

Analysis of the ICT Price Baskets: Case Study on ASEAN and Thailand

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Abstract—The ICT Price Basket is a unique metric that tracks and compares the cost and affordability of ICT services in more than 160 countries globally. It measures communication costs as a percentage of Gross National Income (GNI) per capita, and highlights the tremendous regional disparities in connectivity costs. In this paper, Thailand and ASEAN ICT Price Basket 2014 presented in ITU's Measuring the Information Society Report 2014 are analyzed and discussed.

Index Terms—ICT, price basket, ASEAN, Thailand.

I. INTRODUCTION

The Telecommunications Consumption Survey of Thailand 2014 contributes to the calculation of ICT Price Basket 2014 which subjects to the methodological principles of ITU's ICT Price Basket [1]. Apart from facilitating the consideration of affordability and fairness of ICT service prices from telecom penetration, based on domestic price restrictions (ability to pay), this study also places emphasis on calculating the ASEAN ICT Price Basket to expand the National Broadcasting and Telecommunications Commission (NBTC)'s vision of policy considerations owing to Thailand's participation in the upcoming ASEAN Economic Community integration by the end of 2015. Regarding the role of international regulatory policy, especially within the region, this viewpoint is additional from the ITU's creation of database focusing on the regional analysis of the ICT Price Basket conducted in the Asia-Pacific region alone.

In calculating the ASEAN ICT Price Basket 2014, the data on prices of ICT services among the selected countries is derived from the ITU's Measuring the Information Society Report 2014 which features the prices of key ICT components contained in the ICT Price Basket of the individual countries that held the 2013 ITU membership. For this study, the calculation of the ASEAN ICT Price Basket 2014 according to the aforementioned method, therefore, starts from calculating the ASEAN ICT Price Basket 2013 - based on the aforementioned data, followed by calculating the ASEAN ICT Price Basket 2014, respectively.

In calculating the price of each ICT component to allow favorable comparison among countries with different backgrounds in average revenues and telecommunications economy development, reflected through the purchasing

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power, we can see that the price of each ICT component will be converted into a common currency (USD) according to the exchange rates. This includes the consideration of differences in the purchasing power, using the purchasing power parity (PPP\$) approach to convert the amounts into a common currency, whereas the average monthly gross national income per capita (GNI p.c.) in U.S. dollars is achieved through the Atlas method¹⁴ introduced by World Bank, or through finding the mean using the Atlas conversion factor which underlines the reduction of impacts of both exchange rate fluctuations and international inflation rates in the cross-country comparison.

II. CALCULATION OF THE ICT PRICE BASKET

In this particular study, Thailand's prices of ICT services presented in ITU's Measuring the Information Society Report 2014 are considerably used in calculating the ASEAN ICT Price Basket, because they are of the same database as those of other ASEAN countries. Furthermore, as regards the manipulation of Thailand's ICT Price Basket through calculating the statistical values surveyed during 2011-2012, the ICT Price Basket can be arranged into 3 levels of consumption: low (in the 10th percentile of service users), intermediate (in the 50th percentile of service users), and high (in the 90th percentile of service users) to fulfill the country's aim at promoting the policy considerations. This makes features of the obtained indices differ from those obtained through the ITU's data classification method and affects the international comparison using these indices to become inappropriate. Based on the aforementioned principle, features of the ASEAN ICT Price Baskets 2013-2014 appear as follows:

A. ASEAN ICT Price Basket 2013

This calculation of this particular ASEAN ICT Price Basket subjects to the data obtained from the ICT service price survey, presented in ITU's Measuring the Information Society Report 2014, carried out in 2013. The preparation and calculation of data, therefore, starts from calculating ICT Price Basket 2013. Then, the results will be added to the database for further calculating the ICT Price Basket 2014.

The Atlas conversion factor (local currency to the U.S. dollar) for any country for year t is given by: (e_t^{atlas})

$$e_t^{atlas} = \frac{1}{3} \left[e_t + e_{t-1} \left(\frac{r_{t-1}}{r_{t-1}^{SDRS}} \right) + e_{t-2} \left(\frac{r_{t-2}}{r_{t-2}^{SDRS}} \right) \right] \quad (1)$$

where e_t = the average annual exchange rate (local currency to the U.S. dollar) for year t . GNI in U.S. dollars (Atlas method) for year t (Y_t^{atlass}) is

calculated by applying the Atlas conversion factor to a country's GNI in current prices (local currency) (Y_t) as follows [2]:

$$Y_t^{atlass} = Y_t / e_t^{atlas}$$

The process starts from the preparation of data to make up the 3 ICT Sub-Baskets of interest: Fixed-Telephone Sub-Basket, Mobile-Cellular Sub-Basket, and Fixed-Broadband Sub-Basket. This will contribute to the calculation of each particular Sub-Basket among ASEAN countries, resulting in the calculation of the ASEAN ICT Price Basket which takes all the three Sub-Baskets into consideration simultaneously.

B. Fixed-Telephone Sub-basket of ASEAN Countries

The ITU's survey (2014) indicates that the fixed telephony remains the most widespread ICT service during 2013 [3], compared with others. It was also more favorable than the media like radio and television, though the installation demand has decreased during the past decade. Furthermore, there has been a fairly flat evolution in prices of fixed-telephone services but slightly decline in developing countries, including ASEAN members. This leads to the conclusion that the market for fixed-telephone services is at the fullest capacity of development among the ICT markets.

From the Table I, it reveals that the prices of fixed-telephone services in 2013 still vary among ASEAN countries, excluding Myanmar where the data is inadequate for being taken into consideration. Apparently, the prices can range from the highest affordable entry-level of 0.20 percent of GNI p.c. in Singapore to 6.05 in the Philippines, meanwhile the price of fixed-telephone services in Thailand is comparatively ranked 5th affordable among the ASEAN countries after Singapore, Brunei Darussalam, Malaysia, and Indonesia, respectively.

TABLE I: FIXED-TELEPHONE SUB-BASKET OF ASEAN COUNTRIES IN 2013

	Economy	Fixed-Telephone Sub-Basket			
		as % of GNI p.c.	USD	PPP\$	GNI p.c. USD, 2013*
1	Brunei Darussalam	0.46	12.55	18.91	33,002
2	Cambodia	4.80	3.80	9.81	950
3	Indonesia	1.34	4.00	9.54	3,580
4	Laos	3.94	4.80	12.01	1,460
5	Malaysia	1.05	9.08	17.99	10,400
6	Myanmar	n/a	n/a	n/a	n/a
7	Philippines	6.05	16.49	36.15	3,270
8	Singapore	0.20	8.80	9.10	54,040
9	Vietnam	1.26	1.82	4.44	1,730
10	Thailand	1.38	6.18	14.55	5,370

Remark

- 1) Data on ASEAN countries used in the calculation is obtained from the ITU's Measuring the Information Society Report 2014.
- 2) ITU. GNI p.c. and PPP\$ values are based on World Bank data.
- 3) *Data correspond to the GNI per capita (Atlas method) in 2013 or latest available year adjusted with the international inflation rates.

C. Mobile-Cellular Sub-basket of ASEAN Countries

The ITU's 2014-Survey indicates that mobile-cellular services can narrow the gap in access to fixed-telephone

services. It is found that the coverage gaps in the fixed-telephone network have been filled up by the mobile-cellular network which covers 93% of the global population, and is superior to the 3G network which covers only 50% of the global population (end-2012 data) [4]. According to ITU's calculation of the Mobile-Cellular Sub-Basket, it shows the trend of continual decrease in prices of mobile-cellular services at every level of global development.

From the Table II, it reveals that the prices of fixed-telephone services in 2013 still vary among ASEAN countries, excluding Myanmar where the data is inadequate for being taken into consideration. However, the price gap is not extremely wide compared with those considered at the regional and global levels. Apparently, the prices can range from the highest affordable entry level of 0.19 percent of GNI p.c. in Singapore to 7.92 in Cambodia, meanwhile the price of fixed-telephone services in Thailand is comparatively ranked 4th affordable among the ASEAN countries after Singapore, Brunei Darussalam, and Malaysia, respectively.

TABLE II: MOBILE-CELLULAR SUB-BASKET OF ASEAN COUNTRIES IN 2013

	Economy	Fixed-Telephone Sub-Basket			
		as % of GNI p.c.	USD	PPP\$	GNI p.c. USD, 2013*
1	Brunei Darussalam	0.71	19.65	29.60	33,002
2	Cambodia	7.92	6.27	16.16	950
3	Indonesia	2.30	6.86	16.38	3,580
4	Laos	5.86	7.13	17.84	1,460
5	Malaysia	0.83	7.16	14.20	10,400
6	Myanmar	n/a	n/a	n/a	n/a
7	Philippines	3.72	10.15	22.24	3,270
8	Singapore	0.19	8.74	9.04	54,040
9	Vietnam	2.50	3.61	8.81	1,730
10	Thailand	1.20	5.36	12.61	5,370

Remark

- 1) Data on ASEAN countries used in the calculation is obtained from the ITU's Measuring the Information Society Report 2014.
- 2) ITU. GNI p.c. and PPP\$ values are based on World Bank data.
- 3) *Data correspond to the GNI per capita (Atlas method) in 2013 or latest available year adjusted with the international inflation rates.

D. Fixed-Broadband Sub-basket of ASEAN Countries

The fixed-broadband Internet is considered the key service that conditions Internet penetration - in relation to the speed and amount of data transfer. The 2014 ITU's survey indicates that the global entry-level fixed-broadband prices have roughly decreased by 70% during 2008-2013, whereas the speed and the amount of data transfer provided by service packages have continually risen. This trend is obviously noticeable in developing countries, including ASEAN members.

From the Table III, it reveals that the prices of fixed-broadband services in 2013 still varies among ASEAN countries, excluding Myanmar where the data is inadequate for being taken into consideration. The price gap is quite wide compared with those considered in the light of the Fixed-Telephone and Mobile-Cellular Sub-Baskets. The changes in prices of fixed-broadband services tend to be smaller, both at the global level and in developing countries,

while the prices of fixed-broadband services in developed countries are quite constant. Apparently, the prices of fixed-broadband services can range from the highest affordable entry-level of 0.44 percent of GNI p.c. in Singapore to 14.97 in Cambodia, meanwhile the price of fixed-telephone services in Thailand is comparatively ranked 5th affordable among the ASEAN countries after Singapore, Brunei Darussalam, Vietnam, and Malaysia, respectively. Besides, according to the Broadband Commission for Digital Development's concept which determines that, by 2015, the prices of broadband Internet services should be made affordable in every developing country and that the target for entry-level should be set to cost below 5 percent of average monthly GNI p.c., it is found that Thailand's fixed-broadband prices are at the nearly affordable level (0.02 percent above standards), whereas an enormous improvement is crucially required for Indonesia, the Philippines, Laos, and Cambodia.

TABLE III: FIXED –BROADBAND SUB-BASKET OF ASEAN COUNTRIES IN 2013

Fixed-Telephone Sub-Basket		Speed in Mbit/s	Cap per Month in GB	GNI p.c. USD, 2013*
as % of GNI p.c.	USD			
1. Brunei Darussalam	1.89	51.95	78.28	1.00
				Unlimited
				33,002
2. Cambodia	14.97	11.85	30.55	2.00
				Unlimited
				950
3. Indonesia	6.87	20.50	48.92	0.38
				3.00
				3,580
4. Laos	13.67	16.64	41.65	0.50
				1,460
5. Malaysia	2.42	20.95	41.52	0.51
				Unlimited
				10,400
6. Myanmar	n/a	n/a	n/a	n/a
7. Philippines	8.64	23.54	51.59	3.00
				Unlimited
				3,270
8. Singapore	0.44	19.90	20.58	25.00
				Unlimited
				54,040
9. Vietnam	2.03	2.93	7.15	2.50
				1.00
				1,730
10. Thailand	5.02	22.46	52.85	13.00
				Unlimited
				5,370

Remark

- 1) Data on ASEAN countries used in the calculation is obtained from the ITU's Measuring the Information Society Report 2014.
- 2) ITU, GNI p.c. and PPP\$ values are based on World Bank data.
- 3) *Data correspond to the GNI per capita (Atlas method) in 2013 or latest available year adjusted with the international inflation rates.

TABLE IV: ASEAN ICT PRICE BASKET 2013

	Economy	Fixed-Telephone Sub-Basket as % of GNI p.c.	Mobile-Cellular Sub-Basket as % of GNI p.c.	Fixed-Broadband Sub-Basket as % of GNI p.c.
1	Brunei Darussalam	0.46	0.71	1.89
2	Cambodia	4.80	7.92	14.97
3	Indonesia	1.34	2.30	6.87
4	Laos	3.94	5.86	13.67
5	Malaysia	1.05	0.83	2.42
6	Myanmar	n/a	n/a	n/a
7	Philippines	6.05	3.72	8.64
8	Singapore	0.20	0.19	0.44
9	Vietnam	1.26	2.50	2.03

10	Thailand	1.38	1.20	5.02
	ASEAN Sub-Basket	2.28	2.80	6.22
	ASEAN ICT Price Basket		3.77	

The three price sets contained in the ASEAN ICT Price Basket contribute to the calculation of the three ASEAN ICT Sub-Baskets 2013, based on the aforementioned calculating concept. As regards the results, it is found that among the ASEAN countries, the price of fixed-telephone services stands at 2.28 percent of GNI p.c., the price of mobile-cellular services stands at 2.80 percent of GNI p.c., and the price of fixed-broadband services stands at 6.22 percent of GNI p.c., respectively.

Referring to the ITU's concept of ICT Price Basket calculation, we can utilize the statistical values obtained from the three ASEAN Sub-Baskets to calculate the ASEAN ICT Price Basket 2013 through substituting values into the formula to yield the result of 3.77 percent of GNI per capita.

$$\text{ASEAN ICT Price Basket 2013} = \frac{2.28 + 2.80 + 6.22}{3} = 3.77\% \text{ of GNI p.c.}$$
(2)

E. ASEAN ICT Price Basket 2014

In calculating the ASEAN ICT Price Basket 2014, there are some major problems regarding the obtainment of ASEAN countries' applicable statistical values as well as the data on average monthly GNI p.c. of the year 2014. This is due to the limitation of time spent on collecting the data which creates barriers to the formulation of calculation bases using the accurate numerical values and data. Therefore, this research, instead, relies on the data presented in the ASEAN ICT Price Basket 2013 [5] that has been calculated previously and handles the limitations using the following procedures.

The estimation of the prices of the three ICT sub-baskets of interest is considered from changes in the 2014-ICT consumer price index among ASEAN countries. The details about the ASEAN ICT Price Basket 2014 are as shown in Table V.

TABLE V: ASEAN ICT PRICE BASKET 2014

Country	Application Data	Source of Data
Brunei	CPI: Comm: Telephone & Telefax Services	Department of Economic Planning and Development, Prime Minister's Office
Cambodia	CPI: PNP: Communication: Telephone & Telefax Services	National Institute of Statistics
Indonesia	Consumer Price Index: TC: Communication and Delivery	Central Bureau of Statistics
Laos	CPI: Post and Telecommunication	Bank of the Lao PDR
Malaysia	CPI: Communication: Telephone & Telefax Services	Department of Statistics
Philippines	CPI: CO: Telephone & Telefax Services	Philippine Statistics Authority
Singapore	Consumer Price Index: Communications	Department of Statistics
Vietnam	CPI: Post and Telecommunications	General Statistics Office
Thailand	CPI: TC: Communication	Bureau of Trade and

and Equipments: Services	Economic Indices
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The estimation of monthly GNI per capita in 2014 through considering changes in ASEAN countries' average growth of GNI p.c. in 2014, prices expressed as a percentage of ASEAN countries' GNI p.c. in 2014 (Atlas method), and the rate of changes (growth rates) will appear in Table VI.

TABLE VI: ASEAN COUNTRIES' GNI P.C. IN 2014 (ATLAS METHOD), AND THE RATE OF CHANGES (GROWTH RATES)

Country	Application Data	Source of Data
Brunei	BN: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Cambodia	KH: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Indonesia	ID: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Laos	LA: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Malaysia	MY: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Philippines	PH: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Singapore	SG: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Vietnam	VN: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank
Thailand	TH: GDP: USD: Gross National Income per Capita: Atlas Method	World Bank

To obtain the three price sets contained in the ASEAN Price Basket 2014, the ICT consumer price index (CPI) rate of change in 2014 must be applied to adjust the price values of the three Sub-Baskets 2013. In addition, when this is taken into consideration along with the estimated average GNI per capita in 2014, the result will be the Country Sub-Basket 2014 as shown in the Table VII. This will leads to the calculation of the three ASEAN Sub-Baskets 2014, and the ASEAN ICT Price Basket 2014 which stands at 3.43, as presented in the Table VII.

$$\text{ASEAN ICT Price Basket 2014} = \frac{2.09 + 2.55 + 5.66}{3} = 3.43\% \text{ of GNI p.c.} \quad (3)$$

III. ANALYSIS

The three ASEAN Sub-Baskets 2014 specify the downward trend in the prices of ICT services in every ASEAN country. If each of the Sub-Baskets is separately taken into consideration separately, the findings will be as follows:

A. The variety in Prices of Fixed-Telephone Services Among ASEAN Countries Tends to Decrease.

The prices of fixed-telephone services range from 0.19 percent of GNI per capita in Singapore to 5.7 percent per capita in the Philippines. It is expected that the comparative prices of fixed-telephone services in Thailand will be ranked 6th most affordable among ASEAN countries after Singapore, Brunei Darussalam, Malaysia, Vietnam, and Indonesia, respectively. The price of fixed-telephone services among ASEAN countries in 2014 stands at 2.09 percent of GNI per

capita, which drops from 2.28 percent of GNI per capita in 2013.

B. The Variety in Prices of Mobile-Cellular Services Among ASEAN Countries Tends to Decrease

The prices of mobile-cellular services range from 0.18 percent of GNI per capita in Singapore to 7.28 percent per capita in Cambodia. It is expected that Thailand can still retain its 4th place in price affordability rankings among ASEAN countries after Singapore, Brunei Darussalam, and Malaysia, respectively. The price of mobile-cellular services among ASEAN countries in 2014 stands at 2.55 percent of GNI per capita, which drops from 2.80 percent of GNI per capita in 2013.

TABLE VII: ASEAN ICT PRICE BASKET 2014

Inflation Rate 2014	Avg. Growth GNI p.c.	Fixed Telephone Sub-Basket as % of GNI p.c.		Mobile-Cellular Sub-Basket as % of GNI p.c.		Fixed Broadband Sub-Basket as % of GNI p.c.	
		2013	2014	2013	2014	2013	2014
1. Brunei Darussalam							
1.48%	5.33%	0.46	0.44	0.71	0.68	1.89	1.82
2. Cambodia							
-0.09%	8.69%	4.80	4.41	7.92	7.28	14.97	13.76
3. Indonesia							
-0.79%	12.87%	1.34	1.18	2.30	2.02	6.87	6.04
4. Laos							
0.66%	13.97%	3.94	3.48	5.86	5.18	13.67	12.07
5. Malaysia							
-0.08%	8.59%	1.05	0.97	0.83	0.76	2.42	2.23
6. Myanmar							
n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
7. Philippines							
0.14%	6.36%	6.05	5.70	3.72	3.50	8.64	8.14
8. Singapore							
-0.19%	6.47%	0.20	0.19	0.19	0.18	0.44	0.41
9. Vietnam							
-0.39%	11.07%	1.26	1.13	2.50	2.24	2.03	1.82
10. Thailand							
0.03%	7.43%	1.38	1.28	1.20	1.12	5.02	4.67
ASEAN Sub-Basket				2.28	2.09	2.80	2.55
ASEAN ICT Price Basket						6.22	5.66
						2013 = 3.77	
						2014 = 3.43	

C. The Variety in Prices of Fixed-Broadband Services Among ASEAN Countries Tends to Decrease

The prices of fixed-broadband services range from 0.41 percent of GNI per capita in Singapore to 13.76 percent per capita in Cambodia. It is expected that Thailand can still retain its position in 5th place in price affordability rankings among ASEAN countries after Singapore, Brunei Darussalam, Vietnam, and Malaysia, respectively. The price of fixed-broadband services among ASEAN countries in 2014 stands at 5.66 percent of GNI per capita, which drops from 6.22 percent of GNI per capita in 2013.

If the ASEAN Price Basket 2014 is compared with the ASEAN Price Basket 2013 calculated previously, it is obvious that the obtained indexical values will point out the downward trend in prices of ICT services among ASEAN countries. If the index compositions are taken into consideration, the findings will appear that the prices of every

composite service among ASEAN countries tend to decline, reflecting the remarkable success in the administration of related sectors and the advancement in telecommunications development among ASEAN countries.

IV. CONCLUDING REMARK

The price of mobile-cellular services and Internet access via WLAN is considered the most unfavorable aspect out of the survey findings related to mobile-cellular services. This is due to the expectation that the development in ICT services undergone previously will raise the level of service quality [6], and result in price changes. Considering the cost of mobile-cellular services through the application of ICT Price Basket methodology, it appears that Thailand's approach to price manipulation has proved its continual success. However, the survey findings also point out further requirements for carrying out this process constantly.

The customer survey measuring the satisfaction on fixed-line and mobile Internet services reveals that the inferior connection quality, based on the advertised speeds, is considered a users' significant problem in need of a solution. This includes the problems regarding connection failures and network faults, which pertain to the development of quality and standards that should have been undergone previously according to users' point of view. Therefore, the related sectors should consider establishing service quality standards (which might associate with the price determination basis). Besides, they should monitor and evaluate the service quality at intervals through adopting a random inspection plan to raise service providers' awareness of marketing strategy

formulation, so that they can offer appropriate services that can encourage users to get the best value of money (consumer protection) and can provide users with satisfaction as well.

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