Information and Communication Technology and Its Relation to the Economy in Sumatra

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Abstract. The Covid-19 pandemic still haunts every province in Indonesia and changes the pattern of population activity. Work activities, learning, meetings, gathering, and commerce are online. Unfortunately, the carrying capacity of technology related to this new adaptation is still not sufficient and evenly distributed in every province in Indonesia. The observation area is ten provinces in Sumatera. The approach used is descriptive with the help of graphs, scatter diagrams, correlations, and empirical studies. The results found are that the development of ICT among provinces in Sumatra is not evenly distributed, the development of ICT in most provinces in Sumatra is below the Indonesian average, and there is a correlation between the development of ICT and per capita income.

Keywords: Communication, Information, Sumatra, Technology.

1. Introduction

Covid-19 was detected in 2019 and began to harm Indonesia in early 2020. The pandemic has an impact on the economy in many countries as well as Indonesia [1]. Indonesia's income growth experienced a decline in 2020 in almost all provinces. The negative impact was also experienced by ten provinces in Sumatra, their income decreased in 2020. One of the reasons was the regulations issued to limit the movement and activities of the community to reduce the spread of Covid-19.

Learning activities, work, meetings, and gatherings go online, as well as trading activities. E-commerce also experienced an increase during the pandemic with shoppers dominated by Generation Z, however, physical stores are still chosen by buyers because the goods sold are of high value [3]. Joining e-commerce channels or trading online are options that have helped medium and large enterprises during the pandemic. This effort is not followed by small and micro enterprises, due to low technology mastery, wrong perceptions about online selling methods, and the concern that delivery costs will cancel purchases [4].

Adaptations that occur during a pandemic require technological support, including the internet. The highest internet penetration in Indonesia for the period 2019-2020 (Q2) is Java (56.4%) and then Sumatra (22.1%) [5]. These values indicate a fairly wide gap between regions in the West. Because of this, Sumatra was designate as the research area.

2. Literature Review

The basic theory comes from the Cobb-Douglas production function, then used by Solow [6] in the growth model. Technological progress (A) is assumed to be given, so the impact of technology is observed with the augmented Solow growth model [7]. Technology in this study is associated with information and communication activities. Information and communication technology has a positive

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effect on economic growth [7]–[9]. ICT not only has a positive impact but is also found to harm economic growth [10]. ICT also has an effect on the economy with the magnitude of the impact depending on the location and condition of the observation area [11], [12], as well as equitable access to ICT [13].

3. Methodology and Data Analysis

The research area is Sumatra with ten provinces, Aceh, North Sumatra, West Sumatra, Riau, Jambi, South Sumatra, Bengkulu, Lampung, Bangka Belitung Islands, and Riau Islands. Sumatra is observed because it is located in the Western Region of Indonesia, is close to Java and Singapore as growth centers, and is the second-largest contributor to the Indonesian economy. The research period is from 2017 to 2019 because of the availability of ICT development Index data issued by the Central Statistics Agency (BPS) for the provincial level.

The data used in this study is the ICT Development Index (IP_TIK) issued by BPS [14]. This data consists of three sub-indexes and several indicators with details as follows.

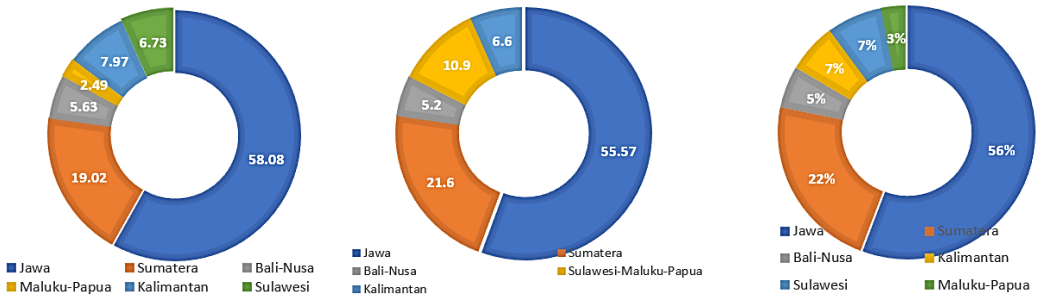
1. Access and Infrastructure measures ICT readiness through fixed telephone subscribers per 100 population, cellular telephone subscribers per 100 population, international internet bandwidth per user, percentage of households with computers, and percentage of households with internet access.
2. Usage describes the intensity of ICT through the percentage of individuals who use the internet, fixed broadband internet subscribers per 100 population, and active mobile broadband internet subscribers per 100 population.
3. Skill is the human ability to use ICT as measured by the average length of schooling, secondary gross enrollment rate, and gross enrollment rate.

The data used to refer to Kurniawati [15], Rath [7], Bahrini [10], and Maneejuk [11], based on their research that ICT has a positive or negative effect on the economy. ICT indicators are generally calculated separately, not in the ICT index, although some use the ICT index in their analysis. This paper uses the ICT index because not all ICT indicators in the empirical reference are available. The purpose of writing is answered using descriptive analysis with graphs, scatter diagrams, and correlations.

4. Research Result and Discussion

Technological advances in information and communication have brought human civilization to a new level. Access to information and communication becomes easier because it is always at hand. This progress allows people to continue their activities despite restrictions on mobility. Virtual face-to-face is now commons for learning activities, meetings, and weddings.

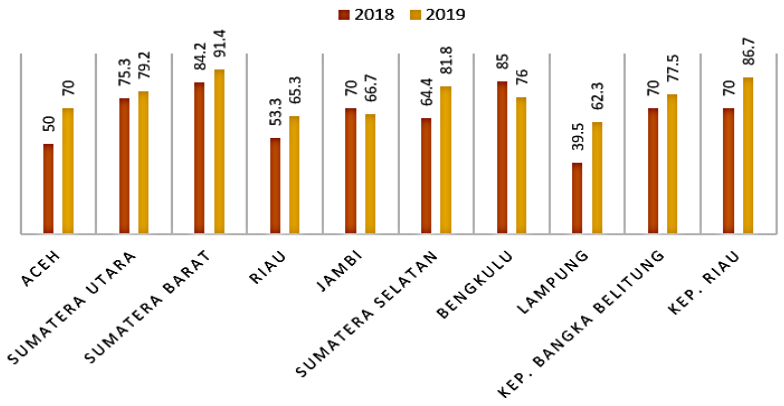
An Interconnected Network or internet is one of the systems that support the advancement of information and communication. Its users continue to grow in Indonesia, with a large number still concentrated in the Java region. Sumatra during the observation period was always in second place. This can be seen in Figure 1.



Source: APJII [5], [16]
Note: 2019 period is 2019 to 2020 at 2nd quarter (Q_2)

Fig. 1. Internet User Contribution by Island 2017, 2018, and 2019 (Percent)

Internet users by the island in Indonesia during the year of observation still showed inequality. Most users are always in Java, followed by Sumatra. Users in Sumatra until the 2020 observation year continued to show an increase. One reason is the increase in population.



Source: APJII [5]
Note: 2019 period is 2019 to 2020 at 2nd quarter (Q_2)

Fig. 2. Internet Users of Total Population per Province in Sumatra in 2018 and 2019 (Percent)

The population is increasing as well as the number of internet users. Of the ten provinces in Sumatra, West Sumatra has the highest number of internet users out of the total population. The opposite thing happened in Lampung Province, the users in this region were the fewest compared to the total population. However, the percentage of internet users in Lampung has increased, unlike Jambi and Bengkulu, which have decreased.

Internet usage activities are highly dependent on many things, some of which are directly related to the availability and quality of information and communication technology infrastructure in each region. The condition of information and communication technology in every province of Indonesia was published by the Central Statistics Agency in 2017, under the name ICT development index.

Table 1. ICT Development Index, Acces and Infrastructure, Usage, and Skill in Sumatera 2017-2019

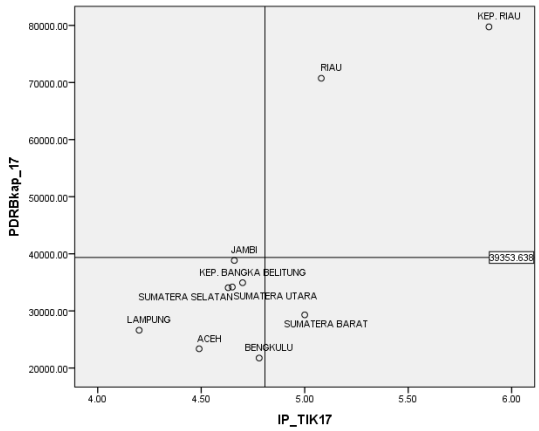
Province	ICT Development Index				Access and Infrastructure			Usage			Skill		
	2017	2018	2019	2020	2017	2018	2019	2017	2018	2019	2017	2018	2019
Aceh	4,49	4,66	4,89	5,27	4,86	5,03	5,33	3,02	3,33	3,54	6,69	6,60	6,71
SumUt	4,65	4,94	5,19	5,44	5,15	5,53	5,64	3,38	3,72	4,21	6,20	6,18	6,24
SumBar	5,00	5,12	5,24	5,52	5,52	5,65	5,78	3,78	3,96	4,11	6,38	6,37	6,41
Riau	5,08	5,25	5,33	5,74	5,5	5,76	5,79	4,16	4,32	4,45	6,07	6,10	6,15
Jambi	4,66	4,91	5,16	5,49	5,21	5,44	5,71	3,53	3,93	4,30	5,80	5,82	5,80
SumSel	4,63	4,81	4,90	5,30	5,38	5,62	5,64	3,43	3,65	3,84	5,53	5,48	5,55
Bengkulu	4,78	4,88	5,20	5,50	5,26	5,5	5,73	3,55	3,61	4,13	6,29	6,20	6,29
Lampung	4,20	4,50	4,82	5,15	4,86	5,02	5,28	2,95	3,50	4,00	5,38	5,47	5,52
BaBel	4,70	4,89	5,24	5,54	5,27	5,57	5,85	3,94	4,12	4,65	5,08	5,07	5,19
KepRi	5,89	6,14	6,39	6,46	6,48	6,80	7,03	5,20	5,46	5,91	6,08	6,16	6,08
Indonesia	**4,96**	**5,07**	**5,32**	**5,59**	**5,09**	**5,34**	**5,53**	**4,44**	**4,45**	**4,85**	**5,75**	**5,76**	**5,84**

Source: BPS [14][17][18]
Note: High 7,26-10,00; Medium 5,01-7,25; Low 2,51-5,00; and Very Low 0,00-2,50.

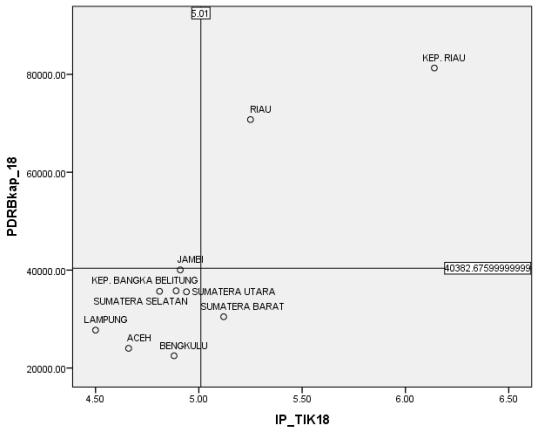
The average value of the ICT Development Index in ten provinces in Sumatra is below the index value of Indonesia, and the majority are in the low category for 2017. This condition changed in 2020, they were already in the medium category. Of the three sub-indexes that make up ICT, the usage value is the smallest and is in low categories during the year of observation. The increasing number of internet users is not followed by the number of fixed and mobile broadband subscribers. This condition is thought to be related to the uneven distribution of ICT infrastructure.

The development of ICT infrastructure in Indonesia is slower than in some other countries in ASEAN, the condition is exacerbated by the inequality of ICT access between regions in Indonesia [19]. Various efforts have been made, including the construction of BTS (Base Transceiver Station) for 3T areas (outermost, underdeveloped, and leading) and the Palapa Ring for equitable broadband access in Indonesia. Satellite carrying capacity is also needed to increase Indonesia's internet speed, if infrastructure development goes well, Indonesia's internet speed in 2035 will reach 30 MB/second [20].

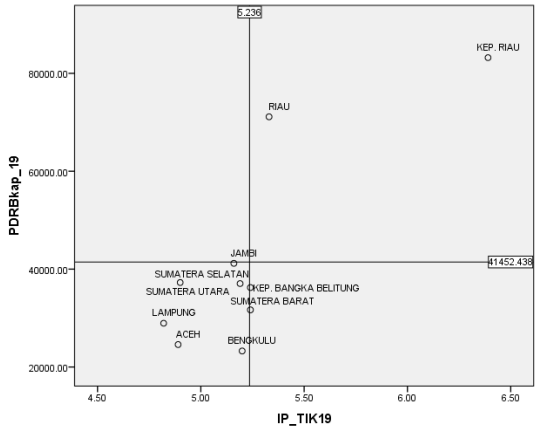
The various values of the ICT development index in the provinces in Sumatra provide information that there is diversity in development achievements, especially for the indicators used in calculating the sub-index. The distribution of various ICT conditions turns out to have a pattern similar to the distribution of economic conditions, this can be seen in Figure 3.



Pearson Correlation .762



Pearson Correlation .818



Note: ICT and GDRP/kapita in 2019 does not correlated.

Fig. 3. ICT Scatter Diagram with GDRP/capita in 2017-2019 in Sumatra

The scatter diagram for the GDRP/capita and ICT development index shows a grouping pattern with the same category. Seven provinces with low ICT development index scores also have low GDRP/capita

scores. Riau and Riau Islands which have a high ICT development index also have a high GDRP/capita value. Only West Sumatra has the opposite value, high ICT development index but a low GDRP/capita. Economic growth is positively influenced by ICT for countries in Asia [15], Arab [8], European Union [9]. ICT has proven to have a positive effect in Indonesia [7]. The role of ICT in Sub-Saharan Africa has also proven to be positive in increasing per capita income, thus helping efforts to reduce poverty rates [13].

ICT as a variable is proven to affect income/capita or economic growth because it is studied together with macroeconomic variables, in other words, ICT does not work alone. Despite having a positive impact on the economy, ICT can exacerbate inequality. An increase in the number of internet users and fixed broadband subscriptions can increase income inequality. On the other hand, an increase in mobile cellular telephone subscriptions and fixed telephone line subscriptions will reduce income inequality in ASEAN-5 [21]. Technological changes may have different impacts on different regions of Europe. The impact depends on the size of the country, the stage of development, and the degree of income inequality, it can be positive or negative [22].

5. Implication and Suggestion for Future Research

The Covid-19 pandemic has changed many people's habits, business activities, work, study, shopping, and entertainment can now be done anywhere from mobile phones to computers using the internet. This condition is a way out when mobility is limited to prevent disease transmission, so special attention is needed to provide equitable internet access throughout Sumatra. The increasing number of users because the need has not been followed by good ICT development, the ICT index of the provinces in Sumatra is still in the medium category with the sub-index still being in the low to medium category.

An Economic recovery that relies on ICT will be successful if followed by accelerated distribution of quality and availability of ICT infrastructure. Unfortunately, accelerating the even distribution of ICT requires a large amount of capital, so it is necessary to think of a solution while the process is running. Things that can be considered are to take advantage of the nature of gotong-royong which has become the nation's roots. Gotong-royong is done to help those in need but has various limitations. This form of effort needs to be investigated further, it is not enough to use economic and demographic indicators but also to use social capital indicators because ICT and social capital affect the community's economy [23] and hypothetically can reduce poverty [24].

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