CHAPTER 1
INTRODUCTION

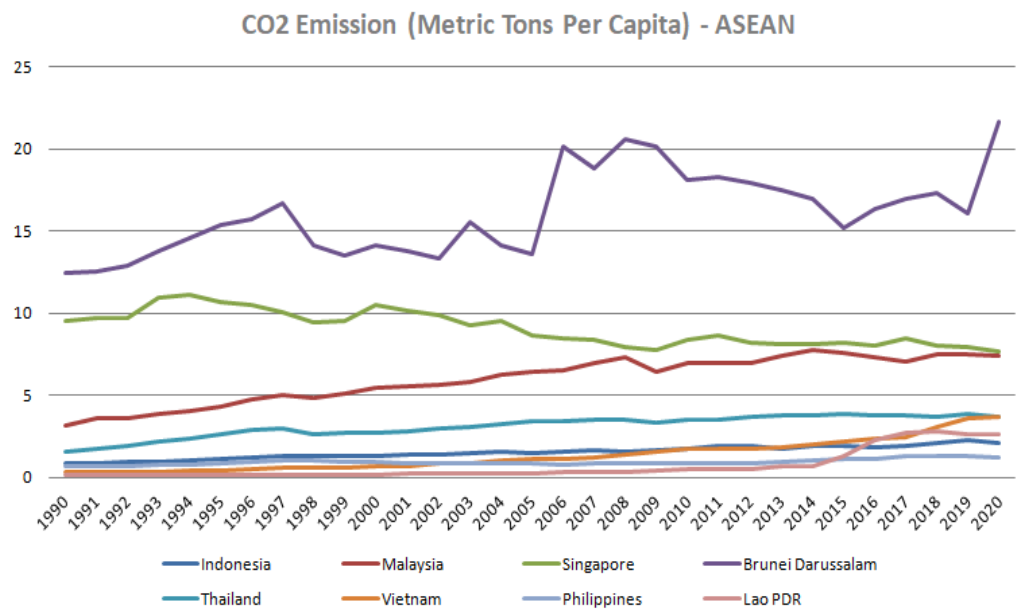
1.1 Problem Identification

Climate change is a topic that is often discussed at the moment. Climate change occurs when the weather changes over a long period of time from a certain variable, namely wind, temperature, and precipitation in a certain period. Based on the United Nations Convention (UN), it relates to climate change due to human intervention directly or indirectly to climate change so as to change the natural climate variability and composition of the global atmosphere.

To preserve the environment, greenhouse gasses (GHGs) can be used to stabilize the earth's temperature. However, the negative impact of greenhouse gasses (GHGs) is that the more the concentration increases, the thickening of the atmosphere will occur. Such as an increase in the earth's surface temperature which is commonly called global warming. The depletion of the ozone layer attached to carbon dioxide (CO_2) emissions is also a major cause of global warming (Ministry of Environment and Forestry of the Republic of Indonesia).

Carbon dioxide (CO_2) emissions occur due to the process of human activities that cause the production of carbon dioxide (CO_2) when they produce, transport and recycle goods (Q. Wang, Sun, et al., 2023). Due to increased activities and excessive consumption and production, increased carbon (CO_2) emissions have had a negative impact on human life, the economy and society.

Graph 1 1 CO_2 Emissions in ASEAN 1990-2020



Sources: World Bank, World Development Indicators

The data in Graph 1.1 above shows the annual results of CO_2 emissions in several ASEAN countries from 1990 to 2020. In the data above, the countries in ASEAN experience fluctuations but tend to increase every year. In graph 1.1, the highest number of CO_2 emissions measured in metric tons per capita is from the country of Brunei Darussalam, where the number of CO2 emissions in 2020 in that country amounted to 21.7 per tons, this number of emissions jumped higher compared to 2019, where the number of emissions CO_2 is 16.1 per tons. Furthermore, the lowest amount of CO_2 emissions from several ASEAN countries in 2020 was the Philippines, which amounted to 1.2 per tons. As can be seen in the graph, the comparison of the amount of CO_2 emissions from Brunei Darussalam and several ASEAN countries is very different, so the step that should be taken is to monitor and control the existing resources in each of these countries in order to achieve this reduction in CO_2 emissions.

Based on British Petroleum (2022) carbon emissions from energy consumption, industrial processes, combustion, and methane increased from 5.7% to approximately 39 billion tons, the same result as in 2021. Therefore, the global climate problem is very serious to be dealt with, to reduce this impact it must be by encouraging low-carbon development. The energy sector is a major economic contributor and an important variable in the economic ecosystem and also impacted by the era of digital technology. The energy resources are limited and are often used to generate negative externalities because they are mainly generated from fossil fuels (Chu, 2022).

At this time, all aspects of production and human life are inevitably affected by digital technology. Digital technologies change the way companies work (E-Commerce), the way people communicate (social networks), the way government policies are socialized to engage the public (e-government), and the distribution of tasks between work and technology (Artificial Intelligence). Digitalization also brings opportunities and challenges for reducing CO_2 emissions and growing the share of renewable energy (Lange et al., 2020). Manufacturing and maintaining digital infrastructure, including data centers, cloud servers, increases energy consumption. Furthermore, smart digital can optimize production processes, infrastructure maintenance and energy-saving grids, and reduce CO_2 emissions to increase economic sustainability (Feuerriegel et al., 2016). Therefore, digitalization is crucial to changing the way various aspects of producing and human life work to mitigate CO_2 carbon emissions and optimize improvements in economic sustainability.

According to the Global Enabling Sustainability Initiative (GeSI) and Deloitte, Digitalization will reduce global CO_2 emissions by 9% in 2030. The reduction in CO_2 emissions is attributed to the optimization of energy network processes and improvements in energy conservation. Cloud solutions and fast internet contribute to sustainable development. Artificial intelligence and the internet of things are increasing the use of renewable energy by improving grid

efficiency and solar access. Digitalization increases the application of information and communication technology (ICT) throughout the economy and society, which is expected to reduce energy demand and carbon emissions. The increase in the use of digitalization in society results in increased energy consumption and its role is very important in the realization of efficient and effective digitalization for today's survival which will also have a positive impact and also a negative impact on climate change.

In the World Economy Forum (2022) digitalization is a technological development which is very influential in the progress in ASEAN. ASEAN is considered to be the next economic and technological power. ASEAN is an intergovernmental organization that aims to expedite economic growth, social advancements, and culture in the Southeast Asian region. ASEAN has 10 member countries. The beginning of the establishment of ASEAN was on August 8, 1967 precisely in the city of Bangkok, Thailand with the approval of the ASEAN declaration by several ASEAN founders consisting of Indonesia, Thailand, Malaysia, Singapore, and the Philippines. On January 7, 1984, the countries of Brunei Darussalam, Myanmar, Cambodia, Vietnam, and Laos also joined ASEAN (asean.org).

Based on data from the World Bank, the highest mobile cellular subscriptions in ASEAN nations in 2020 reached 355,620,388 subscribers. Mobile Cellular Subscription is fairly high with different levels of development. The more the quantity of Mobile Cellular Subscription subscribers in a state, the more accessibility to information and communication is wide open.

The percentage of internet users in each individual has increased. The highest internet users in ASEAN countries in 2020 are Brunei Darussalam at 95% and Singapore at 92%. The highest internet users in ASEAN nations are Brunei Darussalam at 87.11%, Singapore at 86.18, and Malaysia 78.37.

According to the ASEAN National Secretariat, internet users in ASEAN will reach around 7.5 billion users by 2030.

Based on World Bank data, Fixed Broadband Subscriptions in 2020 reached 16,699,249 subscribers. Fixed Broadband Subscriptions in ASEAN countries in 2019 reached 14,802,380 subscribers. Fixed Broadband Subscriptions is one of the potentials to increase economic growth. Broadband services have dial-up modems with 40 times the connection speed which can send information quickly.

According to Belkhir & Elmeligi (2018), as more and more digital ranks are used, the most detrimental direct impact of digitization is the increased emissions in the production, use and disposal of information communication and technology (ICT). If digitization is to help decarbonization, its impacts, namely reducing energy consumption and facilitating the shift to renewable energy, must outweigh the direct and other impacts. Digitalization is an important role in improving the efficiency of production activities. Digitalization in ASEAN is on the rise at the moment. This sector has a significant impact on a country's income. Digitalization is a breakthrough sector in improving economic development in ASEAN countries.

The rise of ICT has a corresponding impact on the increase of carbon emissions in the environment from various forms and multiple sources. Emissions from ICT devices come from the energy consumption used, such as manufacturing the device, or in operation, which is an additional contributor to the total CO_2 of the ICT industry. Some previous studies from Asongu et al. (2017), Danish et al. (2019), and Haini (2021) provide estimation results from ICT development that there is a negative and significant relationship with carbon emissions.

Based on the background of these problems, the author is interested in further examining how changes in information (digitization) and energy consumption affect carbon emissions (CO_2) in the ASEAN region. The research

that the author conducted is entitled **"The Influence of Digitalization on Carbon Emissions (CO_2) in ASEAN"** with eight ASEAN countries, namely Indonesia, Thailand, The Philippines, Brunei Darussalam, Malaysia, Vietnam, Singapore, and Laos.

1.2 Problem Formulation

Based on the background of the problems that have been described, the authors formulate several research problems to be studied including:

1. Is there an influence between energy consumption and carbon emissions (CO_2) in ASEAN countries?
2. Is there an influence of digitalization (Fixed Broadband Subscription, Mobile Cellular Subscription, and Internet Users) on carbon emissions (CO_2) in ASEAN countries?

1.3 Research Purposes

Based on the problems that have been formulated, the objectives of this study are to:

1. Analyze the effect of energy consumption on carbon emissions (CO_2) in ASEAN countries
2. Analyze the effect of digitalization (Fixed Broadband Subscription, Mobile Cellular Subscription, and Internet Users) on carbon emissions (CO_2) in ASEAN countries

1.4 Benefits of Research

Based on the research objectives to be achieved, this research was conducted with the aim of providing the following benefits:

1. This research can be used as additional knowledge and insight for the author, or other parties who read it.

2. This research is expected to be used as a consideration for the ministry of environment and the relevant institution in making policies regarding carbon emissions (CO_2).
3. This research can be used as a reference for further research related to carbon emissions (CO_2).