019).

The scarce resource is inefficiently allocated since many telephone numbering licenses have been issued by the MPTC at a very low fee, which has allowed service providers to purchase many number segments and which has resulted in another type of business selling telephone numbers in inefficient ways, based on the achievement report of the TRC (Moa, 2019). The exclusive license on the phone numbers hints at numerous special and lucky numbers while mobile operators with fewer numbering licenses are not able to compete against the incumbents. Then, it turns into an unfair competition in supplying telephone numbers. Up till now, Metfone has received nine licenses of numbering while Smart Axiata has 11 and CamGSM possesses 13. Also, the TRC describes the inefficient uses of numbering by dominant operators. In particular, the number of registered simcards of Metfone is about 26% of total licensed numbers, compared to Smart Axiata at 50% and CamGSM at 23% (Moa, 2019). An inefficient allocation of numbering would be part of market failure in the telecoms arena. Moreover, most of the scarce common resources are controlled by the incumbents, and this becomes barriers for new entrants and future expansion of the mobile network and investments due to the lack of regulatory policy to modify or withdraw unused licenses (Im, 2015b).

Table-34: Mobile Carriers and Numbering Licenses, July 2019

No.	Mobile Operator	Prefix	Total prefix	Total licensed numbers
1	Viettel (Cambodia) Pte. Ltd	097*, 088*, 071*, 060, 066, 067, 068, 090, 031	9	36,000,000
2	CamGSM Co., Ltd	012, 014, 017, 077, 078, 089, 092, 095, 011, 061, 076*, 085, 099	13	17,600,000
3	Smart Axiata Co, Ltd	010, 069, 070, 086, 093, 096*, 098, 015, 016, 081, 087	11	16,000,000
4	South East Asia Telecom	018*	1	8,000,000
5	XinWei (Cambodia) Telecom Co., Ltd	038*	1	8,000,000
6	Cambodia Advance Communication Co., Ltd	013, 080, 083, 084	4	3,200,000
<b>Total</b>			43	88,800,000

Source: Monthly Achievement Report of the TRC (Moa, 2019)

Though merger and acquisition are usually used to resolve financial problems, it is necessary to be controlled for avoiding the increasing market power which may cause economic inefficiency and the failure of market competition as a restraint on suppliers. Indeed, after the merger and acquisition, Metfone remains the leading mobile operator with the largest market share of 43.60% by the August 2015 (Im, 2015b). Smart Axiata has surpassed CamGSM to be the second market leader with the market

share of 37% while CamGSM has decreased to 18.4% and other four operators hold less than 1%. Furthermore, these few dominant suppliers cause the market high concentrated, checked by the Herfindahl-Hirschman Index (HHI) which is widely accepted in the competition law, antitrust law and technology management to measure the concentration level in a particular industry (William & Alan, 2009). The HHI of Cambodia's mobile market was about 3600 in 2015, compared to 2310 in the early of 2010 (Im, 2015c; Phun, 2010). As a result, the TRC has declared that mobile operators in Cambodia have used the merger and acquisition method for increasing their resources and market powers, rather than network coverage, service quality, efficient production, or innovation.

Recently, the TRC notified a steady decrease in calling duration (minutes) leading to the losses in regulator fees (Im, 2015a). All operators are required to pay for kinds of network connection at 0.3 cent (US\$) per minute to the regulator, according to the inter-ministerial declaration on price floor identification in 2009. The regulator fees are gradually decreasing by 11% in 2015, compared to 15% in 2014 and 18% in 2013 (Im, 2015a). The decline in 2013 was caused by the merger between Hello Axiata and Smart, and the bankruptcy of Mfone. It was also impacted by the differences between the calling minutes reported by the TC and Viettel. Nevertheless, the decrease in 2014 was resulted from the promotion strategies among the three market-leading operators on the grounds of the free additional balances for on-net calls. The fact that Sotelco was acquired by Viettel in 2015 and that all mobile carriers remain using such promotions have forced the regulator fees to drop by 11%. When only few mobile operators possess larger market shares, the regulator fee will consequently decline (Im, 2015a). So, the merger and acquisition method has to be well regulated and controlled by the telecoms law and proper regulations.

In particular, opening market to competition is believed to make consumers more active in choosing any product and service at the best and lowest costs, to stimulate firms to innovate new products and services, and to put pressures on the quality improvement, the price reduction and the consumer welfares as well as the economic efficiency. However, the ubiquitous and open networks provide not only great benefits to the society as a whole, but also some vulnerable consequences. As both desirable and non-desirable situations may happen, it requires an adequate provision for a lawful interception to make sure that the public interest is protected, or the products and services run into the best interests of all citizens. More specially, when the benefits are resulted from some private sector companies in new competitive market, the newly privatized firms have to operate within certain limits and regulations. Indeed, most telecommunications markets have suffered from the aberrations regardless of the existing multiple players. Therefore, the government plays a fundamental role in establishing some necessary terms and

conditions in which the mobile telecommunications can develop through the efficient allocation of the wireless spectrum, the enactment of vital legislation, and the leadership in e-government (Tim, Nicolas, Michael, & Masatake, 2012). Also, the government has to create an environment in which all players can fairly collaborate or compete.

From the ICT assessment in Cambodia undertaken by the USAID in 2001, a number of vitally important policy-oriented elements were recommended to be addressed as soon as possible (USAID, 2001). Despite the lack of proper regulatory policies and framework in telecommunications sector, the government of Cambodia established the National Information Communications Technology Development Authority (NiDA) directly under the prime minister in 2000 to deal with particular problems concerned over the ICT development. Telecom Cambodia was established in 2006 as part of the Royal Government's second mandate by the MPTC (Lao 2008). The TC takes charge of developing an appropriate and modern ICT in Cambodia (Im, 2015a). The Telecom Regulator of Cambodia was created in 2012 to take care of laws and regulations portion. According to the MPTC, the government should strengthen the regulations and policies through specific technical standardization following the ITU recommendations and other world organizations. These regulatory policies are also to encourage a fair competition compliant with both local and international markets (MPTC, 2012).

With the technical assistance from the ITU and ADB, the Cambodia's Telecommunications law was approved by the Council of Ministers and National Assembly of Cambodia in December 2015. This new law mainly focuses on the separating power and roles of legal institutions such as the MOPT (previously called MPTC) and the TRC. In contrast, it does not include any specific regulatory policy in terms of the standard, the service quality, the interconnection, the efficient allocation of licenses and the frequency spectrums, the telecoms numbering, the pricing and accessing price, or the universal service obligations. According to this new telecoms law, the provision of these detailed regulations is subject to be determined and set by the MPTC afterwards. At the same time, this law provides a legal authority to the TRC as a regulatory body and resolve disputes relating to the telecommunications operation. It also performs its administrative, regulatory and financial duties and function in order to investigate and to take measures against all business misconducts which are not compliant with the technical requirements and the quality standard of the telecoms services and equipment.

Designing appropriate and effective regulations is not simply a technical matter of obtaining efficiency objective, but a matter of achieving the social welfare goals and sustainable development as well as the poverty reduction. Consequently, the enhancement of consumer welfares, protection and

empowerment in Cambodia's unstable market is even more vital. For these reasons, a set of appropriately well-designed and effective regulations in the telecoms sector should be carefully established. It is even more complicated if an appropriate regulatory model and its effective policies have not been applied to the market conditions. To response to unstable market, some proper regulations and policies have to be established for the current situation of Cambodia. Therefore, this chapter aims to analyze the policy tradeoffs. It also intends to prioritize the regulations and policies, creating an appropriate environment in which all players fairly exercise their abilities and powers for protecting the public interests and for bringing the best interests to all citizens as well as for improving sustainable development of the telecommunications sector.

As the previous parts already explained the current situation of unstable mobile telecoms market in Cambodia and some deficits caused by the absence of proper regulatory policies in the sector, the rest of this chapter is structured as follows. Next section will review some previous studies on causes and effects of establishing regulations and policies and on various methods used to measure the extent to which a particular set of regulations or policies impacts on the social welfare. The following part will explain all methodologies and analytical procedures used for analyzing the regulatory tradeoffs. Results from analytical tool will be illustrated on the grounds of the demographics of respondents and the significant relation between variables, on which a concrete discussion and interpretation will be made. Finally, the chapter will conclude the regulatory tradeoffs in the context of Cambodia.

## **2. Literature Review of Regulatory Policies**

### **2.1. Rationale and Implementation of Regulatory Policies**

In a perfectly competitive market, the identical goods and services of the economy as well as their prices are determined in the marketplaces in relation to the consumer preferences, incomes and minimum production costs. The efficient outcomes are then determined by the maximization of the social welfares. When a market fails to achieve such market-efficient outcomes, the situation becomes an important reason for the government to intervene the market by setting some essential regulations or policies which are defined as both economic and the social rules (Nicholas, 2005).

Regulatory intervention takes many forms in developing countries and the form of these regulations varies across countries at different time frames. Recently, regulations have been used as an important government's tool and an integrated part of a well-functioning economy to avoid market failure and unstable market (WorldBank, 2001). Following the failure of state-led economic planning and the success of liberalized markets in some developed countries (WorldBank, 1995), this sector has been



widely liberalized and privatized with the intention of promoting the development of the telecoms industry through a reform of regulatory frameworks and regulations. The strategy for the regulatory reform is critical to its effectiveness and the policymakers need to give a great deal to the design of regulatory frameworks. According to Guasch and Hahn (1999), a full deregulation may lead to monopoly while a partial deregulation, in some cases, may not lead to an improvement over the status quo. Then, the design of the effective and appropriate regulations in the telecoms sector in developing countries is not simply as a matter of the technical design, but as a matter of the regulatory quality to balance the accountability, transparency and consistency (Parker, 1999), and as a matter of the achievement of social welfare goals which are usually set to improve the economic efficiency and to achieve the sustainable development as well as to promote the poverty reduction in developing countries (Paul & Sarah, 2007; Hossein, Colin, & David, 2007).

Telecommunications service providers generally benefit from incentive laws and policies, according to Cave, Majumdar and Vogelsang (2002). Ramsey pricing principle, as an example of economic efficiency, is defined as an efficient configuration of the retail and the access price, involving differential mark-ups. These authors also stated that the most reasonable pricing policy depends on the assumptions and level of market competition. Additionally, the fairness in telecommunications industry ensures that all players act transparently (Nicholas, 2005). The fairness especially includes policies that promote good market operations to safeguard that customers have the ability and confidence to enter the market. In the case of a competitive market failure, the government must prevent some dominant suppliers from abusing market power and enhance public confidence through transparent supervision and licensing procedures (Hank, 2000). With reference to TA in 1996, anti-monopoly policies mainly focus on monopoly, interconnection, and mergers and acquisitions. The sustainable development shall be also ensured by the appropriate policy which attracts new investments and expand the business operation (William H. M., 1997). Similarly, Hank (2000) and Patrick (2008) focus on the pre-competition policy, ex-ante regulation, to encourage the potential growth of the telecoms sector.

Most of the problems in formulating and implementing telecommunications policies are based on basic tradeoff between the social and economic goals. Improper regulations may have a significant adverse impact on the economic growth. By reviewing historical data in some developing countries, regulations which control prices and market entry in order to improve workable competition are likely to reduce the growth and negatively impact on economic growth (Guasch & Hahn, 1999). For instance, the inefficient pricing can be resulted from removing price restrictions and retaining entry barriers. It is because those inappropriate regulations do not reflect to the general needs of their markets and

consequently they impose some significant costs which are higher than the significant net benefits for the average consumer.

Usually, such policies and regulations are conscious or unconscious based on specific preferences. According to Tinbergen (1956), the goal and purpose of a regulatory policy is to choose between some alternatives based on value or weight. It is also a common practice for several jurisdictions, including some in developing countries, to put procedures in place that would require a benefit-cost analysis on some essential factors such as bureaucratic expertise, resource availability, political constraints, and economic impacts (Guasch & Hahn, 1999). The ICT Toolkit provides a recommendation that governments must encourage public participation in the designing policy to guarantee the effectiveness of the pro-competition policies and social benefits.

## **2.2. Measures of Regulatory Policies**

To study the policies and regulations in the mobile telecommunications industry in Cambodia, this chapter concludes main purposes and objectives of the Cambodia's telecoms law 2015. The purposes of this law are to ensure the utilization and provision of effective, safe, quality, reliable, and affordable telecoms infrastructure, networks and services in response to the needs of social and economic development, as stated in Article 1 of the law. At the same time, their objectives are to determine (1) the classification and types of permits, certificates and license, (2) the control and utilization of infrastructure and networks, (3) the national telecommunications number plan and electronic address, (4) the standard, quality of services and telecommunications equipment, telecoms service tariffs, and lawful and fair competition, (5) the universal services obligation, capacity building, research and development, (6) the rights of telecommunications operators, person involved with the telecommunications industry and subscribers, (7) the rights of telecommunication operators and fair competition and (8) the rights of users. Though any of these specific regulatory policies had been determined and established, the telecoms law already authorizes the legal power to the MPTC and TRC to design the shortcomings of effective regulations to satisfy their objectives.

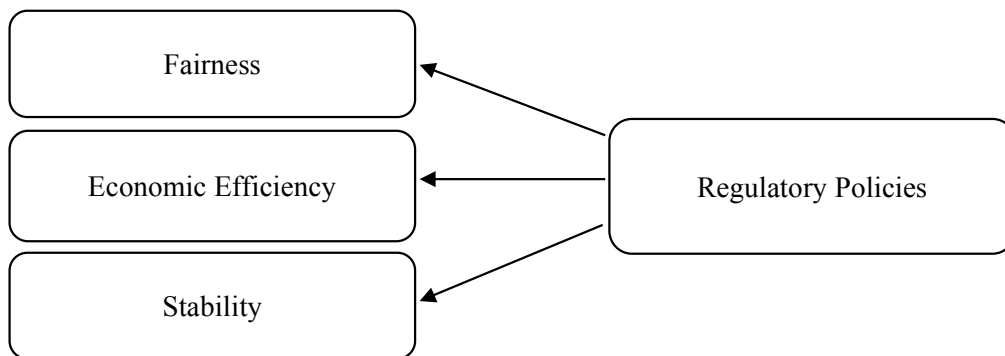
Similarly, in 2014 the Royal Government of Cambodia promulgated a law on the adoption of the National Strategic Development Plan 2014-2018, which is associated with other government's plans such as the Rectangular Strategy, Sectoral Development Strategies, investment programs and the national budget, the ASEAN Masterplan and the like<sup>17</sup>. In addition to the earlier significant progress

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<sup>17</sup> National Strategic Development Plan 2014-2018, <http://www.mptc.gov.kh/site/detail/319#.V6ArSaKCqnM>

through expanding the coverage of the post and telecommunication services and Internet, which increased in the number of users, the NSDP 2014-2018 lists some policies priorities for further developing the ICT as a modern, state-of-the-art and high quality services. To achieve these goals, the government has set up some planned actions to improve the service quality and make the post network more efficient, to develop standards and additional regulations, to enhance the ability in implementing and managing universal service, to undertake the costing exercises, to increase market growth in new innovations, to expand the network coverage in remote areas and some potential areas for economy and tourism, and to improve the efficiency of the backbone network infrastructure. Meanwhile, it is also planned to develop human resource and encourage further private sector to invest in new innovative technologies. Indeed, beside the act of promoting the adoption of telecoms law 2015, the government tries to strengthen the roles of supervisory institutions and enhance institutional coordination to develop and manage this sector with transparency and efficiency. Consequently, the MPTC receives the legal power to strengthen the regulatory framework through the establishment of a sub-degree on a universal telecommunications obligation policy, a national broadband policy, a telecoms development policy and a law on radio communications.

Figure-30. Variables of Regulatory Policies



Source: Made by Author

The literature therefore suggests that regulatory policies are composed of three different groups of major variables, including economic efficiency, fairness, and sustainable development. More specifically, the components of these variables are usually determined by various aspects of the government with higher point denoted better performance regarding the variables concerned. Hence, this study summarizes the variables as follows. Fairness refers to the standard, quality of services and telecommunications equipment, lawful and fair competition, the universal services obligation, capacity building, research and development, the rights of telecommunication operators and fair competition, the rights of all users to access to all services with same quality and price with perfect information, the

interconnections, and transparency in providing promotional strategies. According to the Cambodia's telecoms law 2015, the economic efficiency of regulatory policies in this paper consists of the efficient allocation of licensing, frequency spectrums and numbering plan, the efficiency in setting prices, access prices and taxes, and the efficiency in timely adopting new innovative technologies for more efficient production. Finally, the policymaker is required to improve the market conditions for the development of the telecoms industry in Cambodia.

### **2.3. Tradeoff Analysis of Regulatory Policies**

Regulations or regulatory policies are made and passed by the legislation having the force of a law with some specific forms such as legal restrictions, contractual obligations, social regulations, certificates, accreditation or market regulations and the like. Legislative acts and regulatory initiatives normally produce both costs and benefits as a whole which may result in unintended reactivity effects. Benefits are typically the main goals of the government's intervention and regulatory actions at hand, but their sight effects are also inevitable. A set of regulations is defined efficient when the total benefits exceed the total costs. That is why it becomes an essential activity for policymaker to understand what benefits and costs will be generated by a given regulatory option and who is going to be affected (positively or negatively) by it. Therefore, the regulatory tradeoffs are evaluated by a variety of impact assessment methods by the policy makers.

One of the common tools to solve the tradeoff situation is cost and benefit analysis which is able to bring some evidences for policy decision-making to ensure that a particular set of regulations will efficiently deliver their objectives to the public at high profits and low risks. According to David and John (2009), it, on one hand, may help the government and policymaker to determine which regulations work and which do not as well as how well individual regulations are working. On another hand, it cannot be directly converted to monetary unit. Indeed, some specific measurement techniques are usually used to evaluate specific non-monetary benefits and costs which have become a common practice in legal system (David & John, 2009). While the impacts are typically difficult to quantify or monetize, the net benefits associated with non-market impacts and in particular with improved well-being are usually of a project or regulations assessed with reference to individual's willingness to pay (WTP) for or willingness to accept (WTA) a given policy or project.

WTP is the maximum amount of money an individual is willing to pay a particular product or service while the WTA is the minimum amount of money a person is willing to accept for abandoning a good or service. WTP and WTA can be estimated in two different ways by observing what an

individual actually pay to achieve a given outcome (so called revealed preference, RP) or by asking directly individuals how much an individual is willing to pay to achieve a given outcome in the future (stated preference, SP), according to David and John (2009). Similarly, Ross (2001) defines that RP method is for an observation of an action that has already taken place or individuals' choices which takes form of actual choices made by consumers in a market setting. However, SP method observes the measures which individuals say they would do in a given context, or individuals' choices which may be elicited from survey responses to hypothetical but realistic choice scenarios. As the idea of utility maximization is related to choice behavior, these two techniques bring some special characteristics in the economic analysis; (1) the government policy making and welfare criteria derived from choice data in the workable practice, (2) the qualitative predictions about the environmental changes, (3) a wide scope of personal, household, business, project, regulatory policies, and the like, and (4) the empirical predictions from a relatively sparse model of the choice problem (Jonathan & Paul, 2004).

David and John (2009) summarize the commonly used methods in the RP as follows: travel cost models, Hedonic models, advertising behavior models, costs of illness methods, and so on. At the same time, the SP typically includes contingent valuation methods, choice modeling and conjoint analysis. The strengths of the RP and SP methods can force respondents to consider tradeoffs between attributes, and make the frame for reference explicit to respondents. It is also to estimate the price for attributes, welfare impacts, and level of customer demand for alternative products or services in non-monetary terms (Ross, 2001). The application of the model is depending on the assumptions, theoretical foundations, and scientific methods used in modeling, data collection and analysis. All this suggests that the SP approach has becomes widely adopted in various sectors, particularly to understand the behavioral responses of individuals to government's new policies or regulations, or to estimate demands or preference for new products in the business world. Therefore, the most suitable method for the actual compensation which an individual suffers from regulatory policy in non-monetary unit in Cambodia's telecommunications market is SP technique which requires a survey on the respondents' preference.

#### **2.4. Stated Preference Method**

This method is originally adopted Thurstone (1931) to examine indifferent curves from the experiment of individual choices. It has become wider and wider in transportation field and others since 1970s; Hoinville (1971) measures the respondents' concepts of the trade-off preference for electronic devices, Lerman and Louviere (1978) study the utility expression in travel demand models, Hensher and Stopher (1979) study the behavioral travel choices, Kocur, Adler, Hyman and Aunet (1982) forecast

the travel demand with the direct utility assessment, Kroes and Sheldon (1988) introduce the SP method in the field of transportation with the supplement of revealed preference method, Wardman (1988) compares reveal preference and stated preference models in travel behavior, Beaton, Meghdir, and Carragher (1992) conduct an assessment on the effectiveness in transportation control measurement, and Hensher (1994) studies the travel behavior.

Moreover, it is broader in other various fields such as marketing, economics and environment. The SP approach has been used to observe consumer preference in real markets for the new designs and strategies (Jordan & Harry, 1990). Bateman, et al. (2002) also study money values by using the SP technique to study a set of choices and their willingness to pay for particular benefits. Furthermore, Irigüen and Ortúzar (2004) use the SP to measure the consumer willingness to pay for the reduction of fatal accident risk in urban areas, and Stephane, Thomas and John (2007) estimate the choice behavior on airport and airline in the US. Consumer wishes and preference for acceptable product and attributes of drinking water were also analyzed by the SP method (Techneau, 2007).

This economic evaluation technique is not only for marketing research, but also policy decision-making tool. It is to describe the situations or contexts which respondents are supposed to face, by constructing the purposed-designed survey. This direct approach is to observe the consumer preference in a hypothetical situation where there is too much uncertainty in stating behavior in new situations. This suggests that thus far the SP approach has becomes widely adopted in various sectors, particularly to understand the behavioral responses of individuals to government's new policies or regulations, or to estimate demands or preference for new products in the business world.

According to Kroes and Sheldon (1988), the single general approach includes conjoint analysis, functional measurement, and tradeoff analysis while the last approach refers to the transfer price method. Conjoint analysis is also called multi-attribute compositional model in which the statistical technique is used to examine developed surveys. It is assumed that the data are collected from multiple respondents in multiple data points of layered model, dependent variable shows the choices or tradeoffs, and that independent variables are categorical and coded. The analysis of these tradeoffs is traditionally administered as ranking or rating exercises. Also, it is commonly to present the tradeoffs as choices where participants are required to choose the most preferred alternative from selection of competing alternatives. At the same time, different econometric and statistical methods have been used to examine the utility function. Table-35 summarizes the characteristics and scales of measurement as simple or proportional methods.

Table-35. Scales of Measurement of Stated Preference

Method	Ordinal-level response				Ratio-level response
	Binary choice	Multi-nominal choice	Ranking	Rating	
<b>Open-ended contingent valuation</b>					√
<b>Dichotomous contingent valuation</b>	√				
<b>Attribute-based method</b>	√	√	√	√	
<b>Paired-based method</b>	√				

Source: Stated preference question types (Thomas, 2003)

The characteristics of the SP nonmarket valuation methods are contingent valuation, attribute-based method and paired comparison. Contingent method is commonly used to evaluate a single good or attribute while the attribute-based method and paired comparison are used to predict the preference from several goods and attributes which are similar or different with their different levels of attributes, including monetary and nonmonetary terms (Thomas, 2003). Conjoint analysis is also called multi-attribute compositional model in which the statistical technique is used to examine developed surveys. It is assumed that the data are collected from multiple respondents in multiple data points of layered model, dependent variable shows the choices or tradeoffs, and that independent variables are categorical and coded. The analysis of these tradeoffs is traditionally administered as ranking or rating exercises. Also, it is commonly to present the tradeoffs as choices where participants are required to choose the most preferred alternative from selection of competing alternatives. At the same time, different econometric and statistical methods have been used to examine the utility function.

The conjoint analysis is determined from the main effects analysis-of-variance model to decompose the judgment data into components based on qualitative attributes of alternatives (Kuhfeld, 2010). It will produce the part-worth utility for each level of each attribute. Large part-worth utilities imply the most preferable, while the small value of part-worth utilities refer to the least preferred levels. So, the attributes with larger part-worth utilities become more important in predicting preference. The part-worth utility function takes form as follows:  $y_i = \sum_{j=1}^k \alpha_j \cdot x_{i,j}$ , where  $y_i$  is the preference for the alternative  $I$ ,  $\alpha_j$  the function representing the part-worth of each of the  $L$  different levels of alternatives,  $x_{i,j}$  the level of the  $j^{th}$  attribute of the  $i^{th}$  alternative. This part-worth function defines different part-worth utility value for each of the  $j$  levels of a given attribute.

### 3. Methodologies Used for the assessment of Regulatory Tradeoffs

#### 3.1. Attributes of Regulatory Policies

Three main drivers, including fairness, sustainable development and economic efficiency, will be used in the study in order to resolve the research problem. Each driver contains some particular items with respective levels. Table-36 recaps all attributes, explanations and levels. In order to monitor and measure the changes taking place in the telecommunications and ICT regulatory environment, the ITU has used the quantitative methods to facilitate both the benchmarking identification of evolutionary trends in legal and regulatory frameworks. This ICT regulatory tracker classifies the development of regulatory environment into four groups, including regulatory authority, regulatory mandate, regulatory regime and competition framework. All indications of each group are weighted from 0 to 2 while the reference for the scoring is what is considered the best possible scenario with different meanings. For instance, no (0 point) and yes (2 points) are used for the components of regulatory regime while the scores under the competition framework are indicated as 0 (Full control: no foreign ownership allowed), 1 (Moderate control: 50% or minority interest) and 2 (Loose control: no restriction or controlling interest)<sup>18</sup>.

The European competition telecommunications association (ECTA) regulatory scorecards also seek to assess the effectiveness of regulation and the link between effective regulation and investment across 19 EU countries, by measuring the powers and performance of national regulator authorities (NRAs) and the regulatory regimes overall<sup>19</sup>. Four main areas are used and each of these sections is weighted according to their importance in delivering the objectives. Furthermore, the total score of each section is calculated by the aggregation of the representative weights of its criteria. Most of the weights is rated between 0 and 5. For example, the scores to assess whether there is a clear policy on price control for access products are marked as: maximum score (5 points) if there is a clear policy on the application of price control for access services in a general policy paper; Intermediate score if price control is determined in the context of each individual market analysis and substantiated by a clear policy; minimum score (0 point) if there is no clear policy in terms of price control.

At the same time as various regulations are significantly influences on the development of the ICT sector, the telecom regulatory environment (TRE) was developed to evaluate the improvement of the ICT performance which is affected by the desired objective of telecom regulatory reforms (Samarajiva

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<sup>18</sup> ICT Regulatory Tracker, <http://www.itu.int/en/ITU-D/Regulatory-Market/tracker/Pages/default.aspx>

<sup>19</sup> ECTA regulatory scorecards, <http://www.ectaportal.com/en/POLICY-PUBLICATIONS/Reports/Regulatory-Scorecards/Regulatory-Scorecard-Overview/>



& Dokeniya, 2005). It is to measure the perception which is affected by several different factors, namely connectivity, price, quality of service and choice. Normally, the TRE is one of essential tools for new investments to understand the performance and risks in the telecom sector while these risks are associated with macro-level or country environment, market or commercial environment, and regulatory environment. The TRE score ranges from 1 to 5, while the higher TRE score means the higher effectiveness of the regulatory policy<sup>20</sup>. This analytical tool has been applied many countries in Asia, such as India, Maldives, Indonesia, the Philippines, Thailand and so forth.

Table-36. Attributes, Description and Levels of Regulatory Policies

Attribute	Description	Levels
<b>Fairness</b>	- Competition policy	B1: 0 – 25% (low regulation)
	- Interconnection	B2: 25 – 50% (lower moderate)
	- Consumer right and protection	B3: 50 – 75% (upper moderate)
	- Asymmetric information	B4: 75 – 100 (high regulation)
	- Quality of service	
	- Universal service	
	- Promotion	
<b>Economic Efficiency</b>	- Access pricing	A1: 0 – 25% (low regulation)
	- Network unbundling	A2: 25 – 50% (lower moderate)
	- Technology innovation	A3: 50 – 75% (upper moderate)
	- Licensing management	A4: 75 – 100% (high regulation)
	- Frequency allocation	
	- Numbering plan	
	- Pricing controls	
<b>Stability</b>	- Investment or development	C1: 0 – 25% (low regulation)
	- Network/Service expansion	C2: 25 – 50% (lower moderate)
	- Sustainable competition	C3: 50 – 75% (upper moderate)
		C4: 75 – 100% (high regulation)

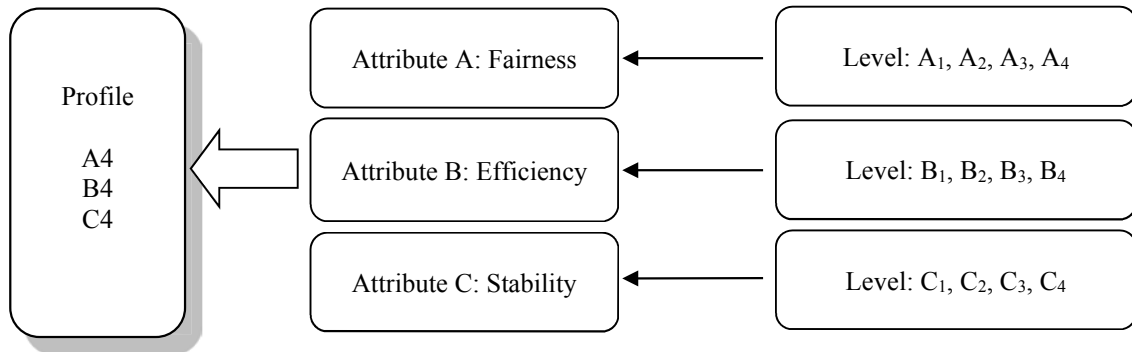
Source: Made by Author

The three drivers of the regulatory policy are treated as individual attributes, each of which is assumed to have four main ranks (Table-36). As the rank is hard to be calculated from exact numerical value, this study will estimate the extent to which the government intervene the telecoms sector in percentage. The rank is scaled from 1 (less regulated than 25% or no controlling interest) to 4 (strictly

<sup>20</sup> Telecom Regulatory Environment (TRE) Assessment, <http://lrneasia.net/projects/2008-2010/indicators-continued/telecom-regulatory-environment/>

regulated more than 75% or full control) while other two levels are considered as lower and upper moderates. Four classification of the economic efficiency are marked as A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub>, and A<sub>4</sub>. Similarly, the ranks of the fairness are B<sub>1</sub>, B<sub>2</sub>, B<sub>3</sub>, and B<sub>4</sub> while the ranks of the sustainable development are noted C<sub>1</sub>, C<sub>2</sub>, C<sub>3</sub> and C<sub>4</sub>, as shown in the Figure-31.

Figure-31. Relationship between Profiles, Attributes and Levels



Source: Made by Author

### 3.2. Tradeoff Scenarios of Regulatory Policies

Three attributes and four ranks would produce a full factorial design of 64 alternatives. However, only 16 alternatives, generated by the orthogonal design of SPSS, will be focused in this paper due to the complexity of questionnaires, as well financial and time constraints (Table-37). Align with the information integration theory, the rating scale is used to collect customers' perception. The rating scale will be divided in 10 levels. A score of 10 means the participants certainly prefer the item while zero implies the participants do not like it at all.

Table-37. Tradeoff Scenarios of Regulatory Policies

Cards	Attributes			Cards	Attributes		
	Transparency	Efficiency	Stability		Transparency	Efficiency	Stability
1	25 - 50%	25 - 50%	75 - 100%	1	A <sub>2</sub>	B <sub>2</sub>	C <sub>4</sub>
2	25 - 50%	0 - 25%	25 - 50%	2	A <sub>2</sub>	B <sub>1</sub>	C <sub>2</sub>
3	75 - 100%	0 - 25%	75 - 100%	3	A <sub>4</sub>	B <sub>1</sub>	C <sub>4</sub>
4	50 - 75%	25 - 50%	0 - 25%	4	A <sub>3</sub>	B <sub>2</sub>	C <sub>1</sub>
5	50 - 75%	0 - 25%	50 - 75%	5	A <sub>3</sub>	B <sub>1</sub>	C <sub>3</sub>
6	0 - 25%	50 - 75%	75 - 100%	6	A <sub>1</sub>	B <sub>3</sub>	C <sub>4</sub>
7	0 - 25%	0 - 25%	0 - 25%	7	A <sub>1</sub>	B <sub>1</sub>	C <sub>1</sub>
8	0 - 25%	75 - 100%	25 - 50%	8	A <sub>1</sub>	B <sub>4</sub>	C <sub>2</sub>
9	50 - 75%	75 - 100%	75 - 100%	9	A <sub>3</sub>	B <sub>4</sub>	C <sub>4</sub>
10	0 - 25%	25 - 50%	50 - 75%	10	A <sub>1</sub>	B <sub>2</sub>	C <sub>3</sub>
11	75 - 100%	25 - 50%	25 - 50%	11	A <sub>4</sub>	B <sub>2</sub>	C <sub>2</sub>
12	75 - 100%	75 - 100%	50 - 75%	12	A <sub>4</sub>	B <sub>4</sub>	C <sub>3</sub>
13	25 - 50%	75 - 100%	0 - 25%	13	A <sub>2</sub>	B <sub>4</sub>	C <sub>1</sub>
14	50 - 75%	50 - 75%	25 - 50%	14	A <sub>3</sub>	B <sub>3</sub>	C <sub>2</sub>
15	75 - 100%	50 - 75%	0 - 25%	15	A <sub>4</sub>	B <sub>3</sub>	C <sub>1</sub>
16	25 - 50%	50 - 75%	50 - 75%	16	A <sub>2</sub>	B <sub>3</sub>	C <sub>3</sub>

Source: Made by Author

### 3.3. Analytical Specification

This chapter is applying the conjoint analysis method for estimating a utility function from individual responses to the questionnaire of a set of 16 options (Kroes & Sheldon, 1988). With this method, participants are freely and independently choosing different options. Once the data is collected, the ordinary least square is applied in order to calculate the rating scores of each option. By using SPSS, the part-worth utility values of all attributes will be also produced.

### 3.4. Data Collection

There are two steps in designing the questionnaires. Firstly, the questionnaire is designed and tested with a pilot test of 50 participants, which are communicated and selected via online (Facebook). The feedback and suggestion from the pilot test are used to simplify the questionnaire. The final version of questionnaire is used to survey customers' perception in four areas of Cambodia down to the time and

financial constraints. Face-to-face survey has been used in order to ensure the data quality, high response rate, and a high degree of control over the data collection process and environment. By using this method, the interviewer can give more comprehensive explanations of questions and tasks than is possible in self-administered modes of questioning. Also, the respondents are motivated to answer the questions completely.

The purposes and scope of the survey are clearly stated in the questionnaire paper, and the interviewer has explained the necessary items of the survey, such as the definition of Regulation of Fairness, Regulation of Economic Efficiency, and Regulation to safeguard the sustainable development in the industry. More specifically, the respondents shall well understand the meaning of the government's intervention by imposing related regulations. The extent to which government or regulators should intervene in the mobile telecommunications market of each measure is represented by its levels, and they are possibly explained in percentage. These levels are (1) Low regulated level, (2) Lower middle level, (3) Upper middle level, and (4) High regulated level. Low regulated environment means that the government will not impose any regulation or very limited number of regulatory policy is imposed to the market, while high regulated level is executed when the industry is fully and strictly regulated by the government or legal institution. As a result, 775 were collected with valid data from the whole random population.

#### **4. Findings on Costs and Benefits of Regulatory Policies**

##### **4.1. Participants' Information of Regulatory Policies**

The demographic results of the respondents indicated that 49.2% of the participants were women and 50.8% were men. 44.60% of them age between 19 and 28 years old. 24.2% are aging younger than 19 years (Table-38). 47.1 % are student and 50% are working people. Talking about income, more than half of participants are working people and their incomes ranging between 100US\$ and 600US\$ while 29.0% have no income. At the meantime, their payment on mobile phone of majority of participants is low at less 10.00 US\$ per month. 28.9% of the participants paid less than USD 5.00 per month, while 8.9% of the participants paid less than 5.00 US\$ per month, while 44% had their monthly payment on mobile phone services up to 10.00 US\$.

Table-38. Demographics of Respondents

<b>Items</b>	<b>Levels</b>	<b>No.</b>	<b>%</b>
<b>Education</b>	lower than high school	102	13.2%
	High school	204	26.3%
	Bachelor Degree	378	48.8%
	Master Degree	74	9.5%
	Doctor Degree	15	1.9%
	Other: .....	2	0.3%
<b>Occupation</b>	Government Officer	73	9.4%
	Non-governmental organization (NGO)	13	1.7%
	Employee	198	25.6%
	Agriculturist	30	3.9%
	Student	365	47.1%
	Self-employed	87	11.2%
	Other: .....	9	1.2%
<b>Monthly Income</b>	No income	225	29.0%
	Less than 100\$	141	18.2%
	101 – 200\$	125	16.1%
	201 – 400\$	130	16.8%
	401 – 600\$	84	10.8%
	601 – 800\$	31	4.0%
	801 – 1000\$	12	1.5%
	More than 1000\$	27	3.5%
<b>Monthly Payment</b>	No payment	11	1.4%
	Less than 5\$	224	28.9%
	6 – 10\$	341	44.0%
	11 – 15\$	81	10.5%
	16 – 20\$	49	6.3%
	21 – 50\$	52	6.7%
	51 – 100\$	13	1.7%
	Higher than 100\$	04	0.5%

Source: Made by Author

#### 4.2. Consumer Preference for Regulations

The Table-39 of part-worth utilities was obtained from the conjoint analysis. The fairness goal is more preferable at an upper middle level with the highest relative importance (38.11%). Goals of the economic efficiency at the lower middle regulated level and a highly regulated policy on the sustainable development are also favored at relative importance of 33.00% and 28.90%. The below table also shows the utility with the highest value of most and least attributes, and the highest value level of utility is preferred for those with low or negative values.. The fairness gains preference on upper middle level at the estimates utility of 1.198. The second attribute of economic efficiency is of its estimates utility on lower middle level at 0.766 while the stability is favored at highest level of regulation at 0.610. Despite low priority, the participants suggest a development of mobile telecoms services with regulated level.

Table-39. Part-Worth Utilities

Attributes	Percentage	Estimates Utility	Relative Importance (%)	Rank
Economic Efficiency <sup>a</sup>	0 – 25%	0.291	33.00	2
	25 – 50%	0.766		
	50 – 75%	-0.491		
	75 – 100%	-0.566		
Fairness <sup>a</sup>	0 – 25%	-0.196	38.11	1
	25 – 50%	0.057		
	50 – 75%	1.198		
	75 – 100%	-1.058		
Stability <sup>a</sup>	0 – 25%	-0.555	28.90	3
	25 – 50%	0.070		
	50 – 75%	-0.124		
	75 – 100%	0.610		
(Constant)		4.509		
Correlation		Score	Significance	
Kendall's tau		.830	0.000	
Pearson's R		.970	0.000	

Source: Made by Author

The total utility values for all scenarios are calculated from the estimated partial utilities. Then, by taking into account a constant, the total utility of all scenarios shall be produced. Table-40 shows the total utilities of all scenarios, one of which has the highest score of 6,608. This scenario contains the fairness/transparency at 50-75%, the economic efficiency at 25-50% and a highly regulated policy on

the sustainable development. The second highest utility score of 6.348 is given to scenario\_16 which suggests the government to intervene the market with the economic efficiency at a lower middle level and transparency and stability goals at the upper medium level. However, the respondents show their least preference (2.760) on a high regulated policy in the economic efficiency and transparency at the same time.

Table-40. Total Utility of Scenarios

Cards	Attributes			Utility	Rank
	Economic Efficiency	Transparency	Sustainable Development		
6	0 - 25%	50 - 75%	75 - 100%	6.608	1
16	25 - 50%	50 - 75%	50 - 75%	6.348	2
1	25 - 50%	25 - 50%	75 - 100%	5.941	3
14	50 - 75%	50 - 75%	25 - 50%	5.286	4
2	25 - 50%	0 - 25%	25 - 50%	5.149	5
10	0 - 25%	25 - 50%	50 - 75%	4.732	6
15	75 - 100%	50 - 75%	0 - 25%	4.586	7
3	75 - 100%	0 - 25%	75 - 100%	4.357	8
11	75 - 100%	25 - 50%	25 - 50%	4.070	9
7	0 - 25%	0 - 25%	0 - 25%	4.050	10
8	0 - 25%	75 - 100%	25 - 50%	3.812	11
5	50 - 75%	0 - 25%	50 - 75%	3.698	12
13	25 - 50%	75 - 100%	0 - 25%	3.662	13
9	50 - 75%	75 - 100%	75 - 100%	3.570	14
4	50 - 75%	25 - 50%	0 - 25%	3.520	15
12	75 - 100%	75 - 100%	50 - 75%	2.760	16

Source: Made by Author

### 4.3. Discussion and Interpretation

The empirical study has measured the regulatory tradeoffs in order to simplify the complex and significant decisions in designing the regulatory policies in the telecommunications market. The outputs from the conjoint analysis show that the fairness is statistical significant at 99% of confidence with a relative importance of 38.11%, the economic efficiency of 33.00%, and sustainable development of

28.90%. The regulated level of the fairness is chosen at upper-medium and the economic efficiency is favored at a lower medium, while the stability is at high rank.

The main purpose of effective regulations in the field of mobile telecommunications in Cambodia should firstly concern on the fairness. This means that the telecommunications regulations, which are more effective and which provide higher benefits in the current situation of Cambodia, should firstly focus on the improvement of transparency and fairness. Based on the NSDP 2014-2018 and the objectives of Cambodia's telecoms law 2015, this regulatory concept refers to a fair competition between suppliers and the extent to which all Cambodian people fairly access to the mobile cellular services at alternative suppliers without any discrimination. In particular, the MPTC and TRC should concentrate on some specific regulations at the upper moderate level to ensure the transparency in telecoms industry. Because there are already many mobile cellular carriers in Cambodia, the government should set up the standards for improving the service quality and expanding the network coverage especially in remote areas and some potential areas for economy and tourism in accordance with the objectives of the ASEAN Masterplan.

Expanding the network and some essential services such as internet to rural areas is important for Cambodia, as majority of Cambodian people are living in the rural areas (78.6%), according to the Cambodian Inter-Censal Population Survey 2013<sup>21</sup>. When the Agriculture, Forestry and Fisheries share about 28.2% of the GDP in 2015, the mobile cellular services play an important role for farmers to connect with the outside world, receiving the latest information about the best market price for their crops before selling their harvest products, through calling, SMS or internet (Denis, 2008; Shimamoto, Yamada and Gummert, 2015). Enlarging the mobile telecommunications network will consequently enhance the growth in farmers' welfares and the national economy. Simultaneously, the consumer rights and empowerment should be protected from various types of asymmetric information and should be enhanced from the grounds that there is no discrimination between networks of different firms. So, the government must enhance a better functioning market to ensure that all mobile carriers are fairly competing in terms of the access of the scarce resources, interconnection, predatory prices and so on.

With the relative importance of 33.00%, the government of Cambodia shall design the regulatory policies to ensure the growth of the economic efficiency at the low level (lower moderate or less than 50%). However, the MPTC must undertake the costing exercises to avoid the predatory price which

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<sup>21</sup> <http://www.stat.go.jp/info/meetings/cambodia/pdf/c13ana07.pdf>



may be harmful for the consumers in the future after the bankruptcy or exit of some suppliers in the market. Moreover, proper pricing regulations not only ensure a fair competition between suppliers, but also improve the efficiency in producing their services. Hence, the pricing control becomes a widely accepted objective in the economic efficiency.

Another important sort of effective regulatory policy to improve the economic efficiency is related to the licensing, allocation of numbering plan and frequency spectrums. Misallocation of these scarce resources may be clear evidence of a strong bias between suppliers, particularly towards offering phone numbers, and it also becomes a matter of inefficiency. Indeed, an efficient allocation these resources may enable the Cambodian government to improve the service quality and to implement the USO program by attaching them to the obligations of licensees. With these specific regulations on price and licensing, there become incentives for the suppliers to produce their services more efficiently. Then, the government may be able to encourage them to adopt new technology innovations or to implement various types of network sharing, such as network unbundling to improve the efficiency of the backbone network infrastructure.

Regulations finally should ensure the improvement and development of mobile telecommunications services. The survey highlights the preference for high-level government intervention to protect sustainable market competition and the development of the telecommunications industry, as it is statistically important for effective regulation. The government of Cambodia should take actions to implement its prioritized policies on the rights of telecommunication operators, fair competition, develop human resource and research and development, which enables the environment for further investments and sustainable development to invest in new innovative technologies. As a result, the government possibly increases market growth in new innovations, such as e-commerce or m-commerce, and develops e-government.

Overall, the empirical study successfully analyzed the costs and benefits of regulatory policies in telecoms sector, incorporating with the preference for the tradeoffs. The study concludes the following practical conclusions for effective regulation in Cambodia's mobile telecommunications industry. If the government or policy makers make specific regulations and policies for mobile telecommunications services in Cambodia, the first priority is justice or transparency, so it refers to economic efficiency and sustainable competition and development of each sector. In particular, the government or policymaker should enhance a better functioning market with a fair competition and transparency between suppliers with the aim of improving quality of services and expanding the network coverage. Especially, the

competition policy, regulation on interconnection and promotion must be well controlled by the government and this control should be at the upper moderate.

At the same time, regulatory interventions to improve economic efficiency are also preferred at low levels. A set of effective regulatory policies should firstly improve market competition on the grounds that all mobile carriers have the same ability to access to scarce resources, such as phone numbers and frequencies, and that both incumbents and new entrants compete equally and fairly in the market in terms of interconnections and promotions without predatory pricing. Enforcing the regulations on resource allocation is not only to attain the fairness goal, but also to improve the efficient control of scarce resources. Efficient regulation is not simply a matter of allocation of resource, but a matter of pricing, accessing price and new innovative technologies, some of which possibly reduce production costs, increase efficiency, improve quality of services, and so on.

The last but not least is that the policymakers should enable environment for the future investments and sustainable development of the telecommunications industry with an intention to enlarge network and promote the concept of universal services with improving quality of services. Though, the establishment of effective regulations to ensure the sustainable competition and development in Cambodia is less prioritized, the consumers prefer that the government puts a strictly control to create an appropriate environment for stable competition and further investments in telecommunications industry. This development should focus on the expansion of the network coverage and the reduction of digital divide as well as new technological innovations, such as e-government, and e-commerce.

## **CHAPTER VI: CONCLUSION AND CONTRIBUTIONS**

### **1. Conclusion**

The findings of this paper indicate the usefulness of the consumer-oriented perspectives for the regulatory policies in Cambodia. The mixing approach, which incorporates with the consumer perspectives, is an analytical tool for a systematic and periodic process to assess the performance of suppliers and existing regulatory policies in relation to certain pre-established criteria or regulatory objectives. This research approach is used to investigate three different domains to solve the problem of unstable mobile telecommunications market. Cambodia – a developing country with a rapidly emerging telecommunications industry – is chosen as a case for this study, which focuses on the adoption factors of the basic services, the market competition and the tradeoffs between regulatory policies. The paper starts with the measurement of main drivers affecting on adoption of mobile telecommunications services. Then, the second case focuses on the marketing condition which is examined from the indication of the consumer switching behavior.

First case measured the main drivers influencing subscription of mobile telecommunications services in Cambodia. It found that the perceived behavioral control is the first requirement and the first motivational factor which informs the regulators and mobile carriers that they should consider the improvement of the network size or network coverage, the quality of services and the network externalities for the increase of service adoption. The paper also indicates the significance of the second factor, the attitude towards behavior which refers to the usefulness, the ease of use and the compatibility. It illustrates that the customers pay their attention on the simplicity of using a particular system or service, the reputation of the company or products, and the available and reasonable price plans. In addition, the promotions and subjective norms are also significant. Since the promotions can reduce the monthly payment, the prepaid subscribers wish for more promotional campaigns from their suppliers. More interestingly, the adoption is impacted by the subjective norm. Beside the influence from family's members, friends, colleagues, mouth-of-word, the subjective norm also means the effects from cultural beliefs. When purchasing mobile phone numbers, the consumers in Cambodia always think about the meanings of numbers which link to Chinese beliefs. Furthermore, the mobile telephone numbers can also display the owner's wealthy and power.

The findings enable the mobile telecommunications carriers and policymakers to consider these factors as requirements or loopholes to be fulfilled, according to the degree of significance. Though many additional services, beside the basic voice and SMS, have been introduced into the market, most of them are not successfully adopted among Cambodian citizens. For policy-makers, the findings suggest the establishment of key policies concerning the network enlargement and the quality of service as well as the ICT services which best match to the actual behavior of Cambodian. The policymakers should pay more attention on the licensing of mobile phone number in order to improve efficient allocation of the scarce resource for the future expansion of the mobile network and further investments in the industry. Finally, there should be appropriate regulations to avoid the use price discrimination to ensure the sustainable development of competitive market and development of the industry.

The second case studied the consumer switching behavior and investigates the switching barriers with the expected presence of mobile number portability. The findings indicate that the dissatisfaction is the main cause for mobile telecommunications subscribers to switch suppliers. It is mostly caused by the functionality of service, availability of service, large network coverage, service quality, availability of products, big network externality and information security. Also, the attractiveness from competitors becomes the second influential factor on switching intention. When the alternative suppliers are more attractive than the current supplier, users might decide on the movement. The empirical study has also found that consumers in Cambodia's mobile telecommunications market do not have enough ability and confidence to switch suppliers. The switching intention might be locked by another essential factor, called switching barriers. Users with switching intention always face some costs of terminating contract with incumbent, costs of searching for new supplier, and costs of subscribing services or related products of new supplier.

More specifically, the users in the current Cambodia's market hesitate to lose their mobile phone numbers, especially special numbers which have high prices, and they cannot have full exertion of their ability and confidence to choose between competing suppliers. Furthermore, the respondents strongly believe that the future implementation of the MNP would increase their switching intention and consequently growing satisfaction. This part of the paper also summarizes the necessity of the PPM model in social science and the MNP to examine the consumer switching behavior in the mobile telecommunications industry. It provides directions for further researches and effective regulatory policies to introduce new innovations, such as the MNP, to the market to reduce switching barriers and to improve quality of services as well as to enhance consumer empowerment and confidence. Based on the past interconnection issues in Cambodia, better quality of services must take interconnection

between carriers' networks into account. Similar to the previous case, mobile phone numbers must be carefully and efficiently controlled by a set of effective regulations for improving competition in the supply of phone numbers among mobile carriers and for ensuring future development of the industry in terms of efficient allocation of entry licensing and numbering plans. At the same time, there should be appropriate regulations to introduce new innovative technologies, such as the MNP, into market to reduce switching costs and the customer lock-in and to enhance consumer empowerment and protection. Then, M&A has to be cautiously controlled in terms of reducing production costs, enlarging network expansion and introducing innovations. It is also to avoid the misuse of increasing market power.

The last part of the paper conducted the costs-benefits assessment of regulatory policies in the sector. The results from the SP method conclude that most respondents prefer the fairness to the economic efficiency and the stable development. Should the government or policymakers bring the regulations for development of the mobile telecommunications service in Cambodia, the first prioritized objective would be the fairness or transparency and then the economic efficiency. The stable development would be in next sequence. The fairness objective is preferred at upper medium level, while the regulatory intervention to improve economic efficiency is preferred at low level. Despite the low priority, the participants suggest a development of mobile telecoms services with regulated level. If the government or policy makers make specific regulations and policies for mobile telecommunications services in Cambodia, the first priority is justice or transparency, so it refers to economic efficiency and sustainable competition and development of each sector. Despite the low priority, the participants suggest a development of mobile telecoms services with regulated level.

It is really interesting to note that in all three cases of this study participants show their strong preference on the importance of the network size or network coverage, the quality of services and the network externalities. These are the main aspects driving customers to adoption mobile telecoms services and to switch between mobile service providers. In this paper, the customers' preference on the fairness to the economic efficiency and sustainable development was also found statistically significant during the regulatory tradeoff. The most noticeable finding to emerge from the analysis is that these preferences are linked to objective of the fairness or transparency and the economic efficiency. According to the current situation of Cambodia mobile telecommunications industry, the government should first enforce the regulatory reform to achieve the fairness and economic efficiency.

By introducing the regulatory policy on frequency and licensing management, universal service obligations, and competition, the network coverage will be expanded, and the service quality will be

enriched. This will reduce the digital divide between urban areas and remote communities and the adoption efficiency of mobile telecommunications services will be improved. Simultaneously, the competition policy will create a fair competitive environment by resolving previous challenges in the market such as use of market power, predatory pricing, interconnections, and disputes between mobile carriers in Cambodia. This law will also create the right conditions to attract private investment in mobile telecommunications and a well-functioning market in which consumers are ensured to have enough ability and confidence.

In summary, the three studies indicate the practical application of consumer-oriented approach in mobile telecommunications industry. With the consumers' perspectives, the research approach provides the supplement to the lack of explanation offered some regulations and laws and it can be applied in different domains in mobile telecommunications industry. It becomes an essential approach for a systematic and periodic process to assess the performance of suppliers and existing regulatory policies in relation to certain pre-established criteria or regulatory objectives. The insight of the consumer behavior and its implications could facilitate the evaluation of the impacts of existing policies and adjust them to be more efficient, applicable and acceptable. Such attention to the consumer side is timely and it is a sign of improved insights into actual consumer behavior and then regulatory policies.

The paper would like to conclude some important implications and contributions from the findings of the three preceding case studies. It is of significance to both academic purposes and all stakeholders in mobile telecommunications sector.

## **2. Contributions**

### **2.1. Contributions to Academics**

For the academic purpose, the paper offers the application of new research model, compared to existing policy-oriented model, to evaluate the business performance, market condition and the performance of regulators, in relation to the available evidence of the actual consumer behavior. This proposed model supplements the lack of explanation offered by policy-oriented approach in the study on mobile telecommunications services. It is possible to study the different domains of the same mobile telecommunications sector, such as the basic services, the market competition, new technology innovations and the tradeoffs between regulatory policies. With similar purposes, the research approach can be applied to many other services and technologies of ICT industry to evaluate the adoption factors, the consumer satisfaction of the services, the marketing conditions, and further requirements from the supply side of the market.

Moreover, the mixing approach, which incorporates with the consumer perspectives, would be a tool for a systematic and periodic process to assess the performance of suppliers and existing regulatory policies in relation to certain pre-established criteria or regulatory objectives. Similarly, the approach is also more applicable for the tradeoffs, which possibly occur at the introduction stage of new products or at the time of establishing regulatory policies. It also implies the cost-benefit analysis in regulatory policies in nonmonetary unit from the utilization of the state preference method to ask individuals about their preferences as choice tradeoffs.

In addition, the paper figures out the significance from the decomposition of some related theories by integrating with other essential factors. For instance, the subjective norm has a high significant impact on the subscription of mobile telecommunications services in Cambodia since the consumers are strongly influenced from the culture or Cantonese. Mobile telephone numbers can be sold at high prices when they are believed to be lucky numbers (888, 168), or nice numbers (easy to remember). This paper also suggests the necessity of the PPM model in social sciences, and the significance of MNP for examining the switching behavior in mobile telecommunications industry.

## **2.2. Contributions to Regulators**

For regulators and policy makers, this approach can provide more adequate and accurate information of the consumers' needs and motivations in mobile telecommunications market, especially those of vulnerable consumers and those in rural areas. The policy makers can have a better and fuller understanding of the consumer needs and the market behavior for the development of pro-competition regulations. The findings of the paper allow the regulators to assist customer participation in mobile telecommunications market by fulfilling the customers' requirements, by raising awareness about new services and options offered by market, and by making process of switching suppliers easier.

The results of this paper also point out the evaluation of well-functioning market and the business performances of suppliers in the market. Firstly, the regulators can determine the opportunities and the threats from the business operations in mobile telecommunications service, according to the degree of significance of all adoption factors. Then, policy maker should enforce the suppliers to improve the supply side through some key policies concerning the network enlargement and the quality of service.

Related to the well-functioning market, the second part of the paper has also found that the consumers in Cambodia's mobile telecommunications market do not have enough ability and confidence to choose among suppliers. Although many alternative suppliers exist in market, the

switching barriers remain critical. Therefore, the MNP should be introduced to reduce the switching barriers. The policy makers should also ensure the improvement of the competitiveness of mobile telecommunications industry from the measurement of the adoption factors.

Furthermore, the regulators should be keenly aware of introducing new technology innovations at timely, profitable, and efficient manners. For instance, the majority of Cambodian population prefer free of charge to port number and the most preferable option to introduce MNP should be composed of free porting fee, five-to-ten-day porting time and easiest porting process. This implies that the MNP should be introduced to Cambodia's market at the lowest price, if possible, or even free of charge.

Beside the insights of the actual consumer behavior in mobile telecommunications market, the paper examines the tradeoff in regulatory policies with customer perspectives. The research approach allows the regulators to assess the performance of suppliers and existing regulatory policies with respect to certain pre-established criteria or regulatory objectives. And then, it helps solve the problems when policy-makers face the tradeoffs for the development of more flexible regulatory policies.

### **2.3. Contributions to Mobile Carriers**

First of all, the findings of the paper will enable the mobile carriers to determine the strengths/weaknesses and consider these factors as requirements or loopholes to be fulfilled, according to their degree of significance. Mobile carriers are also informed that their network size or network coverage, quality of services and network externalities remain the most influential factors behind consumers' choice of the adoption and subscription. At the same time, the suppliers can improve their competitive advantages and increase the subscriptions by focusing on other factors such as promotions and the effects from subjective norms.

According to the second case study, the subscribers are not really satisfied with their current service suppliers. They will switch to other alternatives carriers when other competitors could provide better service and when MNP is available for the reduction of switching barriers. Additionally, the firms, which wish to increase the subscribers or to attract more subscribers from other competitors, should incorporate with the regulators to introduce MNP, and should be aware of setting porting costs or facilitating conditions for porting numbers.

### **2.4. Contributions to Consumers**

While the consumer demand-side is analyzed, the consumer satisfaction is supposed to be increased. The results of the paper inform the suppliers and regulators about the evidence of the actual consumer



behavior and the implication. The insights include the satisfaction level of the current service and their further requirements or needs. This is also able to improve the insights of consumer behavior that may exhibit systematic departure from the rational behavior. Therefore, the consumer right and empowerment are look forward to be enhanced. Finally, they can increase their satisfaction with the government intervention in the mobile telecommunications industries.

### **3. Directions for Further Research**

Though the research approach has been applied for four different domains of mobile telecommunications service, many additional studies should be conducted. The fact that the consumers are required to be rational and make systematic use of information available to them should be testified. Further studies can investigate the rationality of consumer decision making in many different situations, and look into the information asymmetry of the available products and services.

Moreover, the insights of the actual consumer behavior in mobile telecommunications industry can be examined from many other services or technology innovations, and then study the consequences for the regulatory policies. With similar purposes, the research approach should be applied to many other services and technologies of ICT industry to evaluate the adoption factors, the consumer satisfaction of the services, the marketing conditions, and further requirements from the supply side of the market.

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## APPENDIX

### Appendix 1: Questionnaire of Consumer Adoption Behavior

#### I. Personal Information: (Please tick or circle only one answer)

- 1) Age:             Under 18 years             19 – 28 years             29 – 38 years  
                           39 – 48 years             49 – 58 years             Above 58 years
- 2) Gender:             Male             Female
- 3) Marital Status:     Single             Married             Other: .....
- 4) Education:         PhDs             Master             Bachelor  
                           High school     lower than high school     Other: .....
- 5) Occupation:         Student             Government officer     Employee  
                           Self-employ     Other: .....
- 6) Monthly income:     Less than 100\$     101 – 200\$             201 - 400\$  
                           401 – 600\$     601 – 1000\$             more than 1001\$
- 7) Mobile Operator used:  Metfone             Mfone             Excel             Beeline  
                           Smart             Mobitel             Hello             qbMore  
                          (multiple choices)
- 8) Monthly payment for phone:     Less than 5\$             5 – 10\$             11 – 15\$  
                           16 – 20\$             21 – 50\$             more than 51\$
- 9) Source of payment:     Yourself             Parents             Spouse  
                           Company             Other: ..... (multiple choices)

#### II. Information about choosing one mobile operator

		Strongly Disagree	Disagree	Slightly Agree	Neutral	Slightly Agree	Agree	Strongly Agree
1	I feel I would subscribe one mobile operator according to its usefulness for daily communication and interaction.	1	2	3	4	5	6	7
2	I feel I would subscribe one mobile operator with easy ways of using common features as it is really convenient (query balance, recharge balance).	1	2	3	4	5	6	7
3	I feel I would subscribe one mobile operator with suitable prices which is beneficial.	1	2	3	4	5	6	7

4	I feel I would subscribe one mobile operator with suitable price of additional services (Internet, MMS, SMS, Voicemail...) to be easy and saving.	1	2	3	4	5	6	7
5	I feel I would subscribe one mobile operator which gives variety of price plans (packages) because it is wide idea and more alternatives for users.	1	2	3	4	5	6	7
6	I feel I would subscribe one mobile operator with many advertisements, which is more attractive.	1	2	3	4	5	6	7
7	I feel I would subscribe one mobile operator with better relationship with my work place, school, or institution because of its conveniences.	1	2	3	4	5	6	7
8	I feel I would subscribe one mobile operator with lots of bonus promotions, which is beneficial and economical.	1	2	3	4	5	6	7
9	I feel I would subscribe one mobile operator with discount/sale promotions as it is really economical.	1	2	3	4	5	6	7
10	I feel my family members think I should subscribe same mobile operator to them,	1	2	3	4	5	6	7
11	I feel my friends/colleagues think I should subscribe same mobile operator to them.	1	2	3	4	5	6	7
12	I feel I would subscribe any mobile operator based on recommendation from my family members.	1	2	3	4	5	6	7
13	I feel I would subscribe any mobile operator based on recommendation from my friends/colleagues.	1	2	3	4	5	6	7
14	I feel I would subscribe one mobile operator with large coverage area of service.	1	2	3	4	5	6	7
15	I feel I would subscribe one mobile operator which always updates new services.	1	2	3	4	5	6	7
16	I feel I would subscribe one mobile operator with good quality of service and stable service.	1	2	3	4	5	6	7
17	I feel I would subscribe one mobile operator based on my ability to use it.	1	2	3	4	5	6	7
18	I feel I would subscribe one mobile operator based on my time and resources to search and buy it.	1	2	3	4	5	6	7
19	I feel I would subscribe one mobile operator with large amount of subscribers to ease mutual interaction.	1	2	3	4	5	6	7
20	I intend to subscribe mobile telecommunications services	1	2	3	4	5	6	7
21	I intend to be a permanent subscriber of mobile telecommunication services	1	2	3	4	5	6	7

### III. Additional services you are using (Multiple Choices)

- Internet       SMS       MMS       Voice SMS       Voicemail  
 Streaming       Pushmail       Call me back       Mobile E-mail       Miss Call Alert  
 Download       Message<sup>+</sup>       SMS live Chat       Caller Ring Back Tone  
 Instance Messaging & Presence Service (IMPS)

**IV. Please leave your comments here:**

a. What are other reasons why you choose using one mobile operator?

.....  
.....  
.....  
.....

b. Do you have any suggestion for each mobile operator?

.....  
.....  
.....  
.....

c. Do you have any plan to change to other operator? Why?

.....  
.....  
.....  
.....

## Appendix 2: Questionnaire of Consumer Switching Behavior

### I. Personal Information: (Please tick or circle only one answer)

- 10) Age:             Under 18 years             19 – 28 years             29 – 38 years  
                           39 – 48 years             49 – 58 years             Above 58 years
- 11) Gender:             Male             Female
- 12) Marital Status:     Single             Married             Other: .....
- 13) Education:             PhDs             Master             Bachelor  
                           High school     lower than high school     Other: .....
- 14) Occupation:             Student             Government officer     Employee  
                           Self-employ     Other: .....
- 15) Monthly income:     Less than 100\$     101 – 200\$             201 - 400\$  
                           401 – 600\$     601 – 1000\$             more than 1001\$
- 16) Mobile service provider used:             Metfone             Mobitel             Hello/Smart  
                           Excel             Beeline             qbMore            (multiple choices)
- 17) Monthly payment for phone:     Less than 5\$     5 – 10\$             11 – 15\$  
                           16 – 20\$             21 – 50\$             more than 51\$
- 18) Source of payment:             Yourself             Parents             Spouse  
                           Company             Other: .....            (multiple choices)

### II. Information about mobile service provider:

		Strongly Disagree	Disagree	Slightly Agree	Neutral	Slightly Agree	Agree	Strongly Agree
1	I would switch if I am dissatisfied with the functionality and service availability of my current mobile carrier.	1	2	3	4	5	6	7
2	I would switch if I am dissatisfied with the large network coverage and service quality of my current mobile carrier.	1	2	3	4	5	6	7
3	I would switch if I am dissatisfied with the huge number of total subscribers of my current mobile carrier.	1	2	3	4	5	6	7
4	I would switch if I am dissatisfied that the availability of simcards and recharge cards of my current mobile carrier.	1	2	3	4	5	6	7
5	I would switch if I am dissatisfied with the safety of my personal information stored at my current mobile carrier.	1	2	3	4	5	6	7
6	I would switch if I am dissatisfied with the reasonable pricing plan at my current mobile carrier.	1	2	3	4	5	6	7
7	I would switch if I am dissatisfied with the bonus provided by my current mobile carrier.	1	2	3	4	5	6	7
8	I would switch if I am dissatisfied with the customer service of my current mobile carrier.	1	2	3	4	5	6	7
9	I would switch if I am dissatisfied with the loyalty of my current mobile carrier.	1	2	3	4	5	6	7

10	I would switch if the functionality and service availability of new current mobile carrier are more attractive.	1	2	3	4	5	6	7
11	I would switch if the large network coverage and service quality of new current mobile carrier more attractively exists.	1	2	3	4	5	6	7
12	I would switch if the number of total subscribers of new current mobile carrier is attractively huge.	1	2	3	4	5	6	7
13	I would switch if the availability of simcards and recharge cards of new current mobile carrier more attractively exists.	1	2	3	4	5	6	7
14	I would switch if the safety of my personal information stored at new current mobile carrier is more attractive.	1	2	3	4	5	6	7
15	I would switch if the reasonable pricing plan at new current mobile carrier is more attractive.	1	2	3	4	5	6	7
16	I would switch if the bonus provided by new current mobile carrier is more attractive.	1	2	3	4	5	6	7
17	I would switch if the customer service of new current mobile carrier is more attractive.	1	2	3	4	5	6	7
18	I would switch if the loyalty program of new current mobile carrier is more attractive.	1	2	3	4	5	6	7
19	I believe that switching carriers causes lose in compensating to contract termination.	1	2	3	4	5	6	7
20	I believe that switching carriers causes loss of existing number.	1	2	3	4	5	6	7
21	I believe that switching carriers causes loss of all data/information related to existing number (ex. Line, Viber, Facebook...).	1	2	3	4	5	6	7
22	I believe that switching carriers makes me bearing cost, time, and effort of searching for new mobile carrier.	1	2	3	4	5	6	7
23	I believe that switching carriers makes me bearing cost, time, and effort of learning new functionality of new system.	1	2	3	4	5	6	7
24	I believe that switching carriers makes me bearing cost and waiting time of registering new number.	1	2	3	4	5	6	7
25	I believe that switching carriers makes me bearing cost and time for storing new number at other related services (ex. Line, Viber,	1	2	3	4	5	6	7
26	I believe that switching carriers makes me bearing cost, time, and effort of informing new number to friends.	1	2	3	4	5	6	7
27	I believe that the presence of MNP will help me to switch easily between mobile carriers.	1	2	3	4	5	6	7
28	I believe that the presence of MNP will increase my satisfaction level of adopting mobile services.	1	2	3	4	5	6	7
29	I believe that the presence of MNP will help me to find a better mobile carrier.	1	2	3	4	5	6	7
30	I believe that the presence of MNP will increase my intention to change mobile carriers.	1	2	3	4	5	6	7
31	I am intended to switch mobile carriers.	1	2	3	4	5	6	7
32	I would like to recommend my friends/family to switch carriers.	1	2	3	4	5	6	7

### Appendix 3: Questionnaire of Regulatory Tradeoffs

#### I. Personal Information (Please tick or circle only one answer of each question)

- a. **Age:**            Under 18 years old    19 – 28 years old    29 – 38 years old  
                           39 – 48 years old    49 – 58 years old    Over 58 years old
- b. **Gender:**            Male                    Female
- c. **Marital Status:**    Single                Married                Others: .....
- d. **Education:**        PhD                    Master                Bachelor  
                           High school    lower than high school  
                           Others: .....
- e. **Occupation:**        Student                Government Officer    Employee  
                           Self-employed    Agriculturist            Other: .....
- f. **Monthly Income:**    Less than 100\$        101–200\$            201–400\$  
                           401–600\$            601–800\$            801–1000\$  
                           More than 1000\$
- g. **Monthly Payment for Mobile Phone:**    No                        Less than 5\$  
                           6–10\$                11–15\$                16–20\$  
                           21–50\$              51–100\$              More than 100\$

#### II. Personal Preference for Regulatory Policies (Part II)

Suppose that the Government of Cambodia is trying to enhance the development of mobile telecommunications sector. To do so, some regulatory policies are required. Most regulatory policies cover to the economic efficiency, transparency (fairness) and sustainable development (stability). Regulatory policies of mobile telecommunications services are required to intervene at different levels. It is assumed that there are four different levels of government intervention and they are measured in percentage as following:

1. **Fairness** concentrates over the government’s intervention to ensure the availability and obligation of the universal service, availability and service quality, asymmetric information, consumer protection, competition policy between mobile operators and consumers, the network interconnection between mobile operators and network congestion and promotional campaign.
2. **Economic efficiency** is related to the efficiently regulatory control on frequency allocation, licensing, numbering plan, pricing controls in the market, access pricing between different mobile operators, network unbundling and new technology innovation to improve the efficiency of mobile operators.
3. **Stability or sustainable development goal** refers to the government intervention of expanding the network coverage by allowing network unbundling, and of safeguarding a market with a stable competition and the development.

The extent to which government or regulators should intervene in the mobile telecommunications market of each measure is represented by its levels, and they are possibly explained in percentage. These levels are (1) Low regulated level, (2) Lower middle level, (3) Upper middle level, and (4) High regulated level. Low regulated environment means that the government will not impose any regulation or very limited number of regulatory policy is imposed to the market, while high regulated level is executed when the industry is fully and strictly regulated by the government or legal institution.

Finally, we assume that the regulator or policies maker randomly selects 16 scenarios or options of regulatory intervention in mobile telecommunications sectors. Therefore, please rate each option closed to your own preference between 0 (not at all prefer) and 10 (certainly prefer).

Suppose that the government or policy maker is considering some regulatory policies to foster the adoption of mobile telecommunications services in Cambodia. According to the perspectives of public policy, the government or policy maker normally intervenes through three dimensions of the regulatory policies in term of economic efficiency, fairness, and stability. Moreover, the level of government’s intervention is set in percentage and each consists of four levels.

1. Percentage to achieve *fairness*:

- |                          |                           |                           |                            |
|--------------------------|---------------------------|---------------------------|----------------------------|
| A <sub>1</sub> : 0 – 25% | A <sub>2</sub> : 25 – 50% | A <sub>3</sub> : 50 – 75% | A <sub>4</sub> : 75 – 100% |
| (Low Regulation)         | (Lower middle)            | (Upper middle)            | (High regulation)          |

2. Percentage to achieve *economic efficiency*:

- |                          |                           |                           |                            |
|--------------------------|---------------------------|---------------------------|----------------------------|
| B <sub>1</sub> : 0 – 25% | B <sub>2</sub> : 25 – 50% | B <sub>3</sub> : 50 – 75% | B <sub>4</sub> : 75 – 100% |
| (Low Regulation)         | (Lower middle)            | (Upper middle)            | (High regulation)          |

3. Percentage to achieve *stability*:

- |                          |                           |                           |                            |
|--------------------------|---------------------------|---------------------------|----------------------------|
| C <sub>1</sub> : 0 – 25% | C <sub>2</sub> : 25 – 50% | C <sub>3</sub> : 50 – 75% | C <sub>4</sub> : 75 – 100% |
| (Low Regulation)         | (Lower middle)            | (Upper middle)            | (High regulation)          |

Please consider the following 16 scenarios which are the integrations of the three above dimensions. Then, please rate each case from 0 to 10 based on your closest preference.

Scenario	Attributes			Please answer in this following column (circle a number)										
	Fairness/ Transparency	Economic Efficiency	Stability/ Sustainable Development	0 Not at all like				5 Indifferent			10 Certainly like			
1	25 – 50 %	25 – 50 %	75 – 100 %	0	1	2	3	4	5	6	7	8	9	10
2	25 – 50 %	0 – 25 %	25 – 50 %	0	1	2	3	4	5	6	7	8	9	10
3	75 – 100 %	0 – 25 %	75 – 100 %	0	1	2	3	4	5	6	7	8	9	10
4	50 – 75 %	25 – 50 %	0 – 25 %	0	1	2	3	4	5	6	7	8	9	10
5	50 – 75 %	0 – 25 %	50 – 75 %	0	1	2	3	4	5	6	7	8	9	10
6	0 – 25 %	50 – 75 %	75 – 100 %	0	1	2	3	4	5	6	7	8	9	10
7	0 – 25 %	0 – 25 %	0 – 25 %	0	1	2	3	4	5	6	7	8	9	10
8	0 – 25 %	75 – 100 %	25 – 50 %	0	1	2	3	4	5	6	7	8	9	10
9	50 – 75 %	75 – 100 %	75 – 100 %	0	1	2	3	4	5	6	7	8	9	10
10	0 – 25 %	25 – 50 %	50 – 75 %	0	1	2	3	4	5	6	7	8	9	10
11	75 – 100 %	25 – 50 %	25 – 50 %	0	1	2	3	4	5	6	7	8	9	10
12	75 – 100 %	75 – 100 %	50 – 75 %	0	1	2	3	4	5	6	7	8	9	10
13	25 – 50 %	75 – 100 %	0 – 25 %	0	1	2	3	4	5	6	7	8	9	10
14	50 – 75 %	50 – 75 %	25 – 50 %	0	1	2	3	4	5	6	7	8	9	10
15	75 – 100 %	50 – 75 %	0 – 25 %	0	1	2	3	4	5	6	7	8	9	10
16	25 – 50 %	50 – 75 %	50 – 75 %	0	1	2	3	4	5	6	7	8	9	10