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Efficiency Perspective on Telecom Mobile Data Traffic

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ABSTRACT

Objective – The global industry is transforming into a digital world, evidenced by digital transformation performed by almost all of the industry sectors. One of the digital drivers is the support of connectivity provided by the telecommunication industry. The increasing mobile subscribers, along with the growth of mobile data traffic, is the sign of digital transformation itself. However, the rise of OTT (Over the Top) service providers tends to acquire the revenue share of the current telecom industry, seeing the trend of voice and SMS revenue that projected to decline.

Methodology/Technique – This research is intended to measure the impact of increasing mobile data traffic that mostly caused by OTT services to telecom efficiency. The efficiency measurement & analysis were performed using the Stochastic Frontier Approach (SFA) & Data Envelopment Analysis (DEA) method.

Findings – By using the SFA method, Maxis (Malaysia) got the highest efficiency score (0.98), followed by AIS (Thailand) with efficiency score 0.94 and Indosat Ooredoo (Indonesia) as the least efficient telecom provider (0.5). However, by using the DEA method, TLKM (Indonesia) got the highest efficient (0.98), and Celcom Axiata (Malaysia) was the least efficient (0.73/0.8).

Novelty – The compelling results of this study are variable total asset variable had a significant negative impact on the efficiency score, and the variable of mobile data traffic was not significantly impacting the efficiency value (t-Ratio 0.71).

Type of Paper: Empirical.

Keywords: Telecom Operators; Efficiency; Mobile Data Traffic

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JEL Classification: M10, M15, M19.

1. Introduction

The growth of digital services is inevitable, and telecom operators (CSP / Communication Service Providers) is one of the most significant contributors that supporting and providing the connectivity to the customers in this era. This growth creates a huge opportunity to create value on the digital aspect, especially on rising market economies in ASEAN & ASEAN-Indochina (Ure, 2008). During 2007-2017, the number of CSP subscribers has been increasing significantly (CAGR 10.07%), as well as the amount of overall revenue (CAGR 6.08%).

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However, the transaction on basic services (voice and SMS) showed a decreasing trend since people in the digital era prefer to use OTT services (Sujata, 2015). OTT (Over the Top) services, like WhatsApp, have been disrupting basic services provided by telecom operators.

From the perspective of CSP, the extensive use of OTT services (WhatsApp, Skype, Netflix) eventually lead to higher transaction of data traffic and higher additional revenues. Only becoming the connectivity provider of data traffic (dumb pipe) is not the option taken by the CSP, since the OTT players acquire the revenue portion of digital services. The investment done by CSP to provide data infrastructure is not a small amount, proven by capital expenditure amount that tends to increase. This phenomenon drove further research of efficiency factors of telecom operators from the perspective of mobile data traffic.

Evaluating company efficiency can be performed in many ways and methods, based on profit per unit, unit cost, and so on. Efficiency evaluation is commonly expressed as the ratio of output value compared to input value in a production flow (Cooper, 2007). A couple of researches on telecom efficiency have been performed previously: Hendrawan and Nugroho (2018), Masson, Jain, Ganesh, and George (2016), Torres and Bachiller (2011), Baysal, Altu, and Toklu (2007).

Telecom operator or communication service provider (CSP) company, also known as a wireless carrier, mobile network operator, cellular company, or wireless carrier, is the organization that provides mobile wireless communication services to the customer. In the digital era, the services offered by the telecom company will be more variative, not only essential functions like voice or SMS but also a digital wallet, content subscription, handset bundling services, and so on to compete with the OTT players.

2. Literature Review

There are several approaches to measure company efficiency. Saxena, Thakur, and Singh (2009) have performed a classification of the measurement methods as the frontier method and the average method. The frontier method utilizes a comparison of variables by taking the best value of compared ones. In contrast, the average method is conducted by comparing the target variable with the average performance indicator. Al-Farisi and Hendrawan (2010) stated that the comparison of efficiency using frontiers could be derived using two methods of efficiency measurement, namely parametric statistical methods and non-parametric statistical methods. Furthermore, Hendrawan, Nugroho, and Permana (2019), evaluated 14 selected Asean's telco companies from 2008 to 2017 using stochastic frontier analysis. Their research found that the efficiency parameters impact stock value but not significant (t-Ratio 1.35).

Berger (1997) states that the Stochastic Frontier Approach (SFA) is used to measure the cost, profit, or production relationship between input, output. SFA method has more advantages compared to other parametric methods, such as the ability to show two types of error, which are random error and cost inefficiency error. Random error is assumed to follow a standard symmetrical distribution, while cost inefficiency is considered to support the asymmetric distribution.

Sharma, Momoya, and Monahar (2010) conducted efficiency research on ten telecommunication companies in India from 2003 to 2010. The method that was used in this research is to use Data Envelopment Analysis (DEA). Variable used as an input is subscriber and revenue as variable output. The research showed that Bharti Airtel, Vodafone Aircel, and BSNL are the most efficient operators. On the other hand, MTNL, Reliance, and Tata Teleservices had the lowest efficiency among the ten different operators.

Papadimitriou and Prachalias (2009) were estimating the efficiency of marketing expenses with 18 leading global telecommunication operators in Europe, Asia, Africa, and South America during within period 1998, 2001, 2004, and 2006 using Data Envelopment Analysis (DEA). The efficiency calculated based variable staff, investment, marketing expenses, traffic of fix telephony, and traffic of mobile phone as input and total revenue as the output variable. The research shows that Japanese NTT, Swisscom, and Deutsche Telecom are the operators that have the first rank compare to the other 18 operators

Moriwaki, Era, Osajima, and Umino (2009) conduct research related efficiency telecom companies in the Asia-Pacific region with Stochastic Frontier (SF) method using data from 1993 to 2004. The variables used on this study are the capital amount, number of employees, and number of subscribers. The result of the research shows the efficiency score of CSPs in the United States was higher than the developing nations in Asia-Pacific, and the privatization impacted the technical efficiency score.

3. Research Methodology

This research was conducted based on data of financial statements that officially issued by mobile wireless operators in South East Asia during the period 2013-2018. Out of 52 active operators registered in GSM association across 11 countries, using technique of purposive sampling, following nine operators were selected: AIS (Thailand), Celcom (Malaysia), DiGi (Malaysia), Globe (Philippines), IndosatOoreedoo (Indonesia), Maxis (Malaysia), Smart PLDT (Philippines), Telkomsel (Indonesia), XL Axiata (Indonesia). Criteria used for the purposive sampling were: (1) Had a definite increase of stock value during 2013-2018, (2) Had the least number of the customer as 1 million, (3) Had issued the financial report and operational report in 2013-2018.

The efficiency of telecom operators was calculated by using SFA (Stochastic Frontier Analysis) and DEA (Data Envelopment Analysis). Parameters that taken as the input variables are CAPEX, OPEX (operating expense), and total assets. As for the output variables, it utilized the revenue, number of subscribers, and the amount of data traffic. Precisely, for SFA methodology, output parameters that are representing profit function in this study were developed by Berger & Di Patti (2003), Berger &Mester (1997), Hendrawan, Nugroho, and Permana (2019b) are evaluating how close a company obtains profit. The profit equation could be represented as a function of input, output, and environment variables following:

$$\ln(\pi) = f_{\pi}(y.w.v) + \ln u_{\pi} + \ln \varepsilon_{\pi}$$

Where π representing profit variable, y representing output variables, w representing input variables, and v representing environmental variables impacting corporate performance, in this case the inflation.

Following is the equation applied for calculating efficiency using DEA:

$$Max(h_0) = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \quad \text{.....(1)}$$

Where:

$$\frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1 \quad ; \; j = 1,\ldots,n \quad ; \; u_r, v_i \geq 0 \quad ; \; r = 1,\ldots,s \quad ; \; i = 1,\ldots,m$$

y_{rj} = variable of output (subscriber amount, revenue, data traffic)

x_{ij} = variable of input (CAPEX, OPEX, total assets)

u_r = weighted of output variable

v_i = weighted of input variable

4. Results

Table 1 –Efficiency Calculation Result of Mobile Operators Using DEA

Operator	#Rank	Efficiency Score (VRS)
TLKM	1	0,978
DiGi	2	0,976
AIS	3	0,960
Maxis	4	0,920
ISAT	5	0,918
XL	6	0,869
Globe Telecom	7	0,863
Smart (PLDT)	8	0,840
Celcom (Axiata)	9	0,808

Based on efficiency score computation using the DEA method above, TLKM (Indonesia) reached the first top efficiency score (0.978), whereas Celcom Axiata (Malaysia) acquired the efficiency score in lowest position (0.808).

Table 2 – Efficiency Calculation Result of Mobile Operators Using SFA

Operator	#Rank	Efficiency Score
Maxis	1	0,98
AIS	2	0,94
Celcom (Axiata)	3	0,86
TLKM	4	0,85
DiGi	5	0,78
Smart (PLDT)	6	0,60
Globe Telecom	7	0,56
XL	8	0,52
ISAT	9	0,50

Efficiency calculation using the SFA method above showed a different result. Maxis (Malaysia) obtained the highest efficiency score (0.98), and Indosat Oreedoo (Indonesia) had the lowest efficiency score (0.50). Remarkable results showed in table 3 below, based on the SFA calculation are: all of the variables (output & input) were giving positive impact to the efficiency factors except the variable of Total Asset, which is quite significant, and Capital Expenditure value. By applying further study of t-Ratio by calculating the variables

and the efficiency, it revealed that data traffic positively influencing efficiency number but not significant (t-Ratio 0.71).

Table 3 – Significance & Impact of Efficiency Variables

Variable	Coefficient	Std-Error	t-Ratio	Significance	Impact
Revenue	6.96	1.02	6.83	Significant *	Positive
Subscribers	0.28	0.04	7.09	Significant *	Positive
Data Traffic	0.00	0.00	0.71	Not Significant	Positive
Capex	(0.01)	0.01	(1.64)	Not Significant	Negative
Opex	0.53	0.05	11.00	Significant *	Positive
Asset	(0.07)	0.04	(1.75)	Significant ***	Negative

Notes:

* Significant α = 1%
** Significant α = 5%
** Significant α = 10%

5. Discussion

Based on the result of the telecom efficiency score using the DEA method (Table-1), TLKM (Indonesia) acquired the highest efficiency score as 0.978. Subsequently the rank is followed by: DiGI (Malaysia) 0.976, AIS (Thailand) 0.960, Maxis (Malaysia) 0.920, IndosatOoreedoo (Indonesia) 0.918, XL Axiata (Indonesia) 0.869, Globe Telecom (Philippines) 0.863, Smart PLDT (Philippines) 0.840, and Celcom Axiata (Malaysia) 0.808.

However, calculating and comparing efficiency scores using different methodologies gives different results as well. Based on Table-2 as the result of SFA calculation, Maxis (Malaysia) was the most efficient operator with a score of 0.98. The efficiency rank was followed by AIS (Thailand) 0.94, Celcom Axiata (Malaysia) 0.86, TLKM (Indonesia) 0.85, DiGi (Malaysia) 0.78, Smart PLDT (Philippines) 0.60, Globe Telecom (Philippines) 0.56, XL Axiata (Indonesia) 0.52, and IndosatOreedoo (Indonesia) 0.50.

It is shown in Table-3 that the variables of operational expense, total revenue, number of subscribers, and data traffic had a positive impact on company efficiency. It means that an increasing number of those variables would contribute to the rising efficiency score. On the other hand, variables of capital expenditure and total assets had a negative impact on the efficiency score.

All input and output variables had a significant impact, either positively or negatively, except the variable of data traffic and CAPEX. T-Ratio of the variables is listed as following: total revenue (6.83), number of subscribers (7.09), data traffic (0.71), capital expenditure (-1.64), operational expenditure (11.0), and total asset (-1.75). Variables considered as significant factors are those that had α more than 1%. In this research, data traffic had a positive impact to efficiency but not significant.

6. Conclusion

Conclusions based on this research are: (1) the increasing of mobile data traffic is not determining the efficiency and profitability of telecom company considering the impact is not significant; (2) the number of total assets is significantly negatively impacting the telecom efficiency.

Implication to the research and telecom industry are: (1) further research is required to find the empirical correlation between subscribers traffic with the telecom profitability; (2) negative impact of total asset toward the efficiency must be responded by company strategy on how leveraging current asset and investment; (3) telecom operators shall be more focused on acquiring higher ARPU by providing more satisfactory services to the subscribers.

These conclusions are relevant for the object on this study, which is nine CSP (Communication Service Providers) of South East Asia based on financial data in five years period.

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