2021

Educational Factors Predicting Middle-Income Trap and International Competitiveness Index in Southeast Asia

Masatoshi Hara
Walden University

Walden University

College of Social and Behavioral Sciences

This is to certify that the doctoral dissertation by

Masatoshi Hara

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Lynn Wilson, Committee Chairperson,
Public Policy and Administration Faculty

Dr. Janet Hunter, Committee Member,
Public Policy and Administration Faculty

Dr. Steven Matarelli, University Reviewer,
Public Policy and Administration Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2021

Abstract

Educational Factors Predicting Middle-Income Trap and International Competitiveness Index in Southeast Asia

by

Masatoshi Hara

MA, Waseda University, 2015

BA, Waseda University, 2009

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

May 2021

Abstract

The middle-income trap (MIT) refers to the state that middle-income economies have found it challenging to upgrade to reach the high-income stage over an extended period. Overcoming the MIT has long been discussed as an important social issue, notably in Southeast Asia. One major problem in addressing the MIT is directly linked to fewer job opportunities and an unstable income. Promoting industrialization has been the most efficient way to solve the problem. However, little previous research has been conducted on the influence of the enrollment rate in secondary education on the MIT and the international competitive index (ICI) in connection with the barrier issue of industrialization. Tran's economic development stage model and the industrial development model were used to examine the predictive relationships between the economic development stage and education levels. Using secondary data compiled between 1999 and 2018 primarily from the World Development Indicators and the UN Comtrade Database, and multiple linear regression modeling, the strength of secondary education predicting the percentage change in R^2 variance in the MIT and ICI was evaluated in nine Asian economies. Using log transformed data, secondary education alone was not found to be a superior predictor (F [1, 168] = .124, p = .725) for the MIT and (F [1, 175] = .147, p = .702) for the ICI respectively. Tertiary education was found to be a significant predictor in both models (F [1, 168] = 43.09, p = .000) and (F [1, 175] = 7.12, p = .008) respectively and is thus a major factor in escaping the MIT and upgrading the ICI. Positive social change emanates through continued policy support of advancing education as a means to escape the MIT and to promote advancements of the ICI.

Educational Factors Predicting Middle-Income Trap and International Competitiveness Index in Southeast Asia

by

Masatoshi Hara

MA, Waseda University, 2015

BA, Waseda University, 2009

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Management

Walden University

May 2021

Acknowledgments

I would like to express my sincere gratitude to Dr. Lynn Wilson, my faculty mentor and chairperson, Dr. Janet Hunter, my second committee member, and Dr. Steven Matarelli, my university research reviewer, for all their guidance, encouragement, and continuous support through this academic process. Also, to my former supervisors at Waseda University in Japan, Dr. Tran Van Tho, Dr. Shunji Karikomi, and Professor Yusuke Goto. I am thankful for their advice and encouragement to pursue my doctoral study on the middle-income trap in the ASEAN economies.

Dedication

This study is dedicated to my father, Hiroshi Hara, my mother, Mikiko Hara, my older brother, Akihiko Hara, and my younger brother, Yusuke Hara, who have always encouraged me to pursue the highest level of education in the United States that they never achieved.

Table of Contents

List of Tables

List of Figures

Chapter 1: Introduction to the Study

While the world economy has greatly advanced since World War II, a number of economies have struggled for growth, prosperity, and development. The World Bank (2007) has paid close attention to the strategy of how to overcome the middle-income trap (MIT) in many parts of the world. Previous studies have revealed the MIT to be potentially one of the most significant social problems in the world. While proposals to overcome this phenomenon have been introduced from various perspectives, little research has been conducted on the impact of the rate of enrollment in secondary education on the MIT. Notably, expanding secondary enrollment rates needs to be examined statistically, and the effect of the enrollment rate in secondary education on the MIT in Southeast Asia must also be clarified. Therefore, an initial research gap concerns the impact of the enrollment rate in secondary education on the MIT.

Another research problem is the lack of research on the influence of secondary education on the international competitive index (ICI) for industrialization in Southeast Asia. Along with the importance of the enhancement of the enrollment rate in secondary education, the influence of the enrollment rate in secondary education on the MIT needs to be addressed as the second research problem. The potential positive implications of this study for social change are therefore to address the most significant issue constraining socioeconomic development and education in the developing world. Also, the possibility of promoting industrialization by enhancing the ICI is another potential contribution. In accordance with this perspective, I will discuss the influence of enrollment rates in secondary education on the MIT and the ICI in Southeast Asia.

Background of the Study

First, in reviewing theoretical understandings of the mechanism of economic development, Lewis (1954) suggested the concept of a "dual economy" featuring traditional (agricultural) and modernized (nonagricultural) sectors, observing the process by which the labor surplus made available in the traditional sector is transferred into the industrial sector, promoting industrialization; he identified this process as the "turning point" (p. 164) for the developing world. In reaction to this model, Rostow (1956) suggested five stages of economic development in his study, leading from "traditional society," to "the pre-conditions of take-off," "take-off," the "drive to technological maturity," and finally "high mass consumption" in one nation. Based on these economic frameworks, Tran (2016) formed his own framework, describing stages of economic development over time. Building from such key terms as Lewis's "turning point" and Rostow's "take-off," Tran formulated a transition from low-income to lower-middle income, higher-middle income, and high-income stages. The crux point in his framework is that many economies reach a plateau in the middle-income range, falling either into the lower-middle income trap (LMIT) or the higher-middle income trap (HMIT), respectively (Tran, 2016). This perspective considers economic development in terms of industrial development, which should be intensified further to escape the MIT. In 2008, there were 101 middle-income economies in the world, while only 13 economies and regions have achieved the high-income level (World Bank & PRC, 2012). Thus, most economies have found it difficult to upgrade their income levels and have in fact been

trapped in the middle-income stage over the past 40 years (World Economic Forum, 2014).

For the MIT to be overcome, promoting industrialization has been seen as one significant contributor to upgrading the national level of income. In reviewing the development of industrialization in East Asia since the 1960s, the successful shift from import-substituting industrialization to export-oriented industrialization eventually served as the catalyst for "the Miracle in East Asia" (World Bank, 2007). Notably, in examining the shift of the international division of labor, the changes in factor endowment conditions that take place during economic development have corresponded to a structural transformation of comparative advantages. Until a shift from labor-intensive to the capital- and technology-intensive industries has been made successfully, the MIT will persist. The flying goose pattern of industrialization offers a theoretical framework to explain the catch-up process among the least-developed nations, describing the progressive shifts from importing products from overseas, to import substitution, then to exporting products (Kojima & Ozawa, 1985).

For such a framework to be feasible, cyclical enforcement of international competitiveness in the industry must take place, leading to the catch-up industrialization (Watanabe, 2012). In this catch-up process, three skill levels of workers, namely "low skill," "medium skill," and "high skill," correspond to the successive stages of economic development, so that the predominantly "low-skill intensive industry" economy gives rise to the "medium-skill intensive industry" and finally the "high-skill intensive industry" among high-income nations (Tran, 2016). In other words, to enhance their international

competitiveness, middle-income economies need to develop the skill levels among their manufacturing industry labor force in particular.

To enhance the skills of workers and promote industrialization to overcome the MIT, further educational opportunities should be provided. Schultz (1971), for example, analyzed the impact of education on economic development performance. Observing both agricultural and manufacturing development, Schultz saw that the development of human capital through education and training enables the labor force to improve in numeracy and literacy, achieving new job opportunities, improving their income levels, and reducing poverty. In addition, investigating the relationship between national income and education levels, Psacharopoulos (1985) estimated the social and individual return to investment in education using four stages consisting of lower, lower-middle-, higher-middle, and high-income groups and then suggesting the potential implication that the middle-income economies need to have opportunities for secondary education to develop a skilled labor force.

However, according to the United Nations Educational, Scientific and Cultural Organization (UNESCO), due to insufficient budgetary and human resources allocated to education (UNESCO, 2012), creating educational opportunities would require further educational investment among the middle-income economies (Kuroda & Yokozeki, 2005). Lewin and Caillods (2001) have stressed the importance of investment in secondary education in connection with the further development of East Asian economies from the 1970s to the 1980s in terms of growing export-orientation, along with the need to use new technologies in education. These authors have emphasized the importance of

investing in secondary education to develop abstract thinking and adaptability, which contributes to the development of the skilled labor force required in both industrial and service sector production processes.

Of course, the skill requirements of the labor force are different in LMIEs and HMIEs. Indeed, most middle-income economies have achieved the highest educational enrollment rates, at least both in East and Southeast Asia. All six LMIEs and HMIEs, including Thailand, Malaysia, China, Vietnam, Indonesia, and the Philippines, have achieved a net enrollment rate of at least 90% for primary education, while the proportion enrolled in secondary education still needs improvement, averaging approximately 60% to 77% outside of China (World Bank, 2020). The completion rate for secondary education has reached a higher figure of around 85% to 100% in each country (World Bank, 2020). Finally, as for enrollment in higher education, these economies have a percentage ranging from 25% to 45% (World Bank, 2020). Eventually, due to insufficient budgetary and human resource allocations (UNESCO, 2020), additional educational opportunities need to be created in both HMIEs and LMIEs (Kuroda & Yokozeki, 2005).

In summary, the literature review has revealed that although East Asia has achieved significant economic progress in relation to the world economic outlook, the MIT has persisted, as discussed by Gill and Kharas (2007). Also, given the abundance of middle-income economies, the World Bank has classified these countries statistically into two groups: HMIEs and LMIEs. Means to overcome the MIT should therefore be discussed from multiple perspectives, as the issue represents one of the most significant global social problems. Given the importance of promoting industrialization, enhancing

international competitiveness through the improvement of the skills of laborers has at least been identified as an issue (Tran, 2016). Specifically, a review of the socioeconomic history of East Asia in the 1970s and 1980s has shown expanding secondary education to be a significant catalyst for economic development (Lewin & Caillods, 2001). However, the opportunities for secondary education require further enhancement based on such educational indexes as the net enrollment rate, especially in the LMIEs and HMIEs.

Problem Statement

Certain parts of the world have seen higher achievement in growth and prosperity over many decades. Notably, East Asian economies, including Japan, South Korea, Taiwan, and China, have achieved significant development since World War II (Perkins, 2013). Nevertheless, further development, growth, and social welfare need to be promoted elsewhere in Southeast Asia. The importance of escaping the MIT as defined by Gill and Kharas (2007) has long been emphasized by international organizations, including the Asian Development Bank (ADB, 2017) and the World Bank (2018). Gill and Kharas have classified all countries in the world into high-, middle-, and low-income groups according to various indicators and proposed the concept of the MIT in 2006. Applying the concept of a "trap" as "a dangerous or unpleasant situation which you have got into and from which it is difficult or impossible to escape" (Cambridge Dictionary, 2020, Range 2), they applied this definition to the case of middle- and low-income economies, those that have found it difficult to reach high-income levels accompanying growth and shared prosperity. Southeast Asian economies, in particular, including Vietnam, Indonesia, and the Philippines, have been ranked as lower-middle income

economies for 10 years or more. Indeed, the data revealed that 101 middle-income economies in the world in the 1960s, only 13 economies and regions achieved the high-income levels in 2008 (World Bank & PRC, 2012). Most countries have thus found it difficult to upgrade national income levels, thus having fallen into the MIT over the past 40 years (Tran, 2016). Also, given the wide range of situations among the middle-income economies, the World Bank (2007) classified them into HMIEs and LMIEs. From this discussion, the urgent question of how to overcome the MIT emerges as a key social problem to be addressed. Remarkably, one of the key issues in addressing the MIT is linked to the opportunity for securing employment and increasing the individual income. In this study, I aim to observe the hidden culprits of factoring the MIT, ultimately informing public-policy changes in escaping the MIT, notably in Southeast Asia.

Existing research has shown that promoting industrialization would be the best way to escape the MIT (Huang et al., 2018) in securing the opportunity for employment and enhancing the productivity for income increase. In reviewing growth and prosperity among Asian economies since the 1950s, industrialization has clearly contributed to economic development, increasing the productivity of capital while also enhancing human capital development through training and education, especially from the 1960s to the 1980s (Perkins, 2013). During the industrialization process, labor-intensive industries have been replaced by capital-intensive industries, thereby leading to a rapid accumulation of labor and capital and increases in income levels (Watanabe, 2012). From this perspective, industrialization can be considered a significant catalyst for promoting economic development and overcoming the MIT in Southeast Asia.

The flying geese pattern of industrialization offers a theoretical framework to explain the catch-up process for the least-developed nations, describing the trajectory in East Asian economies from importing products from overseas to import substitution to then exporting products (Watanabe, 2012). For this framework to be feasible, Ohno (2009) has stressed that international competitiveness must be enforced cyclically in these industries, leading to catch-up industrialization. For international competitiveness to be enhanced, improving the skills of the labor force should be a key priority. Promoting secondary education can therefore assist developing countries to increase the number of skilled workers in manufacturing industries, leading to further industrialization and contributing to economic growth in the developing world by enhancing national international competitiveness through labor skills, especially given the economic history in East Asia (Lewin & Caillods, 2001; Meyer & Hannan, 1979).

To improve the skills of workers and promote industrialization to overcome the MIT, additional educational opportunities should be provided. Schultz (1971) analyzed the impact of education on economic development in developing countries. Psachalopouros (1985) made the more specific assertion that middle-income economies need to create opportunities for secondary education to develop skilled workers through their studies. Indeed, most middle-income economies have reached the highest levels of enrollment in East Asia. Reviewing the trends of enrollment and completion rates at primary, secondary, and higher education levels in several Asian economies in 2015, the six LMIEs and HMIEs have achieved 90% net enrollment at the primary level (World Bank, 2020). On the other hand, further improvement is needed in the proportion of

secondary education in the five economies other than China, despite the higher completion rate at the secondary level with the figure of 85% to 100% (World Bank, 2020). Finally, as for the enrollment of higher education, these economies have recorded approximately 25% to 45% (World Bank, 2020). Given the insufficient resources currently allocated to education, including both budgetary and the human resources (UNESCO, 2020), promoting educational opportunities needs to be made a higher priority both in HMIEs and LMIEs (Kuroda & Yokozeki, 2005). Based on the scholastic disciplines and observations, two research problems have been identified for this study.

First, the role of expanding secondary education in promoting industrialization and contributing to economic progress should be clarified. Previously, Lewin and Caillods (2001) stressed the strong connection between investment in secondary education and development in East Asian economies from the 1970s to the 1980s, with the use of technology on behalf of the human capital investment to set the preconditions for export-oriented development. These authors emphasized the importance of investing in secondary education, as the skills of abstract thinking and adaptability contribute to the formation of the skilled labor that is increasingly essential in both industrial production and the service sectors. Krugman (1994) also stressed that improvements in the educational level of the workers, as well as capital growth, were the key contributors for the dramatic growth of certain Asian economies, rather than technological change. Nevertheless, far less research has been undertaken concerning the impact of the secondary education enrollment on the MIT. Despite the other possible factors contributing to the MIT, this educational aspect has not been observed and analyzed in

previous studies. Statistical measures of the expanding enrollment rate at the secondary level need to be developed, while the effect of the enrollment rate in secondary education on the MIT in Southeast Asia must also be determined. Therefore, the first research gap to address in this study is the impact of the rate of enrollment in secondary education on the MIT.

Second, international competitiveness, especially the skill level of the labor force, needs to be further promoted for industrialization (Tran, 2016). In particular, LMIEs and HMIEs need to improve the skill of workers in manufacturing industries, but the opportunities allowed for the labor force to pursue secondary education have not been satisfactory (Lewin & Caillods, 2001). Psacharopoulos (1985) also suggested that middle-income economies need to create opportunities for secondary education to develop a more skilled labor force. Therefore, the other research problem is that the influence of secondary education on the ICI for industrialization in Southeast Asia has not been discussed. Along with the importance of the enhancement of the enrollment rate in secondary education, the influence of the enrollment rate in secondary education on the ICI for industrialization needs to be addressed as a second research problem.

Purpose of the Study

The purposes of this study are to contribute to overcoming the MIT and to promote further industrialization through an examination of the enrollment rate in secondary education, clarifying the influence of enrollment in secondary education on the MIT and the ICI, notably in Southeast Asia, by using the multiple linear regression analysis of whether the R^2 increase in the dependent variables (DVs) of the Gross

National Income (GNI) per capita, and the ICI was significant. This study will contribute to elucidating the hidden culprit of difficulty in overcoming the MIT and promoting the ICI addressed as the research problems. While Otsuka (2014) and Lewin and Caillods (2001) have stressed the significance of expanding secondary education in promoting industrialization and leading to economic progress, far less research has been conducted on the impact of secondary enrollment on the MIT. Additional statistical work on enrollment rates in secondary education needs to be carried out, and the effect of secondary enrollment on the MIT has still not been clarified in the context of Southeast Asian development and needs to be clarified.

In addition, research on the impact of secondary education on the ICI is substantially lacking in the context of industrialization in Southeast Asia. Therefore, the relationship between the ICI and the enrollment rate in secondary education was quantitatively examined for the purpose of invoking the ICI construct by employing several conceptual frameworks relevant to the industrialization. This study can contribute to the research purposes by quantitatively evaluating the impact of enrollment rates in secondary education as a predictor for MIT and the ICI in the Southeast Asian society, an unstudied factor. More importantly, for practice, my findings can be valuable as potential applicability to the transformation of policy relevant to the MIT and the ICI for further development in Southeast Asia and generalizable to other underdeveloped regions. In these ways, this study can be contributive to achieve the purposes.

Research Questions and Hypotheses

Research Question (RQ)1: Will enrollment rates in secondary education predict a statistically significant percent change in the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values?

H_0: There is no statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

H_1: There is a statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

Controlled variables:

1. Governance: The index of governance indicators including transparency in policymaking, efficiency in administration service, investment environment, and rent seeking from World Governance Indicators (2020) were employed as the continuous variables.
2. Industrialization: The value added of manufacturing (% of GDP) from World Development Indicators (2020) was employed as continuous variables.
3. Labor market: The labor force participation rate (% under aged 15-24) from World Development Indicators (2020) was employed as continuous variables.

4. Infrastructure: Logistics performance index: Quality of trade and transport-related infrastructure (1 = low to 5 = high) from World Development Indicators (2020) was employed as continuous variables.

IVs = The net enrollment rate in primary and secondary education and the gross enrollment rate of tertiary education were employed as the continuous variables.

*** Net enrollment rate: The rate of students under the designated age enrolled at primary and secondary education per % from World Development Indicators (2020).

*** Gross enrollment rate: The rate of students regardless of the designated age enrolled at tertiary education per % from World Development Indicators (2020).

DV = MIT: GNI per capita (Atlas Method, US$) from World Development Indicators (2020) were employed as continuous variables.

RQ2: Will the enrollment rate in secondary education predict a statistically significant percent change in the R^2 variance in the Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate?

H_0: There is no statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

H_1: There is a statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

Controlled variables:

1. Labor force participation rate: The labor participation rate of men and women with persons aged 15 and older from the World Development Indicators (2020) was employed as the continuous variables.
2. Employment rate of manufacturing industry: The employment rate of manufacturing of men and women (% out of GDP) from the World Development Indicators (2020) was employed as the continuous variables.

IVs = The net enrollment rate of primary and secondary education and the gross enrollment rate of tertiary education:

*** Net enrollment rate: The rate of students under the designated age enrolled at primary and secondary education per % from the World Development Indicators (2020) was employed as the continuous variables.

*** Gross enrollment rate: The rate of students regardless of the designated age enrolled at tertiary education per % from the World Development Indicators (2020) was employed as the continuous variables.

DV = ICI (UN Comtrade Database, 2020) was used as the continuous variables.

Theoretical Framework

The theoretical framework refers to a specific theory regarding the perspective of human effort that is useful to the study of events based on previous theories in the existing study that have been examined and justified by other researchers (Dickson et al., 2018). With this definition, in this study, five theoretical frameworks were employed in helping me signify the two research purposes of this study, show the connection among key variables and the relation to the research approach and purposes, and contribute to the formulation of my theoretical frameworks.

First, the three frameworks by Psacharopoulos (1985), Schultz (1971), and Tran (2016) helped signify the first research purpose of contributing to escaping the MIT by clarifying the influence of enrollment rates in secondary education on the MIT in East Asia from the perspective of economic development and interacting with other development issues relevant to MIT, including the contribution of labor productivity in manufacturing industries and individual skills development to industrialization with larger and broader scales. Second, the other two frameworks by Ohno (2009) and Tran (2016) helped me frame the second research purpose of elucidating the influence of enrollment rates in secondary education on the ICI in the context of industrialization in East Asia. These frameworks can potentially contribute to enhancing the education policy for industrialization in practice from the aspect of human capital development in the middle-income economies in the long run.

Relating to the first purpose of this research, to clarify the influence of enrollment rates in secondary education on the MIT, the three frameworks helped frame the

quantitative research design in clarifying the significance of pursuing the relationship between the MIT and the enrollment rate in secondary education. The human capital development model elaborated by Schultz (1971), the return to investment in education by income-level as suggested by Psacharopoulos (1985), and the stages of economic development set out by Tran (2016), were each highly relevant. Specifically, the essential prepositions of these frameworks, which are the significance of human capital development for economic growth through education in the developing countries, the implication of further investment in secondary education for individual and social return, and the conceptual clarification of the MIT under economic development stages, can help me justify the significance of elucidating the relationship between the MIT and the enrollment rate in secondary education through the quantitative analysis, thus grounding this study. Therefore, the three frameworks helped me find the connection of the key variables of the enrollment rate in secondary education with the MIT. In this way, I used these three models as to follow an econometric approach to quantitatively analyze the relationship between secondary enrollment rates and the MIT by achieving the first research purpose.

Moreover, these three frameworks impacted this study to interpret the significance of overcoming the MIT by enhancing the enrollment rates at the secondary level. Thus, these frameworks enabled me to examine the influence of the secondary enrollment rate on the MIT by using Southeast Asian economies as cases, ranging from LMIEs to HMIEs. These frameworks revealed a relationship between the stages of economic development and the education levels that should be attained to achieve income

growth conceptually, according to theory. For workers to enhance productivity and the quality of their labor, primary education is no longer sufficient for industrial requirements; the importance of secondary education can further be signified. Specifically, the LMIT might be overcome through expanded lower secondary education. Meanwhile, for the HMIT, the promotion of science and technology and of innovation (Tran, 2016) may require enhanced secondary education, notably upper secondary education. This may be essential to reaching the high-income level that Lewis (1954) had suggested might be the "turning point" toward modernization (industrialization). The framework developed from these perspectives thus plays a significant role in reflecting the importance of improving educational opportunities to accompany increases in national income. These three frameworks demonstrate the relationship to the first research question regarding the impact of the enrollment rate in secondary education on the MIT.

In addition, these three frameworks can interact with other development issues relevant to the MIT, including the contribution of labor productivity in manufacturing industries and individual skills development to industrialization. Tregenna (2011) has shed light on the pathways to industrialization in some developing countries by gaining insight into labor productivity in manufacturing. The author offered support for robust industrial policies to create more opportunities for employee training from a human resource management perspective (Tregenna, 2011). UNESCO (2012) also reported the importance of educational opportunities to promote skills development, improve job performance, and strengthen overall organizational behavior in developing countries.

Thus, these frameworks have a potential impact that may be transferred to more specific industrial policy initiatives.

More importantly, the three frameworks helped me build a theoretical framework that visually demonstrates the relationship between economic development stages and education levels, primarily with the use of the economic development stage model formed by Tran (2016). This framework is composed of income stages and educational levels to be achieved for further development in the developing countries. The framework can show the connection of the critical variables of the GNI per capita (Atlas Method, US$) used for the MIT and the enrollment rate in secondary education in this study. With the primary variables, the quantitative approach, the first research purpose, and the research question are linked to the theoretical framework, notably in observing the impact of the enrollment rate in secondary education on MIT. Thereby, the framework is generalized by traditional models.

In turn, the other two frameworks developed by Ohno (2009) and by Tran (2016) were relevant to the second research purpose of this study, clarifying the influence of the secondary enrollment rate on the ICI for Southeast Asian industrialization. Specifically, Ohno crystalized the four stages of industrialization with a focus on Southeast Asian development, then identifying the horizontal line of the MIT visually and implying that promoting secondary education is key to developing the industrialization stage. At the same time, the ICI is an important index used to measure industrial competitiveness in manufacturing industries, which could be useful in elucidating the quantitative influence of secondary enrollment rates on the ICI in manufacturing industries in Southeast Asia.

Previous researchers have observed that industrial conditions can cause HMIEs to be caught in the HMIT (Tran, 2016). In addition, this framework suggests that the enhancement of the skills of the labor force through further opportunities for training, namely in secondary education, may enhance international competitiveness in manufacturing industries, offering a key to success in Southeast Asia, escaping from the LMIT and the HMIT. The hypotheses in these two frameworks relevant to the development stages of industrialization in East and Southeast Asia by Ohno and the ICI by Tran addressed RQ2 regarding the skills of laborers through further opportunities of education and training, notably secondary education, for enhancing the ICI as one of the keys to success both in promoting the industrialization and escaping the MIT in Southeast Asia. From this point of view, these two frameworks supported this study and showed the connection of the key variables of the ICI and the enrollment rate in secondary education, linking to the second research purpose by the quantitative approach.

With these two frameworks, I formulated one more theoretical framework to visually represent the relationship between the industrial development stages per the ICI and education levels. This framework comprises of the ICI per the industrial process and educational levels for industrial development in the developing countries. What is emphasized in the framework is that the enhancement in the enrollment rate in secondary education is the most significant for the industrial development in developing countries. These two components reveal the connection between the key variables of the ICI and the enrollment rate in secondary education. With the main variables, the quantitative approach, the second research purpose, and the research question are connected to the

theoretical framework, notably in observing the impact of the enrollment rate in secondary education on the ICI. Thus, the framework can potentially be generalized with these two theories.

Nature of the Study

The nature of this study was quantitative research using a nonexperimental design to analyze the impact of the enrollment rate of the secondary education on the MIT in Southeast Asia. Specifically, for the first platform for the quantitative analysis (RQ1), I studied the impact of the enrollment rate of the secondary education on the MIT with the use of GNI per capita. Also, regarding the RQ2, the impact of the enrollment rate in secondary education on the ICI in the manufacturing industry was examined through the nonexperimental design. As Tanaka (2015) explained, the nonexperimental design has several advantages, including more generalizability of the results than the experimental design and not needing to intentionally manipulate the variables. Because the research purpose and the research questions in this study quantitatively addressed the relationship between the enrollment rate in secondary education and the MIT as well as the ICI for industrialization on the national scales in East Asia, I chose a nonexperimental design.

With the methodologies for both RQs, panel data analysis was expected to be one of the most appropriate approaches. It was challenging to observe the influence of the enrollment rate in secondary education on the MIT and the ICI for industrialization in Southeast Asia only in one period as educational and economic indexes can easily vary annually due to the change in policy-making conditions (see Tanaka, 2015). Therefore, I observed the data with multiple durations and broader observation points. Panel data

analysis is composed both of cross-sectional data analysis and chronological order data analysis (Kitamura, 2006). Thus, the panel data analysis was expected to be used for this study.

After all, a methodological adjustment from the original design of the panel data analysis to a new one, the multiple-linear regression analysis, was made. One primary reason for this is that the regression analysis plays a significant role in measuring the selected IV's effect on the DV by indicating the DV's R^2 increase. R^2 is the coefficient of determination representing how much the IVs statistically contribute to the DV (Kvalseth, 1985). Therefore, the R^2 variance was measured to see if the IVs influence the DV. The primary purpose of analyzing the effect of the enrollment rate of secondary education on the GNI per capita and the ICI in Southeast Asian economies was to observe the figures of the R^2 variance as coefficients of determination instead of seeking the *t*-value in the case of the panel data analysis. The multiple-linear regression analysis allowed me to use the DVs' general values and the interval ratios of the IVs to be measured. Therefore, it was more appropriate for me to employ the multiple-linear regression model.

In processing the data-collection, for RQ1, the variables of the net enrollment rate in primary and secondary education as well as the gross enrollment rate in tertiary education were employed as IVs, while the other factors of governance, the proportion of the productivity per GDP in manufacturing, labor market, and infrastructure were included as the controlled variables (CVs). Also, for RQ2, I used the variables of the ICI as the DV. The net enrollment rate in primary and secondary education, as well as the

gross enrollment rate in tertiary education, were employed as IVs, while the employment rate in the manufacturing industry and the labor participation rate were incorporated as CVs. As a result, in Chapter 4, I address discrepancies in data collection from the plan presented in Chapter 3. Specifically, by tracing the dataset gained through the World Development Indicators (2020) and the U.N. Comtrade Database (2020) from 1999 to 2018, the IVs of the enrollment rate in primary, secondary, and tertiary education had, at least, over 30 missing data from 1999 to 2018.

Similarly, the DV of governance did not have data recorded in 1999 and 2001 (n/a = 18). The CV of transport services (% of commercial service exports) missed the whole set of data in Vietnam for 20 years and in Timor-Leste for 7 years (1999 to 2005). For prescribing the missing data to be clear, I used the other existing data relevant to the study variable of the enrollment rate in primary and secondary education from the World Development Indicators (WDI) (2020) to cover as much lacking data as possible. Likewise, I employed secondary data from the General Statistics Office of Vietnam (2020). More importantly, the multiple-imputation method was introduced in SPSS ver.25, resulting in a dataset with $N = 180$ maximum. I also reported the sample's characteristics from the name convention in SPSS ver.25, descriptive statistics, and the mean average per country in Southeast Asia. The study results, especially assumption testing and hypotheses testing outcomes relevant to the two research questions, resulting in the null hypotheses' retention for both research questions due to an R^2 increase and Sig. F change was found to be significant.

Finally, I discuss the interpretations of the findings, especially from the aspects of the research outcomes of both research questions and the relation to the theoretical frameworks describing the relationship between the development stages of an economy and education level and between the industrial development stages per the ICI and education level in Chapter 5. Then, limitations and recommendations for future studies are mainly discussed based on the discussion of the interpretations. Notably, I give the recommendations, particularly from three perspectives of the evaluation of variables and research methods, education policies in Southeast Asian economies, and the industrialization for overcoming the most significant topic of the MIT for discussion. Finally, social change areas relevant to the study are summarized, primarily implications to theory, practice, and society. Because the MIT is not as simple as a movement in one or two variables, I highlight the complications of further socioeconomic development in Southeast Asia and outside the world for a wrap-up.

Definitions

Education: World Bank (2020) categorized *education* into three groups of primary and secondary education, and tertiary education as interval scales (WDI, 2020).

Governance: The index of governance indicators, including transparency in policymaking, efficiency in administration service, investment environment, and rent seeking, measured as interval scales through six components: voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law, and the control of corruption obtained from the Worldwide Governance Indicators (2020) at http://info.worldbank.org/governance/wgi/#home.

Gross enrollment rate: The rate of students enrolled in tertiary education regardless of age, collected through the data source of participation in education (gross enrollment rate, tertiary, by percentage) as interval scales, which was extracted from the World Development Indicators (2020) at http://wdi.worldbank.org/table/2.8.

Industrialization: Value added in manufacturing obtained through the data source on the structure of output (manufacturing, % of GDP), which was employed as interval scales from the World Development Indicators (2020) at http://wdi.worldbank.org/table/4.2.

Infrastructure: The logistics performance index: Quality of trade and transport-related infrastructure (1 = *low* to 5 = *high*) was employed as interval scales, using data on trade facilitation from the World Development Indicators (2020) at http://wdi.worldbank.org/table/6.7.

International competitive index (ICI): The international competitiveness index is calculated from the formula I = (X-M)/(X+M; Tran [2013, 2016]) using data on the international trade in goods and services at https://comtrade.un.org/labs/dit-trade-vis/. The figure ranges from -1, 0, and to 1 as interval scales. The value of -1 represents the introduction of the industry by importing with the figure of export 0. The 0 stands for the equivalency between export and import in completing import substitution. The 1 means further less import and the expansion of export (Tran, 2016).

Labor market: Labor force participation rates and employment rates in the manufacturing industry for men and women were used as interval scales through the data source on the labor force structure (labor force participation rate and employment rate for

men and women for ages 15 and older) from the World Development Indicators (2020) at http://wdi.worldbank.org/table/2.2.

Middle-income trap (MIT): In this quantitative study, GNI per capita (US$) was employed as an interval scale under the thresholds of high-, higher-middle, lower-middle, and low-income levels through the data source for GNI per capita (Atlas Method by US$) from the World Development Indicators (2019) at http://wdi.worldbank.org/table/WV.1. The MIT was defined as the state that middle-income economies find it challenging to upgrade the high-income level (ADB, 2017).

Net enrollment rate: The rate of students within a designated age range enrolled in primary and secondary education in a country, collected through the data source of participation in education, which was used as an interval scale from the World Development Indicators (2020) at http://wdi.worldbank.org/table/2.8.

Southeast Asia: Geographically, Southeast Asia entails the 11 economies of Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Vietnam (Emmerson, 1984). However, Brunei and Singapore were excluded from this study because these two are categorized as high-income economies. Thus, nine economies of Southeast Asia were included in the data set as nominal scales for quantitative analysis.

Assumptions

Assumptions can be defined as conditions that researchers cannot demonstrate to be true through the review of publications or working papers and other factors in their studies and that they had thereby to assume to be true (Furlough-Morris, 2017). With this

definition, there were several assumptions in this study, primarily from the perspectives of the key variables in this study, the reliability of the data sets, the accessibility to data, the applicability of the study design, and the expected outcomes to the research purposes in the long run. A summary of how the assumptions support the research purposes and the research questions in this study are described below.

First, as for the key variables in this study, in researching the MIT, it was necessary to identify the use of the GNI per capita (World Bank, 2020). This indicator was employed as a dependent variable in the RQ1: Will enrollment rates in secondary education predict a statistically significant percent change in the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values? in measuring the impact on the MIT more accurately than using the other indicators, including the Gross Domestic Product (GDP) or economic growth rate. The World Bank (2020) estimated the individual income with the use of the GNI per capita and classifying the income groups of low-, lower-middle-, higher-middle, and high-income levels in the WDI (2020). The GNI per capita was employed in this study, as this has been one of the most commonly used indicators for the MIT as well. Thus, I assumed that the GNI per capita represented the most appropriate measurements in observing the impact on the MIT.

Likewise, the enrollment rate in secondary education was employed as one of the representative independent variables in this study. Essentially, the enrollment rate is also a commonly employed element, especially in observing the impact of education on

economic development. UNESCO (2020) established the World Inequality Database of Education by employing the enrollment rate for analyzing the discrepancy along the income levels as an essential key indicator. From this point of view, the enrollment rate in secondary education is assumed to be one of the most appropriate indicators in determining the impact of secondary education on the MIT.

Second, as for the veracity of the data sets and the accessibility of the data in this study, publicly available data collected were primarily the WDI as well as the World Governance Indicators (WGI) by the World Bank (2020). The World Bank has been widely recognized as the most reliable international organization to provide and share the socioeconomic datasets of all the countries with researchers, non-governmental organizations (NGOs), and government agencies (World Bank, 2020). The UN Comtrade Database by the United Nations (2020) is similarly recognized. I used the dataset of the number of imports and exports in the manufacturing industry for calculating the ICI as a dependent variable for approaching the second research question: Will the enrollment rate in secondary education predict a statistically significant percent change in the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate? These data sets were assumed to be genuine and accurate. Also, for these two international organizations to be reliable, accountable, and transparent, publicly open data are constantly accessible (United Nations, 2020; World Bank, 2020). These are widely used, so a few citations of studies that used these data helped solidify my assumptions.

Third, regarding the applicability of the research design and the expected outcomes, I conducted this quantitative study by collecting the open data with nine economies for 20 years, 1999 to 2018, and employing a multiple-linear regression analysis assumed to find a link to the applicability to the research purposes of clarifying the effect of the enrollment rate in secondary education on the MIT and on the ICI in Southeast Asia accurately and genuinely. This quantitative study can contribute to improving the education policy for industrialization and overcoming the MIT in practice in the long run at a larger scale. In this respect, the quantitative analysis in this study can apply to the research purposes. Also, regarding the applicability of the expected outcome to the research purposes, I assumed that other factors might also have some contributions to the MIT and the ICI, including infrastructure, governance, or the labor market, as well as the enrollment rate in secondary education. Sachs (2015) stressed that the other factors of governance, stable labor demand and supply and infrastructure, are of importance in the fundamentals of promoting economic development. The ADB (2017) also demonstrated several factors, including "low level of economic diversification," "insufficient advanced infrastructure" "weak institutions," and "inefficient labor market" (pp. 18-19), contributing to the MIT and the ICI. Based on the existing studies, these other factors, in addition to the enrollment rate in secondary education, can assumingly impact the MIT and the ICI, while it was essential for me to observe if the educational factors can predict the MIT and the ICI. For this reason, it was necessary for me to employ these factors as CVs. From this point of view, the expected outcome is to apply to the research purposes in this study by demonstrating the significance of appropriately

allocating the investment for resolving the possible hindrance of the middle-income economies from upgrading the income level and promoting the industrialization in the long run.

These assumptions above can support the research purposes and the research questions in this study. In particular, the assumptions can help assure the significance of the research purposes of clarifying the influence of the enrollment rate in secondary education on the MIT and on the ICI for industrialization in East Asia through the collection of the open data and the said quantitative analysis. These assumptions can also help to apply the research design and expected outcomes to the research purposes in the larger scales scholarly and practically.

Scope and Delimitations

In this study, I explored the influence of the enrollment rate in secondary education on the MIT and the ICI. While education has been considered one of the most significant contributions to further development in the developing world, the potential of secondary education to overcome the MIT for industrialization needs to be further clarified. In particular, the enrollment rate was studied because the opportunity for enrollment in secondary education has been much less in the middle-income economies than in high-income economies from a statistical viewpoint, is both a social problem and a research problem. The importance of enhancing the enrollment rate has already been clarified in previous studies, but the influence on the MIT and ICI was not yet identified, thus being chosen as the issue of internal validity in this study.

On the other hand, the boundary of populations was arranged by selecting nine countries in Southeast Asia and the theoretical framework representing the relationship between the economic development stage and education level as the issues of external validity in this study. From these points of view, the potential generalizability of this study can be addressed to delimit the boundaries both of population and the theoretical framework. I can potentially generalize the theoretical relationship between the economic development stage and education level by the income levels classified by the World Bank (2020).

Limitations

A potential limitation is that I focused on the impact of the enrollment rate in secondary education on the MIT on the condition that increasing the quantity of education is prioritized. Thus, the quality of education, including how to enhance teaching performance and teaching methods for improving the grades of students, was not centered in this research. Nevertheless, increasing the opportunities for secondary education through the expansion of the enrollment rate is the primary step for the developing countries to overcome the MIT, which can lead to further development in Southeast Asia. The results of the study remain significant despite the said limitation. As Esposito et al. (2011) stressed, even if there is some room for improvement in the quality of education in the developing countries, the quantity of education needs to be prioritized for educational equity and publicity. In this respect, enhancing the quality of education was not my focus in this study.

Also, because I focused on the MIT in the region of Southeast Asia, other economies in other regions might have different results. For instance, Eastern Europe, South America, the Middle East, and sub-Saharan Africa have some middle-income economies. Gill and Kharas (2017) studied the MIT region by paying attention to demographic factors, entrepreneurship, and external institutional anchors region by region. From their studies, there may be different culprits of the MIT in these regions, aside from the enrollment rate in secondary education (Gill and Kharas, 2017). In this regard, the availability of the results gained through this study might potentially be limited in examining the MIT in other areas with different cultural, historical, and social backgrounds as potential biases.

Significance of the Study

This study can have implications for social change in addressing economic development and education in the developing world. Primarily, through this study, I gained insight into the most fundamental phenomenon of the MIT in Southeast Asia of the influence of secondary education. Because this perspective has still not been addressed in previous research, the research can potentially be a major catalyst for growth and prosperity in Southeast Asia.

In addition, addressing the significance of enhancing skills of laborers through secondary education for contributing to the improvement primarily in the ICI can help the middle-income economies appropriately arrange human resource management for promoting the industrialization in the private sectors. From this point of view, this

practical study can be transferable to the other lower-middle-income economies for managing the human resources.

Significance to Theory

First, the potential contribution to the crystallization of a theoretical foundation is to capture the whole picture of the relationship between national income stages and education stages, primarily by gaining insight into the MIT and the enrollment rate of secondary education. Far less research of the causes of the MIT from the perspective of human capital development have been identified, thus being considered a significant research problem. In this regard, this research can be a significant catalyst for creating a framework that theoretically describes the relationship between income levels and education levels.

Second, theoretical research regarding the relationship between industrialization and secondary education through the study of the influence of the enrollment rate in secondary education on the ICI was conducted as extensively as possible. In reviewing the research problem, despite the significance of facilitating the industrialization, the theoretical foundation between the ICI and secondary education was not identified. Thus, I also crystalized another conceptual framework of the relationship between the industrial development process per the ICI and education levels visually (See Figure 2 in Chapter 2) for explaining that under any industrial stages, the enrollment rate in secondary education is essentially a significant catalyst for improving the ICI for industrialization. In this regard, this study can potentially contribute to the conceptual framework of the ICI by

introducing the concept of enhancing the opportunity for secondary education in the context of the industrialization.

Significance to Practice

First, a contribution to promoting education policy by improving the enrollment of secondary education in Southeast Asia is needed, primarily for leading to the successful escape from the MIT in Southeast Asia in the longer term. In practice, emphasizing the enhancement of the enrollment rate in secondary education for public policy can potentially be made. As previously described, investing human capital development is invisible, thus taking longer for the governments to see the outputs of the investment. Nevertheless, there is a greater potential for maximizing human capital development in overcoming the MIT in Southeast Asia through this study. Therefore, addressing the necessity to enhance the enrollment rate in secondary education for practice, notably in the context of overcoming the MIT, is needed.

Second, the contribution to promoting the industrialization through the enhancement of the enrollment rate in secondary education will be essential. In reviewing the research problem, despite the significance of facilitating the industrialization, the specific problems of how to promote the industrialization in the middle-income economies in Southeast Asia have not been addressed in economic studies. Particularly, enhancing the ICI through the enhancement of the enrollment rate in secondary education can potentially be a solid catalyst for the middle-income economies to be encouraged to draw further attention to the viewpoint of the ICI and secondary education for practice. In

this way, the contribution of facilitating the industrialization by focusing on the ICI and secondary education will further be needed.

Significance to Social Change

This study can have implications for social change in addressing the most significant development issue of economic progress and education in the undeveloped world. Primarily, I gained insight into the most fundamental phenomenon of the MIT facing primarily in Southeast Asian economies from the perspective of impacting secondary education. Indeed, in the Sustainable Development Goals (SDGs), the expansion of basic education was emphasized (United Nations, 2020). Because this perspective has still not been addressed in the existing study, the research can be a major catalyst for further development in the region.

Also, addressing the significance of enhancing the skills of laborers through secondary education for contributing to the improvement primarily in the ICI can help the middle-income economies appropriately arrange human resource management for promoting the industrialization in the private sectors. From this point of view, this practical study may be transferable to other lower-middle-income economies for managing human resources.

Summary and Transition

In this chapter, I introduced the overall study by identifying the research problems related to how to overcome the MIT from the perspective of human capital development. I clarified the influence of enrollment in secondary education on the MIT and the ICI, examined through quantitative analysis as a path to promote further industrialization in

Southeast Asia in particular. Studies on the MIT to date have been conducted primarily in terms of industrial policies, governance, and political stability. The specific research problem concerning the influence of education on the MIT has seldom been addressed by previous researchers, in spite of the recognized importance of promoting education in the developing world. Because promoting secondary education has resulted in further development in several high-income economies in Southeast Asia, the effect of the secondary education on the MIT and the ICI needs to be addressed as part of the strategies to promote further industrialization in Southeast Asia. Addressing these factors could offer a significant catalyst and a contribution both to theory and to practice for social change.

In the next chapter, I present a literature review in terms of the search strategy, conceptual framework, and the background of previous studies. Reviewing global development conditions, economic development frameworks, and the concept of the MIT, industrialization, and secondary education in East and Southeast Asia are described in detail.

Chapter 2: Literature Review

With the research purpose of contributing to overcoming the MIT and to accelerating industrialization through the enhancement of the ICI in Southeast Asia, I investigated the impact of the enrollment rate in secondary education on the MIT and the ICI. Studies on the influence of secondary education on the MIT and the ICI have seldom been found in the existing research, despite the importance of promoting secondary education for industrialization in the developing world rather than primary and tertiary education in the labor supply in the manufacturing sectors. Thus, this study contributed to overcoming the MIT and to promoting further industrialization through an examination of the enrollment rate in secondary education, clarifying the influence of enrollment in secondary education on the MIT and the ICI, especially in East Asia.

Within this scope of the problem and purpose as identified, I discuss the literature reviewed to clarify the significance of these research problems in this chapter, showing how the MIT has been studied in an East Asian context in previous studies. Within this literature review, the main topics have related to world economic history since 1700 CE, focusing on development issues in East Asia, a discussion of the MIT, the importance of industrialization, the impact of education on development, and the importance of promoting secondary education through enhancing enrollment rates. After clarifying how the MIT has been studied in previous research and identifying areas that have still not been studied, the research questions and the purposes of the present study are provided with appropriate rationales.

Literature Search Strategy

The search strategy engaged three data sets, as follows. First, Google Scholar (2020) is one of the most representative engines, particularly when looking for previous studies; this search engine was indispensable when searching for working papers or publications pertinent to the MIT and economic development both in English and Japanese. Second, the World Bank Data Site (2020) was the most useful search engine for investigating issues in socioeconomic development in the developing world in terms of quantitative data. Notably, the WDI was an essential database for following socioeconomic conditions in the developing world from a variety of metrics, not only the national income in terms of GDP or GNI, but also such educational barometers such as the enrollment rate in primary, secondary, and tertiary education, the index of governance (including transparency in policymaking, efficiency in administration, investment environment, and rent-seeking), the business environment, the labor market, the employment rate in several industrial sectors, and infrastructure measures (World Bank, 2020). Finally, working papers relevant to the MIT in East Asia available from the ADB (2019) also helped in the identification of East Asia's most significant development issues.

This literature review required the identification of keywords relevant to the MIT because this phenomenon, in turn, is directly linked to the socioeconomic development issues of interest for this study. Thus, it was essential to search bibliographies in relation to *economic development* and the *MIT*. In addition, the academic resources relevant to *secondary education* and *industrialization* in the context of East and Southeast Asia were

also required. Using these five keywords, search engines were used to identify previous studies. The studies found through this procedure were then used to identify both the social problem and the research problems of interest to this study.

To identify the social problem, the research problems, and the research gaps relevant to this study, issues in MIT research were clarified in their statistical, theoretical, and methodological components. Most importantly, statistical evidence of the significance of the MIT as a socioeconomic issue in East Asia was evaluated. In addition, from a theoretical perspective, the mechanism causing the MIT was analyzed, and the research problems relating to the MIT were approached in terms of their methodological aspects, including infrastructure, governance, industrial promotion, and the labor market. Therefore, it was appropriate to begin this literature review using several large databases. Notably, the WDI was helpful to focus on the MIT as a substantial social problem from statistical, academic, and practical perspectives. The social problem was then narrowed down in relation to several other keywords, especially industrialization and secondary education, in the context of East Asia. The next step was to find the research gap and formulate the research questions. At this point, quantitative studies were examined, particularly cases for various countries, provinces, cities, or villages. Quantitative approaches offering specified durations were of particular interest so that the research questions in this study could be answered appropriately in relation to a broader range of countries in Southeast Asia.

Finally, several seminal works, including Becker (1964), Schultz (1971), and Sen (1999) offered a crucial direction within the literature. These authors shared a vision of

human capital investment (education and training) in relation to economic development in the developing world (Becker, 1964; Schultz, 1971; Sen, 1999). From this perspective, economic progress in developing countries is not viable unless human capital investment is enhanced. While educational effects have seldom been visible in quantitative studies of economic development, these seminal works offered the key idea that the MIT should be overcome through human capital development.

The scope of this literature review was limited in terms of its time frame as well as the types of literature and sources searched. The MIT was only named by Gill and Kharas (2007) slightly over 10 years ago. The bibliographies used for this review are based on publications by international organizations of the World Bank and the ADB, as well as the working papers from Japan, including Tran (2013, 2016) and Otsuka (2014). These references contain mainly papers and books in English, as well as some in Japanese.

Based on the search strategy, the literature review in the rest of the chapter contains seven components: the world economic outlook, the MIT, the factors of the MIT, industrialization, the mechanism of economic development, the significance of secondary education for industrialization, and research methods in previous studies. In the last section, the research variables and gaps in the literature are developed.

Theoretical Framework

As previously described, the theoretical framework refers to a general or broader set of ideas by scholars for demonstrating the relationship that exists between the primary variables, primarily through quantitative research (Dickson et al., 2018). To test

hypotheses quantitatively, I used frameworks in a theoretical approach. Specifically, with the research purposes of contributing to the escape from the MIT and promoting the ICI by clarifying the influence of the enrollment rate in secondary education on the MIT and the ICI for industrialization in Southeast Asia, two primary perspectives of the MIT and secondary education and the ICI and secondary education were developed. Along with these research topics, an explanation of the existing frameworks, primarily from the perspectives of how they relate to the research approach and purposes, is given. With the frameworks, I introduce my theoretical frameworks, showing the connections among the key variables and how they informed my analysis of those variables.

Middle-Income Trap and Secondary Education

As described in Chapter 1, three models of economic development are referenced in this study. Tran's (2016) account of developmental stages, the human capital investment model for increasing the individual income elaborated by Schultz (1971), and the return to investment in education by the income level described by Psacharopoulos (1985) all supported the first research purpose of this study: clarifying the influence of the enrollment rate in secondary education on the MIT in Southeast Asia. These frameworks suggested that the MIT may be overcome by enhancing enrollment in secondary education while exploring interactions with other development issues relevant to the MIT. In particular, industrialization was investigated in relation to labor productivity in manufacturing industries and individual skills development. For example, in line with this perspective, Tregenna (2011) directed attention to labor productivity in the manufacturing industry as a factor promoting industrialization. The author also

implied that robust industrial policies are required, including those creating opportunities for employees to strengthen their educational background, which increases labor productivity in the manufacturing industry (Tregenna, 2011). UNESCO (2012) also monitored the progress and outcomes of education, gaining insight into the relationship between skills development, job performance, and organizational behavior in developing countries; these frameworks can also be applied to industrial policies.

Meanwhile, Tran (2016) hypothetically theorized the stages of development in terms of four income groups: low-, lower-middle, higher-middle, and high-income economies. The author then explored how to escape the MIT by dividing the issue into two syndromes: the lower-middle-income trap (LMIT) and the higher-middle income trap (HMIT). He then proposed that improvement in the institutions for development and room for capital-investment growth offered a path out of the LMIT, while the enhancement of the total-factor productivity (TFP) and human resource development could help national economies to escape the HMIT (Tran, 2016). In his earlier work, Schultz (1971) developed the framework of human capital investment as a factor involved in increasing national income and promoting economic development in the developing world.

Psacharopoulos (1985) calculated the individual and social benefits associated with primary, secondary, and tertiary education in relation to low, lower-middle, higher-middle, and high-income economies. The current study uses these frameworks to examine the influence of the secondary enrollment rate on the MIT in several East Asian economies ranging from low-income to high-income stages of development. These three

frameworks assert a relationship between income levels and the education level that are prerequisite to reaching the next income stage as prepositions. In particular, for workers to enhance their own productivity and the overall quality of labor, primary education is not sufficient for industrial development. Therefore, opportunities for secondary education and specifically lower-secondary education are vital for overcoming the LMIT. On the other hand, the HMIT relates to the need to promote science, technology, and innovation (Tran, 2016). Therefore, enhanced secondary education and particularly upper-secondary education is required to proceed to the high-income stage of economic development. In this sense, these theoretical frameworks play a significant role in delineating the importance of improving educational opportunities along with national income. These frameworks help address the first research question, concerning the impact of secondary enrollment rates on the MIT.

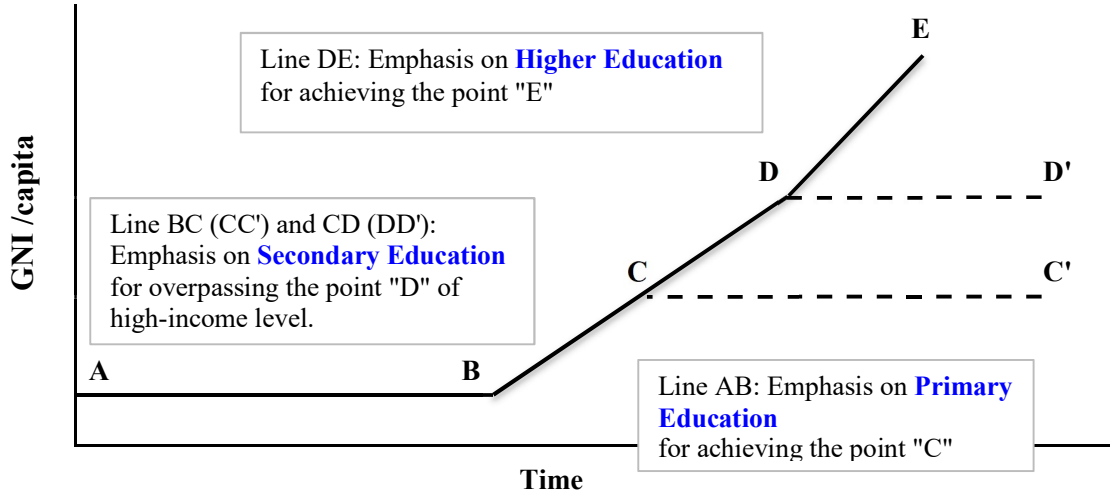
Based on these three frameworks of Psacharopoulos (1985), Schultz (1971), and Tran (2016), a new framework can ultimately be established. Figure 1 below represents the relationship between the economic development stage and education levels by income levels, which was primarily applied by the model by Tran (2016). Specifically, Line AB stands for the low-income stage; the countries in the stage need to expand primary education in Figure 1. Then, the secondary education should further be promoted for overcoming the LMIT (Line BC and CC'). Also, under the line C-D and DD' with the need for the promotion of science and technology and the innovation (Tran, 2016), the secondary education (highlighted in orange) as well as the higher education (highlighted in blue), should further be promoted for finally achieving E and thus escaping the HMIT.

This theorization can play a role in making the relationship between education and economic development more evident.

From this point of view, this theoretical framework can show the connection between the key variables of the individual income and the enrollment rate in secondary education. With the main variables of the Gross National Income (GNI) per capita (Atlas Method, US$) used for the MIT and the enrollment rate in secondary education, the quantitative approach, the first research purpose, and the research question are connected to this framework, notably in observing the impact of the enrollment rate in secondary education on the GNI per capita. Thus, the framework can be rationalized with the existing models.

Figure 1

A Theoretical Framework of Development Stages of an Economy and Education Level



Note. Reprinted from "Emerging Economies and the Middle-Income Trap in Asian Perspective," *The Japan Society of International Economics, 67*, by Tran Van Tho, 2016, p. 78. Copyright 2015 by the Japan Society of International Economics. Reprinted with permission (see Appendix A).

International Competitive Index and Secondary Education

The second purpose of this study is to promote further industrialization in Southeast Asia by clarifying the influence of enrollment rate in secondary education on the ICI. Two frameworks, the stages of industrialization in East and Southeast Asia formulated by Ohno (2009) and the Comparative Advantages Structure developed by Tran (2013, 2016), are particularly useful when examining the quantitative relationship between secondary enrollment rates and the ICI in the manufacturing industry in Southeast Asia.

First, as prepositions, Ohno (2009) developed the stages of industrialization in East Asia, observing the steps necessary for developing manufacturing industries in

Vietnam, the Philippines, Thailand, and Malaysia (Ohno, 2009). More importantly, the author situated the MIT within this framework, emphasizing the importance of investing in opportunities for employees to enhance their skills and knowledge through training and education (Ohno, 2009). Tran (2013; 2016) then developed the Comparative Advantages Structure, presenting international competitiveness in relation to three sectors of industries: the primary (agricultural), secondary (manufacturing), and tertiary (service) sectors. His analysis showed the evolution of the International Competitiveness Index (ICI), which described the process of industrial development. LMIEs in East Asia held a competitive advantage in the first industry, with low skill requirements. Until the second industry, with medium skill requirements, becomes the area of comparative advantage, LMIEs cannot escape their lower level of development (Tran, 2016). At a later stage, when growth slows in the second industry and competitiveness also slows down, the third industry remains in the process of import substitution. This tendency can cause HMIEs to be trapped by the HMIT (Tran, 2016). Such a framework would imply that enhancing the skills of workers by creating training and especially secondary education opportunities, carries the potential to strengthen international competitiveness in manufacturing and is a key to success for Southeast Asian economies to escape from the LMIT and the HMIT.

All in all, those two frameworks developed to interpret industrialization patterns in East Asia can address the second research question of this study. Together they suggest that developing the skills of workers through further opportunities for training, particularly in secondary education, would enhance the ICI and offer a key to success in promoting industrialization and escaping from the MIT in Southeast Asia.

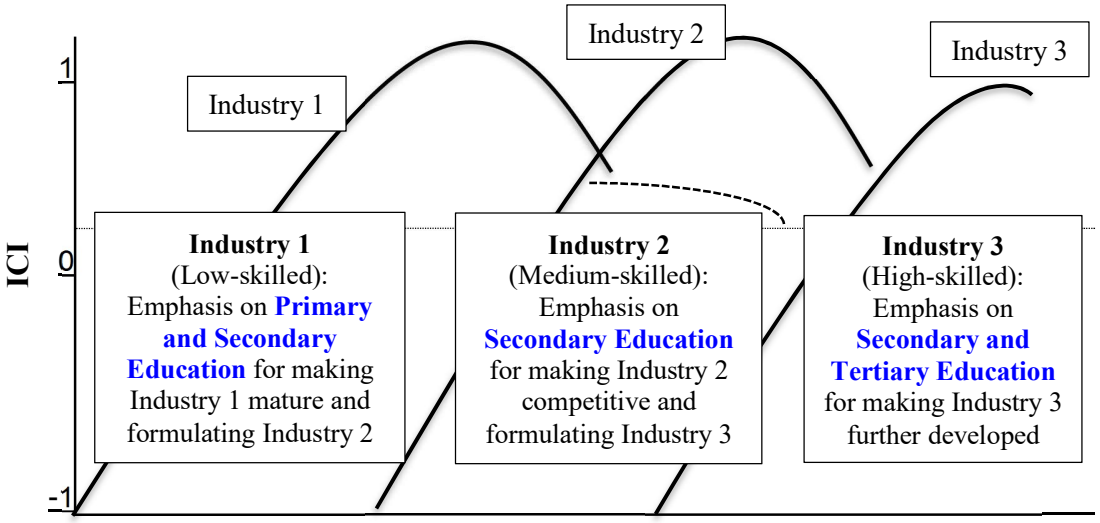
Based on these frameworks of Ohno (2009) and Tran (2016), I can hypothetically crystalize another framework. Figure 2 in the previous page demonstrates the conceptual relationship between the industrial development stages through the ICI and education levels, which is mainly applied from the model by Tran (2016). Specifically, as the author hypothesized, the three stages of industries with low- (industry 1), medium- (industry 2), and high-skilled (industry 3) levels should be progressed through the establishment of comparative advantage industries. Firstly, for low-income economies (Line AB in Figure 1), industry 1 on the left side needs to be further mature through the expansion of labor supplies with, at least, primary education (highlighted in green) as well as secondary education (highlighted in orange). Secondly, for LMIEs (Line BC and CC' in Figure 1) to be able to develop the ICI in industry 2, highlighted in orange, it is indispensable to upgrade the enrollment rate in secondary education. Otherwise, the LMIT can occur. Also, for HMIEs (Line CD and DD' in Figure 1) to enhance the ICI in industry 3 for further competitiveness, it is significantly essential to stabilize the labor supplies with secondary education as well as tertiary education (highlighted in blue). Otherwise, the HMIT can happen. In short, this theoretical framework can demonstrate that the higher educated the labors are, the more advanced and competitive level of industrialization with the higher ICI can be expected in the LMIEs and HMIEs.

What is emphasized in this theoretical framework is to suggest that the enhancement in the enrollment rate in secondary education is fundamentally the essential contribution to the industrial development in developing countries to be further developed. As Ohno (2009) implied, secondary education can play a significant role in

developing the fundamental skills of employees for industrialization in east Asia. With the implication, this framework implies that under any industrial stages, the enrollment rate in secondary education is a significant catalyst for improving the ICI for industrialization. From this point of view, this framework can show the connection between the key variables of the ICI and the enrollment rate in secondary education. With the main variables, the quantitative approach and the second research purpose are connected to this theoretical framework, notably in observing the impact of the enrollment rate in secondary education on the ICI. Thus, the theoretical framework can be generalized with the two existing models. In short, this theorization can play a role in visualizing the relationship between education level and industrial development process per the ICI and ultimately implying that promoting the enrollment rate in secondary education is the fundamental component in developing the industrial processes through the ICI in Southeast Asia. In this way, I can rationalize the choice of these two theories.

Figure 2

A Theoretical Framework of Industrial Development Stages per ICI and Education Level



Note. Reprinted from "Emerging Economies and the Middle-Income Trap in Asian Perspective," *The Japan Society of International Economics, 67*, by Tran Van Tho, 2016, p. 86. Copyright 2015 by the Japan Society of International Economics. Reprinted with permission (see Appendix A).

Review of Previous Studies

Based on the literature search strategy described earlier, the literature review proceeds with seven sections on the World Economic Outlook, the Middle-income Trap, the Factors of the MIT, Industrialization, the Mechanism of Economic Development, the Significance of Secondary Education for Industrialization, and Research Methods in Previous Studies. In the final section, the Research Variables and Gaps in the Literature are discussed.

World Economic Outlook

Historically, most developing countries became independent as low-income economies after the Second World War. Upon de-colonialization, all peoples in the developing world were enthusiastic in the pursuit of further economic development. In the 21st century, some economies have made further improvements in quality of life by increasing income levels, facilitating social welfare, stabilizing their political systems, and promoting employment, thus becoming equivalent to advanced economies including the U.S. and other Western countries.

Whereas some countries have met with success, others have had difficulty in realizing their development goals. East and Southeast Asia, for example, have been more successful than has sub-Saharan Africa (Allen, 2012). Comparative development status reports of different global regions are available from as early as the 16th century using estimates of GDP per capita as continuous. Table 1 represents the trend of GDP per capita from 1700 to 2008 in seven regions: Western Europe, Eastern Europe, Western Offshoots, the former USSR, Latin America, East Asia, the Middle East, and Africa, using data obtained from Angus (2003) and the Groningen Growth and Development Centre (GGDC, 2019). According to Table 1, the GDP per capita in Eastern Europe; Western Offshoots including the U.S., Australia, Canada, and New Zealand; East Asia; Latin America; and Africa was almost equal from 1700 until 1820, ranging from US$ 450 to 650per capita, despite the slightly higher level in Western European economies like the United Kingdom and France (about US$ 1,000). Overall, there was almost no difference in GDP per capita among these regions until after 1820. Examining

the years 1913 to 1949, however, the trend shows an emerging difference in GDP per capita among regions. Specifically, economies in Western Europe and their settler colonies drastically increased their national income, reaching approximately US$ 10,000 before 1965.

On the other hand, nations in East Asia and Africa in particular had US$ 1,000 in per capita income at this time, placing them at the low-income stage. Interestingly, however, the tendency substantially changed for the period 1989 to 2008. In East Asia, Japan and South Korea have reached per capita GDP equivalent to those of Western countries. Furthermore, some nations have succeeded in boosting their productivity while others have remained unsuccessful - notably within the Latin American and East Asian regions. For example, Brazil and Mexico had lower GDP than Chile in 2008, within Latin America. Also, while Japan and South Korea reached a figure of around US$ 20,000, India and the Philippines have had difficulty raising their GDP per capita since 1965. Thus, overall GDP per capita in East Asia is the second-lowest level in the world.

Additionally, although the Middle East, Eastern Europe, and Former USSR have stretched the amount, there has been little substantial change in the GDP amount since 1949. Africa has unfortunately been unsuccessful in increasing the GDP value over time, with the figure never exceeding US$ 1,500 since 1820. As an overview, until 1820 there was no substantial difference in GDP per capita among the regions of the globe, while differences become more significant between 1913 and 1949. Furthermore, since 1965, the discrepancies in GDP per capita can be identified country by country within regions, notably in East Asia and Latin America. In concrete terms, the increase in GDP per capita

in Japan and South Korea has been the most spectacular trend over the last 50 years, as also stated by Perkins (2013).

Table 1

Gross Domestic Product per Capita (US$) World View: 1700 to 2008

Region & countries / Year	1700	1820	1913	1949	1965	1989	2008
Total average in Western European countries	1,028	1,234	3,687	5,005	9,130	16,751	22,246
France	910	1,135	3,485	5,186	9,165	17,300	22,223
United Kingdom	1,250	1,706	4,921	6,939	9,752	16,414	23,742
Total average in East European countries	606	683	1,695	2,111	3,664	5,905	8,569
Western offshoots	476	1,202	5,233	9,268	12,967	22,255	30,152
Total average in Latin America	527	691	1,494	2,510	3,447	5,131	6,973
Brazil	459	646	811	1,672	2,448	5,224	6,429
Chile	-	694	2,988	3,670	4,577	6,283	13,185
Mexico	568	759	1,732	2,365	3,702	5,899	7,979
Total average in former USSR	610	688	1,488	2,841	4,634	7,112	7,904
Total average in East Asia	-	556	752	710	945	1,346	2,296
China	600	600	552	448	702	1,834	6,725
Indonesia	580	612	874	803	983	2,351	4,428
India	550	533	673	619	771	1,270	2,975
Japan	570	669	1,387	1,921	5,934	17,943	22,816
Philippines	-	584	988	1,070	1,633	2,184	2,926
South Korea	-	600	869	854	1,436	8,027	19,614
Total average in Middle East	591	607	1,042	1,776	3,033	4,590	6,947
Total average in Sub-Saharan Africa	421	420	637	889	1,181	1,444	1,780
World	615	666	1,524	2,111	3,228	5,130	7,614

Note. Reprinted from *Statistics on World Population, GDP, and Per Capita GDP, 1-2008 AD.* by Groningen Growth and Development Centre, 2010, http://www.ggdc.net/maddison/oriindex.htm Copyright 2009 by the University of Groningen. Reprinted with permission (see Appendix B).

Consequently, stark differences in per capita GDP were identified among the eight regions in 2008. Notably, there is an income gap between the northern part (Western Europe and North America), and the global south, consisting of sub-Saharan Africa, South Asia, and South America. Also, within the Asia, an income discrepancy is quite evident, especially between Japan and South Korea in Northeast Asia on the one hand and Indonesia, India, and the Philippines in Southeast Asia on the other hand.

As a result, stark differences in per capita GDP were uncloudedly identified among the eight regions. In particular, there is an income gap between the northern part (Western Europe and North America), and the global south, consisting of sub-Saharan Africa, South Asia, and South America. Also, within the Asian region, an income discrepancy is quite evident, especially between Japan and South Korea on the one hand and Indonesia, India, and the Philippines on the other hand. Specifically, Northeast Asian economies have progressed economically, while less dramatic improvements are visible in Southeast Asia, including Indonesia, India, and the Philippines.

Following this description of the world economic outlook in terms of GDP per capita over the last 300 years, the MIT in East Asia provides the next focus of discussion.

The Middle-Income Trap

As previously discussed, certain East Asian economies, including Japan, South Korea, and China, have achieved a new level of development since the Second World War (Perkins, 2013). Nevertheless, further development, growth, and improvements in standard of living need to be further promoted in the region. International organizations have been discussing the MIT for a considerable period (Gill & Kharas, 2007), by

international organizations including the ADB and the World Bank. These authors have classified all the world's economies into high-, middle-, and low-income groups and proposed the concept of the MIT in 2006 (Gill & Kharas, 2007). Following the definition of a "trap" as "a dangerous or unpleasant situation which you have got into and from which it is difficult or impossible to escape" (Cambridge Dictionary, 2019), they applied this definition to the situation of middle- and low-income economies. A longer-term difficulty in escaping the low- and middle-income stages and reaching enhanced levels of prosperity is considered the definition of the MIT. In particular, Southeast Asian economies, including Vietnam, Indonesia, and the Philippines, have remained among the lower-middle income economies for over twenty years. The World Bank (2019) uses US$ 1,005 per capita as the upper cut-off for the low-income group, with US$ 1,006 to 3,955 identified as lower-middle income, US$ 3,966 to 12,235 as higher-middle income, and countries with per capita income over US$ 12,236 in the high-income group, based on the World Bank methodology (WDI, 2018). A majority of these countries has still found it difficult to increase per capita income, remaining within the MIT over the past 40 years (Tran, 2016).

Also, given the wide range of economies identified as middle income, the World Bank (2007) also categorized them into two groups: HMIEs and LMIEs. Indeed, the number of LMIEs and HMIEs, as well as the number of high-income economies, increased, while the number of low-income economies decreased over this period. From this discussion, ways to overcome the MIT in Southeast Asia need to be explored further. Table 2 presents the economic indexes, including the growth rate and GNI per capita, for

East Asia from 1990 to 2014. Based on the income criteria specified by the World Bank, many LMIEs are represented in East Asia, while only three economies fall under the HMIE category. Overall, most of the East Asian economies have achieved economic growth rates from 4.0% to 10% between 1990 and 2014, while there have been stark differences in the value of per capita GNI between LMIEs (under US$ 3,900) and HMIEs economies (from US$5,000 to $10,000).

Table 2

Economic Growth Rate and Income Level

Countries in East Asia	Average growth rate (%) (1990-2014)	Average growth rate (%) (1990-1999)	Average growth rate (%) (2000-2014)	GNI per capita (2014, nominal, US$)
Cambodia (L)	7.4	7.0	7.5	1,020
Bangladesh (LM)	5.2	4.5	5.6	1,080
Pakistan (LM)	4.0	3.8	4.1	1,410
India (LM)	6.3	5.6	7.0	1,570
Lao P.D.R. (LM)	6.6	6.0	7.1	1,650
Vietnam (LM)	6.6	7.4	6.2	1,890
Sri Lanka (LM)	5.4	5.0	5.6	3,400
Philippines (LM)	4.1	2.7	5.0	3,470
Indonesia (LM)	4.8	4.1	5.2	3,630
Thailand (HM)	4.0	4.3	3.7	5,370
China (HM)	9.6	10.1	9.4	7,380
Malaysia (HM)	5.6	6.7	4.7	10,760

Note. L = Low income, LM = Lower-middle income, HM = Higher-middle income. Reprinted from "Emerging Economies and the Middle-Income Trap in Asian Perspective," *The Japan Society of International Economics, 67*, by Tran Van Tho, 2016, p. 71.

Table 3 presents the trend in income levels since 1987 in Southeast Asia. First, the four economies at the low-income stage in 1987 (Indonesia, Vietnam, India, and China), have upgraded to at least the LMIE threshold. Notably, China has reached HMIE status since 2010, with the annual economic growth rate exceeding 10% over the past 15 years.

Secondly, some LMIEs in 1987 (Malaysia and Thailand) have reached HMIE status (in 1992 and 2010 respectively).

On the other hand, I also found that the Philippines has remained the same as the lower-middle income level since 1987. Over thirty years have passed since this economy has been under the same income stage. The Philippines has the longest history of operating under the MIT of any of the countries surveyed. Indeed, many experts see that no other economies have possessed favorable initial conditions for economic development than the Philippines. Primarily, the earlier establishment of democracy, the arrangement of agrarian reform for the "Green Revolution," and the English-spoken environment are featured as the primary advantages of promoting economic progress (Nakanishi and Maquito, 2016).

Despite these desirable initial conditions, socio-economic indexes have shown challenges for economic development in the Philippines, and its GNI per capita (US$ 2,882) remains within the LMIE range (IMF, 2019). Meanwhile, it also has a lower HDI than other countries than other countries—0.699, ranked 13th (UNDP, 2019) — fares even worse in its business environment, with its Doing Business Index (DBI) ranked 124th out of 190 economies in the world (World Bank, 2020). These indexes suggest the challenges involved in escaping the MIT, thus inappropriate policies to take advantage of its good initial conditions could be a hidden factor perpetuating the MIT in the Philippines.

Table 3

The Trend of Income Level Transition in East Asia

Countries in East Asia	Income stage in 1987	Years to be lower-middle Income	Years to be higher-middle Income	Income stage in 2016	Years to stay under middle-income level
Malaysia	LM	1987	1992	HM	15
Thailand	LM	1987	2010	HM	7
Indonesia	L	2003	-	LM	14
Philippines	LM	1987	-	LM	30
Vietnam	L	2009	-	LM	8
China	L	1997	2010	HM	7
India	L	2007	-	HM	10

Note. L = Low income, LM = Lower-middle income, HM = Higher-middle income. Reprinted from "Emerging Economies and the Middle-Income Trap in Asian Perspective," *The Japan Society of International Economics, 67*, by Tran Van Tho, 2016, p. 74.

Furthermore, Indonesia, subject to the LMIT for 14 years, might represent a case similar to the Philippines. During the Suharto regime, the failure to promote industrialization led the nation to develop service industries despite its abundant natural resources and to slow the rise in per capita income levels. Coxhead (2007) suggested that rapid resource depletion and reduced industrial growth could expose countries to slow economic growth for an extended period, the so-called "natural resource curse" that occurred in some emerging economies (Coxhead, 2007). Socio-economic indexes need to be improved, notably by reviewing such institutional aspects as infrastructure arrangements, transparency in governance, and the ability of law enforcement to minimize political corruption (Tran, 2016). From such more accurate measures, the analysis of MIT in East Asia would allow further insight into this social problem.

Factors Involved in the MIT

Based on the statistical data presented above, the further improvement in the income level in East Asia from the lower-middle-income is required from the HMIE to the high-income group and from LMIE to HMIE, respectively. Therefore, escaping the MIT is one of the most critical social problems identified in previous studies, to permit further development in East Asia. The ADB (2017) identified the factors of "unfavorable demographics," the "low level of economic diversification," an "inefficient financial market," "insufficient infrastructure," a "low level of innovation," "weak institutions," and an "insufficient labor market" as contributing to the MIT. (ADB, 2017, pp. 16–17)., Meanwhile, substantial conditions to promote economic development were identified as infrastructure, industrialization, an efficient financial market, a sufficient labor market, governance, social welfare, political institutions, etc. (ADB, 2017; Robert, 2013; Otsuka, 2014).

Other researchers have also studied the factors contributing to the MIT in the middle-income economies, identifying five elements that can contribute to income stagnation: First, *infrastructure* is undoubtedly considered a fundamental aspect of the business environment and an indispensable component of economic development (ADB, 2011). From the perspective of industrialization in particular, expediting infrastructural development has been identified as key to overcoming the MIT in East Asia. Indeed, traffic congestion in the capital regions of Manila, Jakarta, and Bangkok have contributed to economic stagnation by slowing down productivity and inhibiting industrialization

(Studwell, 2013). This inability to create needed infrastructural arrangements can contribute significantly to the MIT over a period of time.

Second, *governance* is also a significant catalyst for economic development in the developing world. The World Bank defined governance as "the manner in which power is exercised in the management of a country's economic and social resources for development" (1992, p.16). The organization then formulated the World Governance Indicators (WGI), based on this definition. The indicators are composed of six criteria: "Voice of Accountability," "Political Stability and Absence of Violence," "Government Effectiveness," "Regulatory Quality," "Rule of Law," and "Control of Corruption;" the World Bank then estimates rankings globally (WGI, 2019). The WGI results imply that rules, regulations, and laws have a significant impact on economic development. In fact, the higher the WGI indices, the higher income level countries achieve (Tran, 2016). Dollar (2015) analyzed the relationship between the rule of law and civil liberties, leading to the hypothesis of a strong relationship between these two variables for the countries with GNI per capita over US$ 8,000 (Dollar, 2015). On the other hand, economies with a lower per capita income level had a weaker relationship between them (Dollar, 2015). This analysis suggests that the enhancement of governance can be a significant component enabling LMIEs to overcome the LMIT.

Third, *labor market arrangements* are another indispensable contributor to further development. The World Bank (2002) demonstrated the significance of building market institutions for promoting economic development and reducing poverty in the developing world (World Bank, 2002). In East Asia, Tran (2016) explained that LMIEs have a

substantial labor surplus at lower income levels, which means that industrialization needs to be enhanced. In other words, the promotion of industrialization can contribute to labor market characteristics where supply and demand meet (Tran, 2016). Even for the HMIEs, the improvement in the employment environment is necessary, through the expansion of capital-intensive industries, the promotion of high technology industries, and the cultivation of human resources for higher levels of productivity (Tran, 2016). Also, Suzuki (2019) surveyed the relationship between academic background and industry of employment in the Philippines (Suzuki, 2019) and found that those who finish their college or university programs tend to work in the service industry. On the other hand, those who only completed their secondary education tended, statistically, to become unemployed (Suzuki, 2019). Therefore, industrial intensification and the labor market are inextricably linked to each other for overcoming the MIT.

Finally, *the promotion of industrialization* is considered one of the most efficient means to overcome the MIT. Otsuka (2014) emphasized that without industrialization, there can be no progress in economic development in developing countries (Otsuka, 2014). Several high-income economies, including Japan, South Korea, and Taiwan, arrived at a successful strategy to enhance industrialization between the 1950s and the 1980s (Perkins, 2013). In particular, rapid industrialization in the chemical, steel, and transportation industries enabled these economies to raise the manufacturing productivity dramatically and improve conditions of employment for the labor force (Tran, 2016). Therefore, successful industrialization has been considered one of the most significant

contributors to overcoming the MIT throughout the economic history, primarily in East Asia, and a key factor in "the East Asian Miracle" for over 20 years (World Bank, 1993).

In reviewing the factors contributing to the MIT in East Asia, most researchers have emphasized the significance of promoting industrialization as being highly significant in promoting economic development. The next section will review economic development and the global economy from both historical and theoretical perspectives, before moving on to examine industrialization in East Asia in particular.

The Mechanism of Economic Development

The mechanism of economic development can be understood by examining several representative economic development theories from the 1950s to the 2000s. Lewis (1954) suggested the theoretical concept of a "Dual Economy" with traditional (agricultural) and modernized (non-agricultural) sectors; he observed the process by which the labor surplus generated in the traditional sector was incorporated into the industrial sector, identifying the "turning point" that led to industrialization (Lewis, 1954, p.164). Considering these models, Rostow (1956) suggested five stages of economic development: from a "traditional society," to "the pre-conditions of take-off," "take-off," the "drive to technological maturity," and finally "high mass consumption" (Rostow, 1956). Furthermore, paying closer attention to the effect of industrialization on per capita income, Ranis and Fei (1961) developed the principle of wage determination by observing the correlation between labor and productivity in the industrial sectors, formulating the Ranis–Fei Model (Ranis & Fei, 1961). On the other hand, Harris and Todaro (1970) challenged Lewis's model while developing a theory relevant to the

impact of the urban poor, observing a relationship between expected wages and "disguised unemployment" in the developing world, resulting in the Harris–Todaro Model (Harris & Todaro, 1970, p.134). Based on these economic theories, Tran (2016) arrived at a simple conceptual framework describing the economic development stages over time. Invoking such key terms as the "turning point" (Lewis, 1954) and "take-off" (Rostow, 1956), the author formulated a framework progressing from low-income to middle-income and to high-income stages.

Furthermore, paying closer attention to the stages of the industrialization in East Asia, Ohno (2009) summarized the "catch-up" process of industrialization. With reference to the East Asian cases, he stressed the importance of improved policy making and private sector activation to reach the tertiary stage and overcoming the MIT (Ohno, 2009). Ohno (2010) formed the stages of "catch-up" industrialization, then classifying industrialization into five stages, from "prior to the industrialization," to the "initial introduction of foreign capital manufacturing corporations," "internalization of parts industries," "internalization of key skills and technology," and finally the "internalization of innovation" (Ohno, 2010). Paying close attention to four ASEAN countries — Thailand, Malaysia, Vietnam, and the Philippines— his work then located the MIT in the context of the industrialization and identified what is required to step up to the next stage on a case-by-case basis. For instance, to proceed from stage zero to the first stage, foreign manufacturing needs to be introduced in fragile economies, especially in sub-Saharan Africa with the poorest one billion people, "Bottom Billion" (Collier, 2008). In the lower-middle income economies, manufacturing establishments must accumulate through

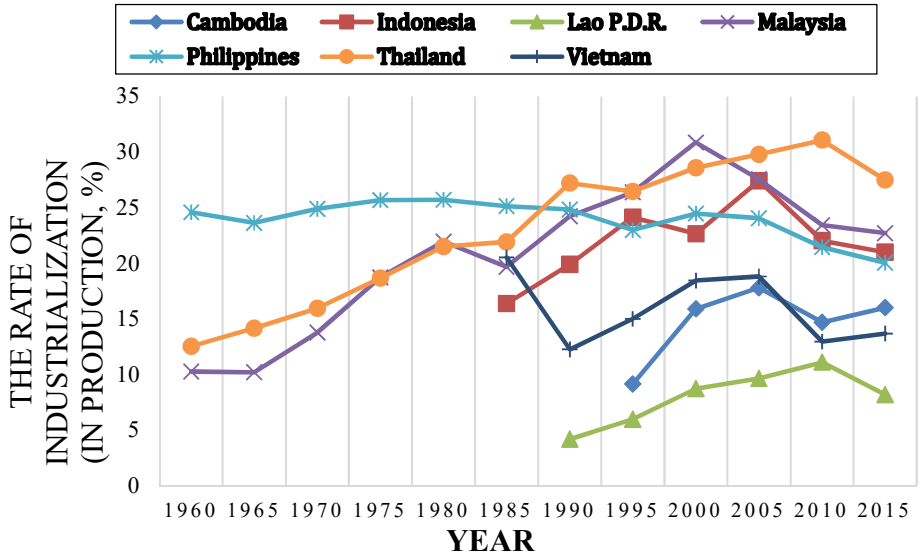
foreign direct investment. After these foreign capital industries mature, parts industries may be internalized, thanks to training opportunities whereby employees can acquire the skills needed to manufacture the parts, producing materials for the third stage. Also, the local economy must master the management techniques and technologies for producing higher-quality products. Finally, innovation and creativity can help manufacturing industries lead to world-class status (Ohno, 2010). In this framework, current LMIEs are to be found in the first stage of this transition, while HMIEs are at the second stage.

Industrialization

For the MIT to be overcome, industrialization has been understood as a key to upgrading the national income level. In reviewing industrial development in East Asia since the 1960s, a successful shift from import-substitution industrialization to export-oriented industrialization became the catalyst for "the Miracle in East Asia" (World Bank, 2007). Figure 3 represents the rate of industrial production (within total economic production) from 1960 to 2015 in the ASEAN economies. From the 1970s to the 1980s, these countries were successful in shifting from import substitution toward export-oriented industrialization, leading to the contribution of the industrial sector to the total economy.

Figure 3

The Rate of Industrialization (in Production) in Southeast Asia (1960-2015)



Note. From "WV1. World Development Indicators: Size of the Economy," by World Bank, 2020 (http://wdi.worldbank.org/tables). In the public domain.

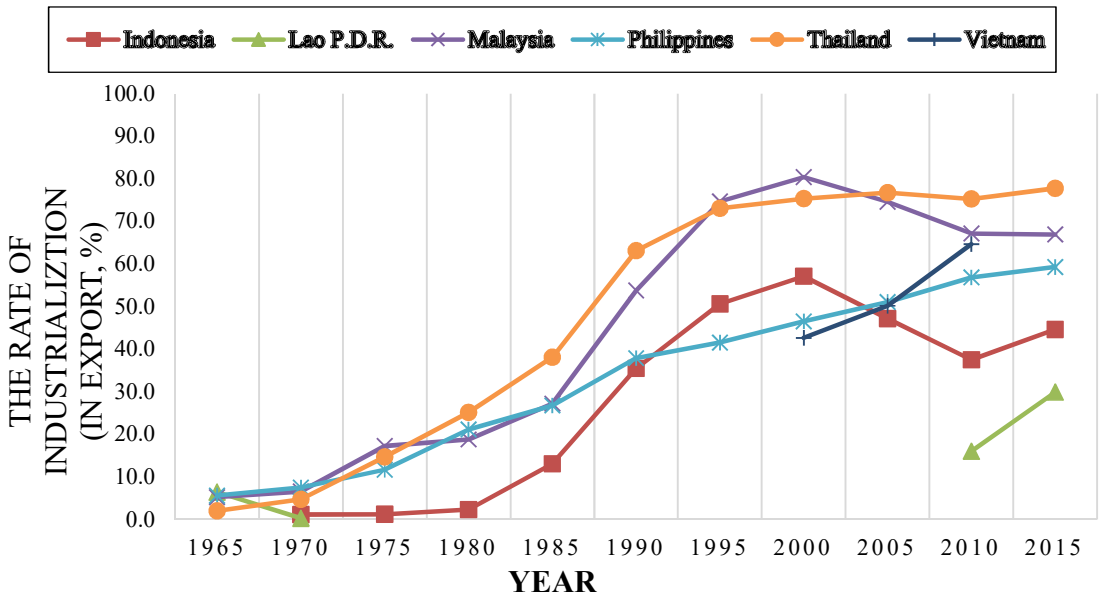
From the 1970s to the 1980s, these countries were successful in shifting from import substitution toward export-oriented industrialization, leading to the contribution of the industrial sector to the total economy. Regarding the development pattern in Thailand, Ohshima (1987) paid attention "agriculturalization" (Ohshima, 1987, p.58) and observed labor surpluses and shortages following the impacts of the Monsoon season (Ohshima, 1987). Mitigating these seasonal labor surpluses, increasing wages, and mechanizing the labor process became the significant contributors to increasing labor productivity in agriculture. As a result, workers were able to migrate to industrial sectors and engage in manufacturing industries, raising the export rate in Thailand since the 1980s.

A similar shift from agriculture to manufacturing was also observed in Malaysia. In turn, in the Philippines, despite a proportion of industrial activity reaching approximately 20% of production and 60% of exports, the economy has remained within the LMIE group. Otsuka and Banerjee (1998) stressed the significance of industrialization in rural areas by suggesting that creating new job opportunities both in urban and rural areas in East Asia. In turn, when observing the proportions in the LMIEs, including Vietnam and the Lao P.D.R., the industrial contribution remains at approximately 7.5% to 12.5% of the national economy in 2015, although it increased from the 1990s to the 2000s. Other economies, such as the Philippines and Indonesia, remain over 20% since the 1990s, although the Philippines had a recent decrease in the industrial proportion of the economy, with figures of ranging between 20% to 25% for the past 55 years.

Figure 4 presents the industrialization rate in export from 1965 to 2015 in the ASEAN economies. Four economies - Malaysia, Thailand, the Philippines, and Indonesia -experienced an increase, and the proportion in Thailand, which stood at 2.0% in 1965, climbed to the largest share among these economies reaching 77.8% in 2015, followed by Malaysia with 66.9%. The Philippines had the third-highest share, 59.3% in 2015, followed by Indonesia with 44.7%. From 1985 to 1990, all four economies drastically raised the proportion of manufactured exports. Based on this trend, Figures 3 and 4 above imply that HMIEs achieve a more substantial proportion of industrialization than LMIEs in terms of both production and exports.

Figure 4

The Rate of Industrialization (in Export) in Southeast Asia (1965-2015)



Note. From "WV1. World Development Indicators: Size of the Economy," by World Bank, 2020 (http://wdi.worldbank.org/tables) in the public domain.

In relation to the industrialization rate in East Asia, Tran (2016) classified manufacturing products into three levels according to value added in production (Low, Middle, and High skill-intensity industries). The author observed the change in the ICI in each industry as the flying geese pattern of industrialization represents the process to enhance the international competitiveness by using the amount of import (M) and export (X) in the UN Comtrade database, and then calculating the international competitiveness using the index (Tran, 2016). The international division of labor can be seen through changes in factor endowment conditions corresponding to the structural transformation of the national economy and its resulting comparative advantages. The MIT can persist as

long as the shift from the labor-intensive industry to the capital-intensive industry/technology-intensive industry is not successfully made.

The flying geese pattern of industrialization is a theoretical framework to explain the catch-up process in the least-developed nations, describing the sequence beginning with importing products from overseas, then import substitution, and finally exporting products (Watanabe, 2012). For this framework to be feasible, international competitiveness must be enforced cyclically in the manufacturing industry, leading to the catch-up industrialization (Ohno, 2009). Within the catch-up process, three skill levels are identified within the labor force, which are "low skill," "medium skill," and "high skill" levels. In reviewing the conceptual framework previously represented in Figure 1, the line BC is equivalent to "low-skill intensive industry," while line CD incorporates "medium-skill intensive industry." Finally, the high-income nations also possess "high-skill intensive industry" (Tran, 2016). From this perspective, improving the skills of laborers is necessary to improve national ICI.

As previously described, the World Bank (2007) has classified the widely varied middle-income economies into two groups: HMIEs and LMIEs. However, most studies to date have dealt with the MIT as facing one unified group of middle-income economies. Tran (2016) distinguished these two groups, analyzed their characteristics, and identified development issues within ASEAN economies for each individual case (Tran, 2016). In the case of HMIEs, he characterized the stage of transition from labor surplus to insufficiency of labor. Thus, he emphasized the importance of enhancing industrial and comparative advantage, identifying the need to promote science and technology and

improve human resource quality, notably within Malaysia and Thailand, as a "*higher-middle-income trap* (HMIT)" in his study (Tran, 2016, p. 90).

This suggests that enhancing total factor productivity and improving quality of human resources will be key for the development of the HMIEs (Tran, 2016). On the other hand, LMIEs such as Indonesia, Vietnam, and the Philippines, retain labor surpluses, leaving further room for capital-investment growth. Tran (2016) observes the inappropriate allocation of labor and capital investment through weak governance, an unstable policy environment, and institutional issues including rent-seeking as leaving LMIEs in the "*lower-middle-income trap* (LMIT)" theoretically (Tran, 2016, p. 95).

For these middle-income economies to escape the LMIT, he concluded that "there is room for input-driven growth so that the improvement of factor markets and thus the resource allocation is essential" (Tran, 2016, p.103). Also, he pointed out that the phenomenon of the "premature deindustrialization" has led to a reduction in manufacturing industry as the driving force for growth, and thus, to the slow-down of further development notably in terms of industrialization. In the case of the Philippines, while there was a drastic reduction in the competitiveness of low-skilled labor-intensive industry, there was an improvement in the medium and high-skilled industry (Tran, 2016). As Suzuki (2013) observed, the Philippines has hosted manufacturing processes with lower value-added, despite the high proportion of technology-intensive exports, resulting in industrialization making a lesser contribution to further development (Suzuki, 2013).

Furthermore, as in the case of Vietnam and Indonesia, inappropriate resource allocation due to ineffective economic institutions, weak governance, an unstable policy environment, and rent seeking caused these two economies to demote industrialization (Tran, 2010). Acemoglu and Robinson (2012) have pointed out that "extractive political and economic institutions" carry the potential to terminate sustainable development in the developing world. Sachs (2012), however, stressed economic development may be feasible even within extractive institutions. For instance, in spite of the dictatorship of Park Chung-Hee in the 1970s, South Korea became successful in industrialization during the 1970s and 1980s (Sachs, 2012). Regardless of extractive institutions, Tran (2016) emphasized the significance of creating a stable and transparent policy-making environment to overcome the MIT (Tran, 2016). Based on these previous studies, the improvement of the ICI in East Asia by increasing the quality of labor should be of key importance.

The Significance of Secondary Education for Industrialization

For the skills of workers to be ameliorated and for industrialization to be promoted to overcome the MIT, educational opportunities should be provided. Schultz (1971) analyzed the impact of education on economic development. In relation to agricultural and manufacturing development, he observed that the enhancement of human capital through education and training enables workers to improve the numeracy and literacy required for their job opportunities, improving their income levels, and reducing poverty. A relationship between education and economic growth can therefore be conceptualized. Nogami and Hayase (2010) created a theoretical framework relating

income increases to years of schooling. This framework simplified the relationship between income and human capital investment, describing how uneducated laborers can raise their income levels, while those who are educated can raise the income after the duration of education. For economists, human capital consists in knowledge, training, and skills to be used for productivity in the workplace defined by Becker (1964) and Schultz (1971). For the human capital to represent a kind of investment, benefits need to be collected after the investment has been made. Particularly in the developing world, the children in rural areas often forego opportunities for education due to their parents' lack of financial resources and a necessity for help with housework. The authors emphasized the significance of education as the only way to connect economic development with individual welfare; education and training can help laborers enhance their abilities and increase their productivity (JETRO, 2010). Also, Banergee and Duflo (2012), in their study of "Poor Economics," used a randomized controlled trial model, observing and analyzing the impact of education on poverty and individual income based on years of field research in developing countries (Banergee & Duflo, 2012). These authors concluded that there is no single means to eradicate poverty, while education is at least one of the appropriate ways to reduce poverty by expanding job opportunities (Banergee & Duflo, 2012). Finally, Sen (1999) emphasized the importance of primary and secondary education for further development and poverty eradication, and then formed the "Capability Approach" (Sen, 1999, p.5). Based on this theoretical framework, investment in education can invisibly boost individual incomes and also facilitate economic development.

Researchers have also gained insight into the impact of education on national and individual incomes through empirical research and reached some robust conclusions. Regarding the return to investment in education, historically the Mincer wage equation has been employed to observe the benefits of education quantitatively within labor markets. Mincer stated that when education is considered as a potential investment, the problem is whether the internal return rate is higher than the market interest rate or not. Thus, the equation model became a representative model used to calculate the benefits of education, employing regression equations that include such independent variables as years of education, characteristics of workers, features of the labor market etc. (Mincer, 1974).

Based on this equation, it is possible for researchers to observe the impact of education on the individual wages empirically. Using this equation, Psacharopoulos and Patrinos (2004) estimated the social and individual return to investment in education by classifying income into four groups of lower, lower-middle, higher-middle, and high income. Psacharopoulos (1985) presented the return to education according to the four income levels and describing both social and private rates of return. When this calculation was made in 1993, LMIEs and HMIEs had the highest proportion for primary education, with figures ranging from 14% to 35%, while the rate of return to secondary education was estimated to be approximately 10% to 20% at all the income levels. Apparently, in middle-income groups, financial investment in primary education seemed to be the key to further development. However, these authors reached the speculative conclusion that middle-income economies also need to create opportunities for secondary

education to developing skilled laborers in more advanced studies (Psacharopoulos & Patrinos, 2004). Indeed, most of these middle-income economies have achieved the highest levels of enrollment in East Asia.

Table 4 describes the trends of enrollment as well as completion rates for primary, secondary, and higher education in several Asian economies in 2015. The six economies presented, including both LMIEs and HMIEs, have achieved at least 90% net enrollment in primary education, but improvement is needed in the proportion in secondary education as the figure averages approximately 60% to 77% with the exception of China. Notably, the Philippines has the lowest percentage among the middle-income economies in 2016, 65.9%. In this regard, the case of the Philippines is striking for its higher enrollment rate of primary education and the lower rate of secondary education (NEDA, 2017; PSA, 2018). Finally, as for enrollment in higher education, these economies have a percentage with a range of 25% to 45%. Eventually, due to an insufficient allocation of financial and human resources (UNESCO, 2019), these opportunities need to be cultivated in both HMIEs and LMIEs (Kuroda & Yokozeki, 2005).

Table 4

Educational Indicators

Countries in East Asia	Enrollment rate in primary education in 2015 (Net, %)	Enrollment rate in secondary education in 2015 (Net, %)	Completion rate of secondary education in 2015 (Net, %)	Enrollment rate of tertiary education in 2015 (Net, %)
Indonesia (LM)	90.9	76.8	98.5	27.9
Philippines (LM)	95.7	65.9	86.5	35.3
Vietnam (LM)	98.0	77.8	90.0	28.3
China (HM)	100.0	100.0	100.0	45.4
Malaysia (HM)	99.5	73.4	87.0	42.4
Thailand (HM)	98.0	77.3	79.6	45.9
South Korea (H)	100.0	100.0	100.0	93.3

Note. "LM" does for Lower-middle Income, and "HM" for Higher-middle Income. From "WV1. World Development Indicators: Size of the Economy," by World Bank, 2020 (http://wdi.worldbank.org/tables). In the public domain.

Secondary education is defined as education for young students with ages between 11–12 and 18–19, between primary education and higher education. Secondary education aims to expand the knowledge and academic background of individuals with a view to enrollment in higher education and preparation for working within organizations. The length of secondary education varies by country with a typical period of six years in almost all countries (three years for junior secondary school and three more years for senior secondary school) but ranges between 2 and 8 years in some nations (Kuroda & Yokozeki, 2005).

Furthermore, Kuroda and Yokozeki (2005) summarized the outcomes of secondary education, classifying them into “purposes attained,” “required knowledge,” “required skills,” and “required attitudes” through both lower and upper secondary education, respectively. They describe the required outcomes in relation to two goals: further studies and working in society, identifying similarities in purposes, and required knowledge. Yamada and Karikomi (2020) also stressed the significance of enhancing “absorptive capacity” (Yamada and Karikomi, 2020, p. 155) for industrialization. In other words, the primary purposes to be attained through junior high school and high school are to move on to higher education and to be engaged in jobs as skilled or unskilled workers.

On the other hand, lower and upper secondary education call for different skills and attitudes in relation to the labor force. Junior high school students need only basic numeracy or the other fundamental skills including communication skills, while high school students need the ability for analysis, problem-solving, and planning to achieve goals. Regarding the required skills and attitudes in lower secondary education, discipline and positive attitudes are generally required, while others desirable in high school include accuracy and entrepreneurship. Indeed, Otsuka and Kurosaki (2003) showed accuracy and entrepreneurship to be important for work as factory managers in China (Otsuka & Kurosaki, 2003).

From the perspectives of required outputs, secondary education can be a catalyst for promoting industrialization by equipping employees with additional skills. Interestingly, from the perspective of employment, Foster (1965) described the purposes of secondary education as the acquisition of basic knowledge required by skilled and

unskilled workers including necessary abilities of calculation, analysis, planning, and problem-solving. These skills are required for industrialization and economic development (Foster, 1965).

Lewin and Caillods (2001) viewed investment in secondary education as strongly connected to the development of East Asian economies from the 1970s to the 1980s in terms of their export orientation, on behalf of education. In "The Myth of East Asian Miracle," Krugman (1994) stressed that an improvement in the educational level of workers, as well as capital growth, played a larger role than technological advances. Researchers have emphasized the importance of investing in secondary education to improve abstract thinking and adaptability, contributing to the promotion of a skilled labor force required in advanced industrial production and service sectors. One of the best ways to improve the educational opportunities for children would be financial support so poor households are able to send children to school (Sawada, 1999). Despite the significance of the quality of education, the quantity of education also needs to be enhanced by increasing the number of students in school. Esposito et al. (2011) emphasized the increase in the quantity of education rather than the quality of education in developing countries, saying that "all is not lost" (Esposito et al., 2011, p. 1579). These authors emphasized the importance of investing in education to increase opportunities for all children, even with a lower quality of education. In observing the output of education quantitatively, the Education Production Function (Glewwe, 2002) is a representative framework used to demonstrate the mechanism producing educational output relying on educational supply and based on varying investment at the household and community

levels. This “inductive” function represents the educational input and output (Hanushek, 1995) with the simple equation of $y = f(X)$. Specifically, “y” means productivity per labor (L) capita, while “X” stands for capital (K) stock per labor capita (Solow, 1956).

The input variables for the Education Production Function represent the motivation and characteristics of students, the home environment, household income, school facilities, teacher training, the number of teachers, the community, the social environment, etc. On the other hand, its outputs are represented as grades, enrollment rates, completion rates, years of schooling, labor productivity, wages, etc. (Hanushek, 1995). This framework can help to clarify the factors responsible for the lack of educational opportunities in the developing world and promote an understanding of the importance of investing in secondary education for the poor households and enhancing the enrollment and completion rates for secondary education. At least, promoting secondary education and enhancing the enrollment rate can lead to further industrialization by forming both skilled and unskilled workers, while opportunities for secondary education need to be improved further given the conditions currently preventing students from attending school.

One of the most significant models of economic growth models, the Robert Solow model, carried an idea similar to the production function described on the previous page, developing the role of capital investment and of technological advancement for economic growth (Solow, 1956). In this conception, the technological development of a country is accompanied by increasing capital investment: the more advanced the technology becomes, the more productivity is expected.

Research Methods in Previous Studies

Finally, from the body of research regarding education and income levels in the developing world, several empirical studies were identified as relevant. For instance, Otsuka (2003) investigated the impact of education and household conditions on the income barriers in the rural areas of several local provinces in the Philippines (Otsuka, 2003). The survey method for this study was to observe the change in the variables of income level and education level between 1964 and 1999. The authors included the rates of university graduation, junior high school graduation, gender, the age groups 26–35, 36–45, 46–55, and 56–65, family structure, property size for agriculture, and area of irrigation (Otsuka, 2003). As a result, these authors concluded that those who work in the non-agriculture sectors and have completed university have the highest income. In other words, families whose members have graduated from universities or colleges have the highest family income among groups (Otsuka, 2003). Also, those engaged in non-agricultural employment have a higher income than the those in the agricultural sector for approximately 13 years (Estudillo, 1999; Quisumbing, and Otsuka, 2001b). Finally, regarding the gender difference in educational investment in the developing world, the educational level of parents is a significant variable suggesting the human capital available to the parental generation. This variable is expected to positively affect the education for their children (Deolalikar, 1993; Parish & Willis, 1993; Behrman et al., 1999; Struss & Thomas, 1995).

In other relevant research, Kurosaki (2001) showed a similar impact for education on individual incomes in the case of Pakistan based on surveys conducted in 1996 and

1999 (Kurosaki, 2001). The author observed a difference between the agricultural and non-agricultural sectors in the impact of human capital (education) on the wages from 1996 to 1999 (Kurosaki, 2001). The variables employed in this research were human capital (enrollment rates at the primary, junior high school, and high school levels), household assets including the size of agricultural land, and dummy variables for agricultural family, and village status (Kurosaki, 2001). The methodologies employed in this study were panel data analysis and logistic model respectively. Logistic models are widely used to examine and describe the relationship between a binary response variable (e.g., 'success' or 'failure') and a set of predictor variables.

In common with the multiple-linear regression, the primary objective of logistic regression is to model the mean of the response variable, given a set of predictor variables. However, what distinguishes logistic regression from linear regression is that the response variable is binary rather than continuous in nature (Fitzmaurice and Laird, 2001). The author concluded that human capital has a major impact in the non-agricultural sector, while in the agricultural sector the impact of education was not so much observed (Kurosaki, 2001). Similarly, Duflo (2001) surveyed the impact of school construction on schooling and the labor market in Indonesia between 1973 and 1978 using panel data analysis; the study showed substantial positive effects on wages. Also, Breierova and Duflo (2004) estimated the influence of education on fertility and child mortality between 1973 and 1978 in Indonesia. Their findings showed that education for females is a stronger determinant of age at marriage and of early fertility than education

of males, while education both for males and females seem to be equivalent factors in reducing child mortality (Breierova & Duflo, 2004).

Based on these previous quantitative studies, education seems to play a significant role in enhancing income levels for non-agricultural workers, particularly those working in manufacturing. Therefore, this literature survey implies that promoting the industrialization in the developing world through education could be a significant contributor to overcoming the MIT.

Several other studies were helpful in their analysis of industrialization. In East Asia in particular, it is worth reviewing the successes of Japan, Korea, and Taiwan. Interestingly, Inoki (1991) looked at the role of education in relation to industrial development in the developing world. Interested in how a modernized sector is developed through industrialization, another study looked for the factors inhibiting modernization that education contributed to overcoming in the case of Japan, Taiwan, and China (Yamamura, Sonobe, & Otsuka, 2003a). In this study, the role of education was to foster the innovative entrepreneurship in manufacturing companies, summarizing the hypothesis of developmental stages linking industrialization to education (Yamamura, Sonobe, & Otsuka, 2003a). Unlike the conceptual framework developmental by Ohno (2009), other scholars have identified three phases of industrialization: launch, quantitative promotion, and qualitative enhancement (Otsuka, Liu, & Murakami, 1998; Sonobe, Kawakami, & Otsuka, 2003).

Furthermore, these authors attributed the significance of higher education as enabling entrepreneurs to become more innovative in manufacturing high quality

products. In particular, their survey paid attention to the motorbike industries in Japan from 1945 to 1965 from the perspective of the engine quality (Otsuka, Liu, & Murakami, 1998). Interestingly, the authors found a positive and significant impact associated with the general number of years of education among employees, the ratio of the engineers to the workforce, alternative human capital variables, etc. and corporate performance (Otsuka et al., 1998; Sonobe et al., 2003). At the same time, however, the concluding remarks of the study observed that the relationship between labor productivity and human capital seemed to be much more complicated than had been expected (Otsuka et al., 1998; Sonobe et al., 2003).

In relation to industrial development, researchers have surveyed the influence of education on the formation of labor skills, conducting a comparison between Japan and several Southeast Asian countries. In their studies, the key difference in skill development characteristics is flexibility for change at the point of production, particularly in manufacturing companies, which affects international competitiveness throughout East Asia (Ueshima et al., 2006). However, this research was carried out using qualitative methods, and could not determine quantitative impacts. Also, the influence of education in relation to the MIT was not identified through this research approach. Many authors have focused on poverty reduction or economic development and have not considered the context of how to escape the MIT in particular. Quantitative analysis of relevant variables from the perspectives of industrial development and labor skill formations were not within the scope of these studies. Nevertheless, they have left

some significant findings relevant to further study of such aspects as the MIT and education.

Research Variables

Based on the literature review, for this study to be able to clarify the influence of rates of enrollment rate in secondary education on the MIT and the ICI in the context of Southeast Asian industrialization, the research variables are the following.

First, for the first research purpose of the clarification of the influence of enrollment rate in secondary education on the MIT in East Asia, the dependent variable should be the GNI per capita (in US$) in the Southeast Asian economies since the value is one of the most principal barometers to assess the impact of education on the MIT. Thus, the GNI per capita were employed as a dependent variable. For independent variables, since the significant elements of the MIT have been discussed earlier in this chapter, the representative educational factors of enrollment rates will be incorporated as the independent variables by classifying into the three levels of “Primary,” “Secondary,” and “Tertiary education” categories. Regarding the other factors, including “Infrastructure,” “Governance,” “Labor Market,” and “Industrialization,” however, also demonstrated a strong relationship with the MIT in the previous studies. For this reason, these factors need to be controlled so that their influence is held steady in the linear regression, thus allowing the education rates to become the primary driver of prediction.

Second, to investigate the influence of secondary enrollment rates on the ICI in the context of industrialization in Southeast Asia, the dependent variable should be the ICI calculated for the Southeast Asian economies. On the other hand, the independent

variables here are the net enrollment rate at the primary and secondary levels and the gross enrollment rate for tertiary education.

Furthermore, since the ICI is relevant to the labor participation and the manufacturing employment conditions, two other variables were considered as controlled variables so that their influence is held steady in the linear regression, thus allowing the education rates to become the primary driver of prediction: the labor participation rate for those aged over 15 and the employment rate in manufacturing industries.

Gaps in the Literature

In summarizing the results of the literature, it has been evident that MIT has been discussed mainly by Gill and Kharas (2007). As previously explained, only 13 out of 106 middle-income economies in 1961 have achieved the high-income level in 2008 (WDI, 2018). Meanwhile, the World Bank has classified this varied group of countries into two classes, HMIEs and LMIEs. The key social problem, how to overcome the MIT, should be discussed in different contexts and from different points of view. Tran (2016), for example, analyzed the primary factors affecting the HMIEs and the LMIEs, respectively. He determined that the former need to enhance their technological and human resource capacity once the transfer of labor surplus to manufacturing is largely complete, while the latter has room to promote input-driven so that factor markets and resource allocation can be significantly improved within available labor reserves (Tran, 2016). Given the importance of promoting industrialization, enhancing international competitiveness through the improvement of the skills of the labor force by education was given additional emphasis. Expanding secondary education is a significant catalyst for

economic development, according to the socio-economic history of East Asia during the 1970s and 1980s. However, the impact of opportunities for secondary education needs further investigation using one of the available educational indexes concerning enrollment rates in Southeast Asia.

Finally, in reviewing existing studies from the perspective of their methodologies and variables for education and economic development, several significant variables have been employed as dependent and independent variables, including human capital and household income. Quantitative analyses have been identified, including panel data analysis, logistic models, and the Mincer wage equation. The role of education in preparing the way for industrialization was noted, but quantitative research on international competitiveness was not identified in this literature. Based on this literature review and the findings of previous studies, the remaining issues can be summarized in the following way:

First, although the literature review clarified the significance of expanding secondary education in promoting industrialization and leading to economic progress, far less research was found concerning the impact of secondary enrollment rates on the MIT. Although factors contributing to the MIT have been described in this literature, the educational aspect has not been the focus of previous studies. Reviewing the previous studies, although the impact of education on individual income was examined at a micro level in several villages or other areas, research on education and economic development using cross-sectional data was not identified. In particular, the relationship between the MIT and secondary education had not been examined across national economies in any

existing studies of Southeast Asia. Therefore, the first research gap concerns the impact of the rate of enrollment in secondary education on the MIT.

Second, although Tran (2016) pointed to the potential to enhance the international competitiveness of the manufacturing industries through cultivating the skills of workers, in the context of overcoming the MIT in East and Southeast Asia, far less research has looked at the impact of secondary education rates on the ICI. From the perspective of improving secondary enrollment rates in Southeast Asia, the influence of net enrollment rate in secondary education on the ICI is a crucial issue. Reviewing the literature from the perspective of methodologies and variables employed, the role of education in promoting industrial development and labor skills was often examined qualitatively, and the effect of secondary education on the ICI was never uncovered. From this point of view, the relationship between the ICI and the rate of enrollment in secondary education, in the context of Southeast Asian industrialization, was examined, notably in helping me contribute to filling up the study gap.

Based on these research gaps, the purpose of this quantitative study is to clarify the influence of secondary enrollment rates on the MIT and on the ICI, in the context of industrialization in Southeast Asia. Although Otsuka (2014) and Lewin and Caillods (2002) stressed the significant role of expanding secondary education in promoting industrialization and leading to economic development, far less research has addressed the impact of the enrollment rates at the secondary level on the MIT. A statistical examination of the impact of secondary enrollment is therefore overdue, and the effect of enrollment in secondary education on the MIT should be clarified in the context of East

Asia. Although Tran (2016) stressed the significance of enhancing the international competitiveness of manufacturing industries by enhancement the skills of workers, little quantitative research has looked at the impact of enrollment in secondary education on the ICI. From the perspective of improving secondary enrollment rates in Southeast Asia, the influence of net secondary enrollment on the ICI needs to be examined.

Summary and Transition

Above all, it is evident from the literature review that the MIT has been discussed for more than ten years, but that little attention has been placed on enhancing international competitiveness by improving the skills of workers through education, especially through the expansion of secondary education. Research on the impact of the secondary enrollment rate on the MIT has been identified as a gap in the literature. Second, although the role of human capital in international competitiveness has been recognized as one of the most influential ways to promote industrialization, little research has considered the influence of secondary education on the ICI: another crucial gap.

The present study contributed to filling these gaps, clarifying the influence of the rate of enrollment in secondary education on the MIT and the ICI, in the context of Southeast Asian industrialization. This study can contribute to further development in the area, helping the MIT to be overcome from a human capital perspective. Expanding secondary education offers a path toward further economic and social development in the developing world. Based on the literature review, Chapter 3 pursues the specific quantitative methodologies proposed to address the study's two research questions, explaining how these questions were approached in more detail.

Chapter 3: Research Method

In this study, I aimed to contribute to overcoming the MIT and promoting further industrialization in Southeast Asia by analyzing the influence of the enrollment rate in secondary education on the MIT and the ICI. Otsuka (2014) and Lewin and Caillods (2001) each stressed the significant role of secondary education in promoting industrialization, leading to economic progress. However, little research to date has addressed the impact of secondary enrollment rates on the MIT in particular. Enrollment rates at the secondary level need to be enhanced in terms of statistical metrics, and the effect of the secondary enrollment rate on the MIT in Southeast Asia has not been clarified based on empirical findings. Thus, the relationship between secondary education and the MIT needs to be addressed in this context.

Also, while Tran (2016) stressed the importance of enhancing the international competitiveness of the manufacturing industry through the enhancement of the skills of workers, little research has addressed the impact of secondary education on the ICI. In this context, the influence of net enrollment in secondary education on the ICI needs to be examined. In Chapter 3, I pursue these research objectives by developing the quantitative methodology for the study, introducing its research design, justifying the analytical approach, and introducing the specific methodology used to fulfill the study's purposes.

Research Design and Rationale

I employed quantitative analysis with the use of a nonexperimental design for the primary purpose of observing the impact of the enrollment rate of the secondary

education on the MIT and ICI in Southeast Asia in this study. The research questions are as follows:

RQ1: Will enrollment rates in secondary education predict a statistically significant percent change in the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values?

H_0: There is no statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

H_1: There is a statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

Controlled variables:

1. Governance: The index of governance indicators including transparency in policymaking, efficiency in administration service, investment environment, and rent seeking from World Governance Indicators (2020) were employed as the continuous variables.
2. Industrialization: The value added of manufacturing (% of GDP) from World Development Indicators (2020) was employed as continuous variables.

3. Labor market: The labor force participation rate (% under aged 15-24) from World Development Indicators (2020) was employed as continuous variables.

4. Infrastructure: Logistics performance index: Quality of trade and transport-related infrastructure (1 = low to 5 = high) from World Development Indicators (2020) was employed as continuous variables.

IVs = The net enrollment rate in primary and secondary education and the gross enrollment rate of tertiary education were employed as the continuous variables.

*** Net enrollment rate: The rate of students under the designated age enrolled at primary and secondary education per % from World Development Indicators (2020).

*** Gross enrollment rate: The rate of students regardless of the designated age enrolled at tertiary education per % from World Development Indicators (2020).

DV = MIT: GNI per capita (Atlas Method, US$) from World Development Indicators (2020) were employed as continuous variables.

RQ2: Will the enrollment rate in secondary education predict a statistically significant percent change in the R^2 variance in the Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate?

H_0: There is no statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI

composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

H_1: There is a statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

Controlled variables:

1. Labor force participation rate: The labor participation rate of men and women with persons aged 15 and older from the World Development Indicators (2020) was employed as the continuous variables.
2. Employment rate of manufacturing industry: The employment rate of manufacturing of men and women (% out of GDP) from the World Development Indicators (2020) was employed as the continuous variables.

IVs = The net enrollment rate of primary and secondary education and the gross enrollment rate of tertiary education:

*** Net enrollment rate: The rate of students under the designated age enrolled at primary and secondary education per % from the World Development Indicators (2020) was employed as the continuous variables.

*** Gross enrollment rate: The rate of students regardless of the designated age enrolled at tertiary education per % from the World Development Indicators (2020) was employed as the continuous variables.

DV = ICI (UN Comtrade Database, 2020) was used as the continuous variables.

For RQ1, I explored the impact of the secondary enrollment rates on the MIT. Because the MIT is a kind of socioeconomic phenomenon, the GNI per capita was employed as a representative DV, in which the IVs were used based on such aspects of the MIT as the enrollment rate in primary education and tertiary education. Also, in consideration of the other possible factors of the MIT, notably including governance, industrialization, the labor market, and infrastructure through the literature review, these variables were included. However, because I observed the educational factors predicting the MIT, these other factors should be considered CVs to hold steady in the linear regression, thus allowing these three educational enrollment rates to become the primary drivers of prediction. Also, for RQ2, the enrollment rate in secondary education on the ICI in manufacturing industries was examined with the IVs of the net enrollment rate in primary education and the gross enrollment rate in tertiary education. The other two variables of labor force participation and employment rate in the manufacturing industry were also included as the other factors than education. Still, these variables considered CVs to observe the educational factors predicting the ICI in the same way I did for the RQ1.

As for the research design for these two RQs, I examined the relationship between enrollment in secondary education and the MIT, as well as the ICI, quantitatively in relation to industrialization in East Asia on a national scale. For such a study, a nonexperimental design has several advantages, including more generalizable results than an experimental design and no need to manipulate the variables as an experimental design would require (Tanaka, 2015). A nonexperimental design is most appropriate

when aiming to clarify the influence of enrollment in secondary education on the MIT and the ICI in the context of industrialization in Southeast Asia.

For both RQs, the multiple-regression model was the most appropriate methodological approach to observe the dependent variable (income levels) in relation to more than two independent variables. It would be difficult for a study to identify the influence of secondary enrollment rates on the MIT and the ICI based on one single period of measurement because educational and economic metrics change frequently due to constant changes in policy conditions within nations, regions, and even cities (Tanaka, 2015). Thus, it was more appropriate for me to observe data over a longer duration, allowing for a broader range of observations. The analysis was, therefore, the most appropriate choice for addressing these two RQs.

For RQ1, the GNI per capita was employed as the dependent variable. The independent variables were education (enrollment rates for primary, secondary, and higher education), governance, industrialization, labor force, and infrastructure. These variables were selected as conditions for promoting economic progress, based on a review of the literature from Doner and Schneider (2015) and the ADB (2017).

To address RQ2, the ICI was employed for the multiple-regression analysis, extracted from the UN's Comtrade Database (2019). The rate of employment in manufacturing industries and the labor participation rates for men and women were added as IVs in consideration of the other factors contributing to international competitiveness in the manufacturing sector by reviewing Tran (2013) and ADB (2017).

The time frame for the multiple regression analysis employed to address these research questions was a 20-year period from 1999 to 2018. Several international organizations have produced the indexes to be assembled as panel data, including the WDI (2020) from the World Bank and the Comtrade Data (2020) from the United Nations. These sources were used to address the research questions in this study as decisively as possible.

Finally, this research design has the potential to make an important contribution its academic discipline. In pursuit of its first research objective, this design offers quantitative insight into the impact secondary education on the fundamental challenge facing many Southeast Asian economies, the MIT. Because this perspective has not been addressed in previous research, the design could offer a significant catalyst for further development in Southeast Asia. From this point of view, this design could suggest a new academic horizon in addressing both economic development and education in the developing world.

Also, documenting the importance of enhancing the skills of workers through secondary education to contribute to the ICI could help middle-income economies to manage their human resources more effectively to promote further industrialization. This, this study is transferable in a practical sense to the other lower-middle income economies in their management of human resources.

Methodology

Based on the research purposes of contributing to overcoming the MIT and to promote further industrialization by examining the influence of the enrollment rate in

secondary education on the MIT and the ICI, especially in Southeast Asia through, by using quantitative analysis and research questions of "Will enrollment rates in secondary education predict a statistically significant percent change in R^2 variance in Southeast Asian Middle-income Trap composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values?" and "Will enrollment rate in secondary education predict a statistically significant percent change in R^2 variance in Southeast Asian International Competitive Index composite scores more than primary and tertiary education when controlling for labor force participation and manufacturing employment rate?," the quantitative methodology of panel data analysis was expected to be employed using specified dependent and independent variables. The dependent variable of the GNI per capita and the ICI per capita is derived from the research purposes of clarifying the effect of the enrollment rate in secondary education on the MIT and the ICI. On the other hand, as for the first research question, the independent variables of education (enrollment rates in primary, secondary, and higher education), governance, industrialization, labor force, and infrastructure were derived from the primary conditions of promoting economic progress, based on a review of the literature from Doner and Schneider (2015) and the ADB (2017).

As for the second research question, the independent variables of employment in manufacturing industries and the labor participation rates for men and women were added as independent variables stemmed from the other components contributing to international competitiveness in the manufacturing sector, primarily because of these two

components to be fundamentally indispensable for promoting the industrialization in reviewing the literature from Tran (2013) and the ADB (2017). In analyzing the effect of economic development policies, including the income status, it is usually challenging for this study to measure and observe the change through the policies solely in one period with one country (Tanaka, 2016). At first, I also considered that the panel data analysis can help further clarify the impact of secondary education on MIT and ICI as it covers both time series and cross-sectional data. More specifically, in choosing the panel data analysis, as Okui (2015) describes, it is more adequate for economic studies to select a fixed effect model than a random effect model with two reasons of the ability to analyze the methodology by applying it as the fixed effect and the importance for social sciences, including public policy, development economics (Okui, 2015).

Also, in following a non-experimental design, this study mainly focused on the influence of the rate of enrollment in secondary education on the MIT and the ICI in relation to industrialization in Southeast Asia by finding the effect with the longer period of time as objectively as possible. Specifically, national-level data from Southeast Asian economies were assembled to cover the period from 1999 to 2018, bringing together data collected by several international organizations including the World Bank (2020), the United Nations (2020). By using the data, the panel data analysis was planning to be employed this time, and the resulting findings were presented. Based on these foundations, further specific aspects of the methodology are presented in the following sections.

However, I made a methodological adjustment to the multiple-linear regression analysis this time, instead of the panel data analysis. One reason for this is that I primarily observed the effect of the enrollment rate of secondary education on the GNI per capita and the ICI in Southeast Asian economies, especially by gaining insight into the figures of R^2 variance as coefficients of determination. R^2 stands for the coefficient of determination, indicating how much the IVs statistically contribute to the DV (Kvalseth, 1985). R^2 variance is the figure indicating that the IVs influence the DV via the change in the value of R^2. R^2 variance is a significant catalyst for the study outcome and process. Notably, the figure is a significant barometer for determining if null hypotheses can be rejected or not by analyzing if it is lower than .05 to be significant. The multiple-linear regression analysis allows me to use the DVs' general values and the interval ratios of the IVs to be measured. R^2 change is, therefore, totally different from seeking the t-value in the panel data analysis. In this respect, I abandoned the panel data analysis in favor of the multiple regression analysis. Instead, using the multiple-linear regression model allowed me to answer the research questions using the values of R^2 increase.

Population

Regarding both dependent and independent variables employed in the quantitative study, the target population were those involved in the labor force and educational institutions within the population of nine out of 11 national economies (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Timor-Leste, and Vietnam) in Southeast Asia. Brunei and Singapore were excluded since these two are high-income economies. Thus, these two are not included in the dataset, and then nine

economies as the LMIEs and HMIEs in the region being employed in the dataset. Also, GNI per capita was employed as a measure of income, based on national income per person as estimated by the World Bank (2020).

Finally, the data elements for RQ1 include education (enrollment rate at primary, secondary, and higher education levels) as independent variables, as well as governance, industrialization, labor force, and infrastructure as controlled variables. For RQ2, the data from the ICI through UN Comtrade data (2020) are also employed. As noted, the rate of employment in manufacturing and labor participation rates for men and women were added as controlled variables, since these are relevant to industrialization in terms of the labor market for manufacturing.

Sampling and Sampling Procedures

Since the purpose of this quantitative study is to contribute to overcoming the MIT and to promote further industrialization by clarifying the influence of enrollment in secondary education on the MIT and the ICI, notably in Southeast Asia, sampling strategy is simply to compile readily accessible data from several international organizations, including the World Bank and the United Nations, from 1999 to 2018. These data are authoritative, definitive, and complete enough to answer my research questions due primarily to high accuracy and reliability through the elaborated investigation, analysis, and endorsement by the government agencies in many parts of the world (World Bank, 2020). These data are also appropriately matched with the variables that I used for testing the hypotheses, especially in the components of educational and

economic parameters. For these reasons, I found these data to be the best for my quantitative study.

Regarding the specific procedures, the sample was drawn from the World Development Indicators (WDI, 2020) and UN Comtrade database (2020). Appropriate independent variables were identified based on their relevance for promoting economic progress according to the literature review. In particular, several primary factors identified in the literature as contributing to the MIT will be included, along with the independent variables relating to RQ1 and RQ2 (enrollment rate at Primary, Secondary, and Tertiary levels) with the labor participation rate, the rate of employment in the manufacturing industry, and the ICI as dependent variables for RQ2.

As for the sampling frame, the number of observations produces a sample size of 180: 9 national economies over 20 years (1999 to 2018) for each variable. Also, the unit of analysis refers to the primary entity that researchers are analyzing in their studies (Mathew, 2018). Also, the units can be classified into several types, including "individuals," "groups," "artifacts (books, photos, newspapers)," "geographical units (town, census tract, state)," and "social interactions (dyadic relations, divorces, arrests)" (William, 2020). This time, I relied on the publicly open data, including the GNI per capita, the enrollment rate in secondary education, the ICI, etc. from the WDI (2020), the WGI (2020), and the UN Comtrade Database (2020), and I collected them on a national scale. Principally, these international organizations calculated these data by using the samples of all the citizens in an entire nation at the macro-level (World Bank, 2020;

United Nations, 2019). From these points of view, the unit of analysis would be the "national economy."

Finally, concerning a power analysis, based on the reference from Cohen (1992), in setting up input parameters, the alpha level was arranged as 0.01 (1%), 0.05 (5%), and 0.1 (10%) accordingly with the figure of power level 0.8 regularly. Also, with the effect size classified into three groups of small (0.2), medium (0.5), and large (0.8), the sample size was automatically determined. Since this study employed at least over 100 sampling data as one group, it was basically effective to show the significance accurately for multiple regression analysis on the condition of the alpha level 0.05 and power analysis 0.8 (Mizumoto & Takeuchi, 2010).

With the condition above provided by Cohen (1988) as well as Mizumoto and Takeuchi (2010), G*Power was appropriately used as a tool for calculating the size. In this study, to observe the effect of enrollment rate in secondary education on the MIT and the ICI by indicating the figure of $p < .05$, the minimum condition of the alpha level I need to select should be 0.05 with power analysis 0.8 under the appropriate condition of effective size f^2 of .15 to be at a significant level. With these three conditions, the minimum required sample size should at least be 68 when using linear regression with a fixed-effect model and three independent variables (enrollment rate of primary, secondary, and tertiary education) vis-à-vis one dependent variable per each RQ for observing the R^2 increase.

Procedures for Primary Data Collection

For data collection, appropriate variables need to be obtained, notably through the World Development Indicators (WDI, 2020). As described previously, since some primary elements of the MIT were found in previous studies, the independent variables were chosen based on these studies. Specifically, for RQ1, the independent variables are not limited to enrollment rates at different levels of education, but also include infrastructure, governance, industrialization, and labor market variables, which are representative aspects of international development. These data were collected from the "World Development Indicators" (WDI, 2020) published. As for the variables of "Governance," the "World Governance Indicators" (WGI, 2020) was the primary data source for data collection.

On the other hand, for RQ2, the independent variables are the employment rates, the labor participation rates, and the enrollment rates at various levels of education. These variables were collected from the "World Development Indicators" (WDI, 2019). The ICI will be obtained from the UN Comtrade Database (2020) from the source, "International trade in goods and services." The ICI was calculated with the use of total amount of import (M) and export (X) in manufacturing industry of each economy by using the formula of (X-M)/(X+M); (Tran, 2016). To be specific, the total amount of import and export in the manufacturing industry in each economy were gained by the selected source. Then, the calculation of the ICI per each economy by using the formula was made.

Also, demographic information was gained for nine selected economies in Southeast Asia (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Timor-Leste, and Vietnam) from the category of "Population Dynamics" by "World Development Indicators." (WDI, 2019)

The data were accessed through public downloading functionality. The dependent and independent variables were applied to my analysis of the data for the period from 1999 to 2018. The reason to select this duration is to maximize the usable amount of data by minimizing the amount of missing data. Also, since this study aims to observe changes in secondary enrollment rates, GNI per capita, and the ICI in Southeast Asia are collected for as long a term as possible for more robust results.

Instrumentation and Operationalization of Constructs

First, as for the instrumentation of the methodology, Otsuka and Kurosaki (2003) provided several quantitative outputs regarding years of schooling and wages in the developing world, using instrumental variables to control potential covariates and confounding factors and thereby observing causality as accurately as possible (Otsuka & Kurosaki, 2003). Since individual income can reflect internal and external environmental factors, including individual ability, ambition, family environment, employment conditions, political stability (Matsushita, 2015), confounding factors should be identified between the dependent and independent variables. One of the approaches to this requirement is to introduce instrumental variables that correlate with the dependent variables and do not correlate with the error function (Matsushita, 2015).

This approach may help to establish the sufficiency of the instrumentation used to answer the two RQs. Specifically, in the first platform, all the dependent variables, including instrumental variables, were regressed onto exogenous variables, and values of the dependent variables will be predicted. Then, in the second platform, the dependent variable was regressed onto the predicted values developed in the first platform. In the case of this study, removing possible confounding factors between secondary enrollment rates and the GNI per capita for RQ1, as well as the ICI for RQ2, and then regressing the dependent variable onto the values predicted by the first platform, is a methodology most appropriate to assessing potential causal relationships between those variables.

To maintain the reliability of this study, it also necessary to be aware of the weak instrumental problem: The regression model can be interpreted as a quantitative methodology representing the relationships between all the endogenous variables and exogenous variables. Thus, variables may show much lower error functions, maintaining consistency in avoiding the impact of the error as much as possible. On the other hand, regarding the validity of the study, it is necessary for the study to avoid bias in evaluating the impact of secondary enrollment rates on the MIT and the ICI. Since the concepts relating to the key variables of enrollment rate, the MIT and the ICI have been set by international organizations, this study can ensure a certain level of construct validity. Using standardized constructs, the quantitative results of the study should reflect the concepts to be measured. Generally, the regressed model can be shown in the following formula:

$$Yit = \alpha + X0\ it\beta + uit \quad (i = 1,...N;\ t = 1,...T) \cdots\cdots (1)$$

As for the error terms, the general model of the two-way error component is expected to be used as the fixed effect model with the following formula:

$$uit = \gamma\ i + \varepsilon\ it \cdots\cdots (2)$$

In fixing the formulas of (1) and (2), the integrated formula is as follows:

$$Yit = \alpha + X0\ it\beta + \gamma\ i + \varepsilon\ it \cdots\cdots (3)$$

For RQ1 and for RQ2, either a fixed effect model or a random effect model must be chosen. As Okui (2015) has explained, it is more appropriate for economic studies to choose the former, a fixed effect model. The author described two specific reasons for this: the ability to analyze the methodology by applying it as the fixed effect, and the importance for social sciences, including economics (Okui, 2015). The application of the model represented by equation (3) to both RQs can help this study to show a more authentic analysis though more extensive data. Thus, the multiple-regression analysis with a fixed effect model was employed to test the hypotheses both for RQ1 and RQ2.

Each variable was classified into three groups for nominal, categorical, and continuous variables, and was examined using multiple regression analysis for each research question. SPSS was used for this analysis as one of the most useful tools available. With data collected through the databases discussed above, the downloaded data were put into an SPSS dataset, then set up for analysis. SPSS includes the multiple-linear regression with fixed-effect model; it was employed both for RQ 1 and RQ 2. Finally, variable and scale scores were calculated by the multiple-linear regression model. Since the research questions concern the impact of the enrollment rate in

secondary education on the MIT and the ICI, the resulting scores were judged based on the figure of R^2 along with the statistical significance tests at the 1%, 5%, and 10% levels.

Data Analysis Plan

Using the multiple linear regression analysis with a fixed effect model is the appropriate statistical test to answer the two research questions. It is used when the data are collected over time and the same individuals or analysis unit. Then a regression is run over these two dimensions (cite). Data were collected over 20 years (1999 – 2018).

The SPSS Statistics software version 25.0 was used for the analysis. When completing the dataset gained and chosen through the websites publicly available from several international organizations, each datum was put in the SPSS data and classifying the data into three types of categorical, nominal, and continuous accordingly.

The analysis plan was primarily to conduct testing assumption and then testing the hypotheses. In showing the steps, firstly, I developed how my dataset does not violate any assumptions before conducting the regression analysis. I collected publicly accessible data from international organizations and confirmed that there is no statistically significant difference in GNI per capita between selected countries in Southeast Asia. Also, I conducted the assumption testing from the seven types of normality, linearity, homoscedasticity, independence error, zero conditional mean, no perfect collinearity, and no serial correlation. As a result, I confirmed several violations, notably in normality, while linearity, homoscedasticity, independence error, and zero conditional means seemed significant.

As for normality, the distributions not normally distributed, even when log transformed, potentially affecting the overall regression model output for RQ1 and 2, respectively. Also, there appears to be some collinearity between IVs in conducting testing assumptions. Accepting these potentially impactful assumption violations, I moved forward with regression modeling with the understanding that generalization should proceed with caution. The null hypotheses were retained for both RQs however important foundational information was gained. From these points of view, the risk of these assumption violation were noted and accepted as study weaknesses.

Secondly, the statistical tests to observe the hypotheses were performed through the variable, and scale scores were calculated by the multiple-regression model using a fixed effects model. Since the research questions concern the impact of secondary enrollment rates on the MIT and the ICI, the scores were judged primarily by the R^2 based on the Hausman fixed effect model. For each research question, R^2 increase of each dependent variable was used to ascertain whether the hypothesis is valid or null. Also, the procedures for testing assumption were introduced at the stage of arranging the dataset of the variables collected through the open-data publicly available from the World Bank and the United Nations for RQ1 and RQ2, respectively. The variables gained through the dataset were put in the SPSS data and automatically reflected in the data analysis.

At the same time, however, a rationale for including potential covariates and confounding variables could potentially be made. For instance, in the case of potential covariates, as for RQ1 and the relationship between enrollment rate in secondary education and income level, the higher the proportion of manufacturing to GDP, the

higher the amount of GNI per capita is likely to be. Potential confounding variables might include, for example, labor force participation rates and rates of completion of secondary education. Covariates and confounding variables can therefore be expected. The results of the analysis were interpreted through the R^2 variance. The null hypotheses for RQ1 and RQ2 were retained based on a strict interpretation of predicting secondary education would be a superior driver over both primary and tertiary education, which was not found. However, the overall regression models for both RQs did illustrate significance in predicting the DVs when evaluating the cumulative effect of education from primary to tertiary. Post hoc analyses were conducted to further investigate those findings.

Threats to Validity

External Validity

One of the most significant threats in external validity would be whether the results of the research questions can be applicable and transferable to all the countries or not. This study focused on the MIT in East Asia, addressing the influence of the enrollment rate in secondary education on the MIT and the ICI with nine economies in the region. In a word, under the different population and the development conditions with the various governmental policies for further progress, the variety in the data settings can be observed in this study. In this regard, the result can be observed in the same way. Nevertheless, as well-known, MIT has occurred not only in Southeast Asia, but also in the other regions, including South America (Latin America), Eastern Europe, and sub-Saharan Africa. In a word, in the case of the different environments, the research findings

in this study might potentially be changed. Despite identifying the missing data, I found the testing results to be significant in the R^2 increase in the DV of the GNI per capita for RQ1 and the ICI for RQ2. No negative effect of the missing data on validity was identified. In this way, the generalizability of the study results to be applicable to other regions can potentially be available.

Internal Validity

As described in the "Instrumentation" above, one of the most significant concerns would be whether it is possible for the study to remove the covariates and confounding factors. In order for this study to remove these two factors, removing the possible confounding factors between the enrollment rate in secondary education and GNI per capita and making the dependent variable regressed into the predicted values in the first platform can be interpreted as the appropriate methodology in leading to the appropriate causality between those variables.

Nevertheless, still, the weak instrumental problem can potentially occur. In that case, the other methodology will be considered so that the bias-free can be possible. For instance, the Limited Information Maximum Likelihood (LIML) was suggested by Anderson and Rubin in 1949 as this method has been well-known as an alternate approach to minimize the biases (Matsushita, 2015). In this regard, the LIML can potentially be the alternate in addressing the issue of the confounding factors.

Construct Validity

As described in the item of "Instrumentation" above, regarding the validity, this study needs to avoid the bias as appropriately as possible in getting the result of the

impact of enrollment rate in secondary education on MIT and the ICI, respectively. I used representative variables of enrollment rate obtained from the international organizations, having been quantified and validated by other international source organizations. In this regard, my study data were assumed to uphold construct validity.

Ethical Procedures

Since the data were accessed through the several international organizations' websites publicly available, there is no ethical concern and no need for institutional permission. Also, there is no plan to intervene with the participants in data collection and describe the treatment, including the protection of personal information. On the other hand, I collected and used the archival data gained through international organizations, including the World Bank (2020) and the United Nations (2020), as described in the research design.

Finally, regarding the other ethical issues, since this study deals with the development issues in the developing world, the low-income condition is considered to be a serious social issue in the world. In this regard, some may criticize that increasing individual income is not everything in the lives of others. Indeed, some researchers specializing in politics, sociology criticize economists since increasing the income does not constantly make people happy (Otsuka, 2014). Nevertheless, from the perspective of social change, overcoming MIT should be justified in the real world in promoting economic progress and reduce extreme poverty in the long run. In this regard, dealing the economic statistics should be justified for the shared incentives scholarly and practically. The Institutional Review Board (IRB) approval number is 10-30-20-0740154.

Summary and Transition

With the non-experimental design, I focused on the influence of the enrollment rate in secondary education on the MIT and the ICI in nine economies of Southeast Asia with the quantitative study. Specifically, sampling strategy is to earn the commonly accessible data from the several international organizations primarily including World Bank and the United Nations from 1999 to 2018, which can justify the research purposes as a strategy of sampling. The methodology I employed here is the multiple linear regression analysis with a fixed-effect model, primarily for the study purpose of clarifying the impact of secondary education's enrollment rate on the MIT and the ICI by focusing on the R^2 variance.

I used the variables of the enrollment rate of primary, secondary, and higher education, governance, industrialization, labor force, infrastructure as for the RQ1, while the RQ2 does have the data of the ICI. Each variable was classified into three groups of nominals, categorical, and continuous variables accordingly, while the scores were judged by the figure of R^2 increase. Regarding the instrumentation to answer the research questions, the multiple-linear regression analysis was employed for acquiring the expected values. Particularly, removing the possible confounding factors between the enrollment rate in secondary education and GNI per capita for RQ1 and the ICI for RQ2 and then making the DV regressed into the predicted values developed in the first platform can be interpreted as the proper methodology in leading to the appropriate causality. With the approach, the results of testing hypotheses can be seen in Chapter 4.

Chapter 4: Results

In this study, I aimed to contribute to overcoming the MIT and promoting further industrialization in Southeast Asia, primarily by quantitatively analyzing the influence of the enrollment rate in secondary education on the MIT and the ICI. The secondary level's enrollment rates need to be enhanced in terms of statistical metrics because the effect of the secondary enrollment rate on the MIT in Southeast Asia has not been clarified based on empirical findings. Thus, the relationship between secondary education and the MIT needs to be addressed in this context. Also, while Tran (2016) stressed the importance of enhancing the manufacturing industry's international competitiveness by improving the skills of workers, little research has addressed the impact of secondary education on the ICI. In this context, the influence of net enrollment in secondary education on the ICI needs to be examined. I investigated the educational factors predicting the MIT and the ICI in Southeast Asian economies with the research problems and purposes. This study addressed the following research questions and hypotheses:

RQ1: Will enrollment rates in secondary education predict a statistically significant percent change in the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values?

H_0: There is no statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

H_1: There is a statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

RQ2: Will the enrollment rate in secondary education predict a statistically significant percent change in the R^2 variance in the Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate?

H_0: There is no statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

H_1: There is a statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

With these research questions and hypotheses, I begin Chapter 4 with the data collection process for observation and report of characteristics of the sample. I also address discrepancies in data collection from the original plan and report the sample's characteristics from name convention in SPSS, descriptive statistics, and mean average per each country. Then, study results, especially assumption testing and hypotheses

testing results relevant to the two research questions, are shown. Finally, I conclude Chapter 4 with a summary of the findings and a transition to Chapter 5.

Data Collection

After Walden University's IRB approval, data collection was conducted over a 3-week time frame. The data were primarily gained through publicly open websites from the World Bank and the United Nations in 1999 to 2018 with nine economies in Southeast Asia (Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Thailand, Timor-Leste, and Vietnam). In this section, I discuss the review of the results of the sampling procedure, the methods of the missing data, and the characteristics of the sample.

Process and Observation

Overall, for arranging the dataset to approach both RQ1 and RQ2, I used the secondary data in several variables for covering the missing data. Specifically, for RQ1, the three IVs included the enrollment rate of primary, secondary, and tertiary education, the DV of GNI per capita, and the CVs of governance, industrialization, labor market, and infrastructure. The dataset listed the World Development Indicators of WDI, the World Governance Indicators of GNI, and the UN Comtrade Database ($N = 180$). The samples gained through the publicly accessible data from the international organizations were completely different. Specifically, for the DV of GNI per capita (Atlas Method, US$), the resultant sample was obtained through the WDI (2020). Secondly, the IVs of the enrollment rate of primary, secondary, and tertiary education had respective figures of

the sampling; n = 113 for primary education, n = 112 for secondary education, and n = 132 tertiary education were gained from the WGI (World Bank, 2020) as well.

Finally, for the CVs, the resultant samples are as follows: The variable data of governance was gained through the WDI. It is composed of six elements of voice and accountability, political stability and absence of violence/terrorism, government effectiveness, regulatory quality, rule of law, and control of corruption, accordingly (WGI, 2020). Between 1999 and 2018, the WGI did not arrange the data in 1999 and 2001, thus being n = 162 per each factor. Secondly, for industrialization, I found the value-added rate in manufacturing per GDP with n = 178. Regarding the labor market, I chose the variable data of labor force participation rate for ages 15+ for a total of both male and female with modeled ILO estimate and picked up N = 180. Finally, for infrastructure, I selected the logistics performance index variable, quality of trade and transport-related infrastructure (1 = *low* to 5 = *high*), resulting in n = 49 for the designated 20 years from 1999 to 2018 from the WDI (2020).

In analyzing the data for RQ1, some missing data were identified, especially in the IVs of the enrollment rate of primary, secondary, and tertiary education and the CV of infrastructure. As for the required minimum sample size, in quickly reviewing the data-collection from G*Power as a tool for calculating the size, I indicated the figure of $p < .05$; the minimum condition of the alpha level is .05 with power analysis .80 under the appropriate condition of effective size f^2 of .15 to be at a significant level with the three IVs of enrollment rate of primary, secondary, and tertiary education vis-à-vis one dependent variable per each RQ for observing the R^2 increase in Chapter 3. With these

conditions, the minimum required sample size was 78 in using linear regression with a fixed-effect model. Therefore, the number of the logistics performance index item, quality of trade and transport-related infrastructure (1 = *low* to 5 = *high*), was not a sufficient size.

Furthermore, the number of resultant samples of the enrollment rate in primary and secondary education exceeded the minimum size of 78. However, several critical lacking pieces of data were identified. First, there were no data from Vietnam between 1999 to 2018. Also, several countries, notably Cambodia and the Philippines, did not have enough data in the WDI. While the highest amount of data within the IVs was tertiary education (n = 132), the size of the enrollment rate in primary and secondary education should be equivalent to the number in tertiary education as the primary parameter in this study. In this respect, further sampling of data-gathering for the enrollment rate in primary and secondary education should be considered.

On the other hand, for RQ2, the three IVs of the enrollment rate of primary, secondary, and tertiary education, the DV of the ICI, and the CVs of labor force participation rate and employment rate in the manufacturing industry were probed. Specifically, for the DV of the ICI, I used the UN Comtrade Database (2020), as explained in Chapter 3. For a quick review, the ICI is calculated from the formula i = (X-M)/ (X+M; Tran, 2013, 2016) using data on the international trade in goods and services. The figure ranges from -1, 0, and to 1. The value of -1 represents the industry's introduction by importing with the figure of export 0. Secondly, 0 stands for the equivalency between export and import in completing import substitution. Finally, 1

means less import and export expansion (Tran, 2016). With this notion, I used the items of goods import (US$) and goods export (US$). As a result, 136 samples for these two items were obtained from the UN Comtrade Database (2020). Second, regarding the three IVs of the enrollment rate in primary, secondary, and tertiary education, I used the same data method as for RQ1. Thus, I obtained n = 113 for primary education, n = 112 for secondary education, and n = 132 for tertiary education from the WDI (2020). Finally, the CVs of labor force participation rate and employment rate in the manufacturing industry helped me obtain the samples from the WDI (2020). As for the former, I chose the item labor force participation rate for ages 15+, total (%) with the modeled ILO estimate and then collected the maximum number of samples (N = 180). For the latter, I selected the item employment rate in manufacturing industry (% of GDP) and obtained the maximum amount of data (N = 180) as well.

Prescriptions for the Missing Data

With changes to the process as noted above, the missing data for several variables were found, despite the secondary data's employment for maximizing the sample size. Specifically, for the missing data identified with over 10, the IVs of enrollment rate in primary, secondary, and tertiary education had the missing data with the figure of at least over 30 for 20 years between 1999 to 2018. Likewise, the DV of Governance does not have the data in 1999 and 2001 (*n/a*=18) according to the World Bank survey (2020). Finally, the CV of Transport services (% of commercial service exports) lacked the whole data of Vietnam for the designated 20 years and Timor-Leste for seven years (1999 to

2005). In summary, the missing data above were found from the dataset collected through the World Development Indicators (2020) and the U.N. Comtrade Database (2020).

For the missing data elements from the outset, the first thing I did was increase the data amount sourced from the secondary data. Principally, secondary data refers to the existing data collected through the organizations, while primary data is often defined as the one made by the scholars (Surbhi, 2016). As previously explained in Chapter 3, I used the preliminary data through the international organizations, e.g.) the World Bank (2020) and the United Nations (2020), while plenty of missing data were still identified. In this regard, I used the other existing data relevant to the enrollment rate in primary and secondary education from WDI (2020) to cover as much lacking data as possible. The specific methods of the secondary data are described as follows.

Firstly, as for the enrollment rate in secondary education, I used the similar variable of "Adjusted net enrolment rate, lower secondary, both sexes (%)" from WDI (2020), and thus adding up eight more resultant samples of Cambodia and the Philippines in 2010 to 2017. Moreover, as for the enrollment rate in primary and secondary education in Vietnam, I looked for the secondary data from the official government website, called the General Statistics Office of Vietnam (GSOV, 2020). These data are publicly accessible and were retrieved directly through the website. I chose the item of "Pupil of Lower-Secondary Education" from the category of "Number of classes, direct teaching teachers and pupils of general education as of 30 September" (GSOV, 2020) for sampling. It is justifiable to use the lower secondary education data since secondary education refers to completing the provision of primary education that started at the basic

level (WDI, 2020). For this notion, the enrollment rate in secondary education should be equivalent to the one in lower-secondary education. Consequently, I employed 20 more resultant samples from 1999 to 2018 at this time. As a result, the total number of sampling data of the enrollment rate in primary education is 133, while secondary education is 140.

Secondly, regarding the logistics performance index: Quality of trade and transport-related infrastructure (1=low to 5=high), as previously described, I did not obtain a sufficient number of samples (n = 49). WDI (2020) covers the data only for 6 years of 2007, 2010, 2012, 2014, 2016, and 2018. Since the sample size is substantially smaller than the needed minimum size of 78 to meet sufficient statistical power, I looked for another item relevant to infrastructure, resulting in the identification of "Transport services (% of commercial service exports)," instead. This item covers all transport services, including ship, air, land, internal waterway, space, and pipeline, which residents of one economy perform for those of another (WDI, 2020). Currently, infrastructure is composed of energy, telecommunication, transports (airport, ports, rail, and road), and water (GIH, 2020). Among the components, transports are the representative factor affecting the lives of people. In this regard, this indicator can demonstrate one country's infrastructure level and involve the carriage of passengers and the movement of goods, which can be interpreted as equivalent to trade and transport-related infrastructure. I, therefore, employed this item as secondary data (n = 153).

On the other hand, as for the RQ2, since I found the missing data relevant to the ICI in Timor-Leste and Lao P.D.R. for 20 years, I employed the alternative data from

WDI (2020) as the secondary data due to the primary parameter in this RQ. Specifically, the additional data of “Goods imports” (BoP, current US$) and “Goods exports” (BoP, current US$) was obtained through the WDI (2020). Consequently, 39 more resultant samples were gained, thus being in total n = 175 as of this variable’s sampling.

Finally, for increasing the sampling size, the same procedure with the RQ1 was executed; As for the enrollment rate in secondary education, I used the secondary data of "Adjusted net enrolment rate, lower secondary, both sexes (%)" from WDI (2020) again, and then adding up eight more resultant samples of Cambodia and the Philippines in 2010 to 2017. Likewise, as for the enrollment rate in primary and secondary education in Vietnam, I found the secondary data from the General Statistics Office of Vietnam (GSOV, 2020). I chose "Pupil's item of Lower-Secondary Education" from the category of "Number of classes, direct teaching teachers and pupils of general education as of 30 September" (GSOV, 2020) for sampling. Through the process, I employed 20 more resultant samples from 1999 to 2018 this time. As a result, the enrollment rate's total number of sampling data in primary education is 133, while the one in secondary education 140.

Consequently, despite the secondary sources, the missing data remain for some variables. Therefore, statistical procedures were used to impute values for missing data (see Little & Rubin, 2014). The treatment for the missing date should further be identified for the purpose of avoiding making the data biased. Principally, the missing data are classified into three types of MCAR (Missing Completely at Random), MAR (Missing at Random), and MNAR (Missing Not at Random), accordingly (Enders, 2010). In this

way, I prescribed the missing data when collecting them randomly, depending on the years to be investigated by the World Bank (2020) and the United Nations (2020), respectively.

Through additional literature review, I considered employing several methods, then chose one of the most appropriate approaches. One way is the so-called "listwise deletion," which is the most common way to handle the missing data by omitting the cases with the missing data and then employing the remaining data for analysis (Kang, 2013). Secondly, "pairwise deletion" is the other way to eliminate insufficient information only if the specific data-point for testing a particular assumption is missing (Kang, 2013). These two methods are representative to omit the missing data and use the remaining data. However, as expected, an insufficient sample size can be the result. Indeed, when handling the missing data with the listwise deletion, the number of the sampling size for RQ1, for instance, was significantly reduced (n = 73).

On the other hand, in the case of the pairwise deletion, given that the data-point, which stands for the IVs (enrollment rate in primary, secondary, and tertiary education) predicting the DVs in this study, is missing, the number of the size for RQ1 becomes slightly larger than the ones by the listwise deletion with n = 98. Finally, one more way of handling the missing data is to employ the multiple imputation method. I used SPSS v. 25 for statistical analysis and imputation of missing values function whereby SPSS automatically replaced the missing data with estimated figures (see StatsGuild, 2020). On behalf of this approach, it was not necessary to omit the lost data.

In choosing one of the most appropriate methods this time, principally, the listwise deletion is regarded as valid only if the amount of omitting data is within 10%. Meanwhile, the multiple imputations do work in over 10% deletion of the missing data from the original dataset (Little & Rubin, 2014). In the case of employing the listwise, the total number of samples when hiring the listwise is only 73, which is lower than the number calculated by G*Power's power analysis with the figure of 78. One more way of handling the missing data is that it would be optional for me to employ the pairwise deletion since this method removes only those minus data points but leaves other case observation data present. Nevertheless, the proportion of the three IVs' study variable's missing data is around 25%, with the figures of approximately 40 to 50 cases, out of the total samples available 180 in maximum. In this respect, those values may not represent the correct answer if they were directly measured.

Though the replaced missing value is returned based on statistical algorithms from the present values (Enders, 2010), the multiple-imputation method would not sound incomplete. Overall, in considering several approaches to handling the insufficient data, I opted to replace missing data by employing the SPSS imputation function resulting in a retained sufficient sample size ($N = 180$) in keeping the analysis as unbiased as possible.

Methodological Adjustments

As previously stated in Chapter 3, before starting the actual data analysis, including assumption testing, adjustments were made to research methods previously outlined in the chapter. Specifically, I was planning to employ the panel as the most appropriate statistical test to answer the two research questions, especially when the data

are collected over time and the same individuals or analysis unit. As previously described, the analysis is appropriate for economic studies to choose either a fixed effect model or a random model (Okui, 2015). The panel data analysis's primary purpose is to observe the figure of *t*-value as the value of prediction with the time-series and cross-sectional data.

On the other hand, the primary purpose of my research questions observing the effect of the enrollment rate of secondary education on the GNI per capita, and the ICI in Southeast Asian economies is to primarily see the figures of R^2 variance as coefficients of determination, which is different from seeking the t-value for the panel data analysis. The linear regression model allows me to use the general values of the DVs and the interval ratios of the IVs to be measured. In this way, it is not appropriate for me to employ the panel data analysis this time. Instead, using the multiple-linear regression model allows me to answer the research questions using the values of R^2 increase as directly as possible. The original formula for the multiple linear regression model is shown as follows:

$$Y = \beta 0 + \beta 1X1 + \ldots + \beta nXn + \varepsilon \quad \cdots\cdots (1)$$

For a brief explanation of each code, "Y" means the predicted value of the dependent variable, "$\beta 0$" stands for the y-intercept (value of y when all other parameters are arranged to 0), "$\beta 1X1$" represents the regression coefficient ($\beta 1$) of the first independent variable ($X1$). It is worth describing how increasing the figure of the independent variable has on the predicted y value (Bevans, 2020). Then, "βnXn" demonstrates the regression coefficient of the last independent variable. Finally, "ε"

represents model error. For example, how much variation there is in our estimate of "*Y*" needs to be considered. In applying the official formula (1) above to this study, I made the formula for both RQs as (2) below.

$$Y_{gni/ici} = \beta 0 + \beta 1X1_{oth.facs} + \beta 2X2_{edu.pri} + \beta 3X3_{edu.sec} + \beta 4X4_{edu.ter} + \varepsilon \quad \cdots\cdots\cdots\cdots \quad (2)$$

For simplicity, I made each code per RQ specific, e.g.) the code "$_{gni/ici}$" represents GNI per capita for RQ1 and the ICI for RQ2 as DVs. Also, the code "$_{oth.facs}$" means the alternative factors, including *Governance, Industrialization, Labor Market, Employment,* and *Infrastructure* fixed as the CVs. Finally, the codes "$_{edu.pri}$," "$_{edu.sec}$," and "$_{edu.ter}$" stand for the enrollment rates in primary, secondary, and tertiary education as the IVs.

From these points of view, it is necessary to appropriately adjust the methodology to appropriately approach the research questions. The basis of the multiple linear regression model using interval-ratio level data allows relevant interpretation of these data. Thus, I switched to the multiple-linear regression model this time.

Characteristics of the Sample

Based on the data collection treatment and consideration of needed methodological changes described above, I explain the characteristics of the sample by gaining insight into the following three perspectives of naming conventions for each variable, descriptive statistics, and the country's mean averages for the DVs and IV. Firstly, this study had, in total, two DVs, three IVs, and 11 CVs both for RQ1 and RQ2. The variable definitions and labeling conventions are summarized both in Table 5 and Table 6. Table 5 represents the DVs and the IVs, while Table 6 shows the study's CVs. These name conventions are used in the output tables and were primarily employed as

identifiers in SPSS. After handling the missing data, the sample contained in a maximum of $N = 180$ cases in all the variables with 20 years from 1999 to 2018 in the designated nine economies in Southeast Asia (Cambodia, East Timor, Indonesia, Laos, Malaysia, Myanmar, Philippines, Thailand, Vietnam). As for the DVs, the DV_1 (GNI per capita) for RQ1 was estimated per each economy by the World Bank (2020). I calculated the DV_2 (ICI) for RQ2 by using the data from the United Nations (2020) and referring to the method suggested by Tran (2016). Then, regarding the IVs, the enrollment rates in primary, secondary, and tertiary education were employed from the WDI.

At the same time, I relied on one secondary data from the national statistical data gained through the Vietnamese government website to increase the samples. For DVs and IVs, natural log transformation data was employed to compare the difference in the summary of study results with and without the transformation data. As can be seen in Table 5, I also showed the naming conventions of the five variables of GNI per capita, ICI, and the enrollment rate in primary education, secondary education, and tertiary education.

Table 5

Labelling Conventions for Dependent and Independent Variables

Label code	Name	Definition
DV1_GNI	GNI per capita (US$)	Gross National Income per capita measured by Atlas Method in US$ (WDI, 2020).
DV2_ICI	International Competitiveness Index (ICI)	It is calculated from the formula i=(X-M)/(X+M) by using data on the international trade in goods and services (Tran, 2016).
IV1_Ed_Pri	Net enrollment rate in primary education	The rate of students within a designated age range enrolled in primary education in a country, collected through the data source of participation in education (WDI, 2020).
IV2_Ed_Sec	Net enrollment rate in secondary education	The rate of students within a designated age range enrolled in secondary education in a country, collected through the data source of participation in education (WDI, 2020).
IV3_Ed_Ter	Gross enrollment rate in tertiary education	The rate of students enrolled in higher education regardless of age, collected through the data source of participation in the education (WDI, 2020).
DV1_GNI_LG1	Natural log of GNI per capita (US$)	Natural log of Gross National Income per capita measured by Atlas Method in US$ (WDI, 2020).
DV2_ICI_LG1	Natural log of International Competitiveness Index (ICI)	Natural log of the ICI calculated from the formula i=(X-M)/(X+M) by using data on the international trade in goods and services (Tran, 2016).
IV1_Ed_Pri_LG1	Natural log of Net enrollment rate in primary education	Natural log of the rate of students within a designated age range enrolled in primary education in a country, collected through the data source of participation in education (WDI, 2020).
IV2_Ed_Sec_LG1	Natural log of Net enrollment rate in secondary education	Natural log of the rate of students within a designated age range enrolled in secondary education in a country, collected through the data source of participation in education (WDI, 2020).
IV3_Ed_Ter_LG1	Natural log of Gross enrollment rate in tertiary education	Natural log of the rate of students enrolled in higher education regardless of age, collected through the data source of participation in the education (WDI, 2020).

Note. Study labelling codes and conventions.

Table 6

Labelling Conventions for Controlled Variables as Alternative Factors

Label code	Name	Definition
CV1_GV_1	Governance: Voice and Accountability (V/A)	V/A measures the extent to which citizens in a country can join the government selection, freedom of expression and a free media (WGI, 2020).
CV1_GV_2	Governance: Political Stability and Absence of Violence/Terrorism (P/A)	P/A is defined as the measurement of the possibility of political instability and politically motivated violence (WGI, 2020).
CV1_GV_3	Governance: Government Effectiveness (G/E)	G/E measures the quality of public and civil services, and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the commitment to the policies (WGI, 2020).
CV1_GV_4	Governance: Regulatory Quality (R/Q)	R/Q observes the ability of the government to formulate and implement sound policies and regulations that permit and promote further development in private sector (WGI, 2020).
CV1_GV_5	Governance: Rule of Law (R/L)	R/L sees the extent to which agents have confidence in and abide by the rules of society, and the quality of contract enforcement, property rights, the police, and the courts (WGI, 2020).
CV1_GV_6	Governance: Control of Corruption (C/C)	C/C percepts the extent to which public power is used for private gain, including both petty and grand forms of corruption (WGI, 2020).
CV2_Indust_1	Value added in manufacturing industry per GDP	Value added in Manufacturing through the data source on structure of output per GDP (WDI, 2020).
CV3_Labor	Labor force participation rate for ages 15+ in total	Labor force participation rates and employment rates in the manufacturing industry for men and women are obtained through the data source on Labor force structure (WDI, 2020).
CV4_Infra.	Transport services percentage of commercial service exports	The rate of all transport services, including ship, air, land, internal waterway, space, and pipeline performed by residents of one economy for those of another is calculated (WDI, 2020).
CV5_Indust_2	Labor force participation rate for ages 15+ in total	Labor force participation rates in the manufacturing industry for men and women are obtained through the data source on Labor force structure (WDI, 2020).
CV6_Indust_3	Employment rate in manufacturing industry per GDP	Employment rate for Males and Females for age 15 and older is employed (WDI, 2020).

Note. Study labelling codes and conventions.

Table 6 shows the CVs for both research questions. CV_1 stands for Governance with six components, including voice and accountability, political stability and absence of violence, government effectiveness, regulatory quality, the rule of law, and control of corruption gained through the Worldwide Governance Indicators (WGI, 2020). For the other factors of *Industrialization, Labor, Employment, and Infrastructure* (CV_2_Indust_1 to CV_6_Indust_3), I employed the data from the WDI as described in Chapter 3.

Furthermore, as noted in the same chapter, the population was defined as those involved in the labor force and educational institutions within the nine economies in Southeast Asia. The data were identified regarding these DVs and IVs through the survey by international organizations. Thus, the data are assumingly regarded as the representative items of the population. It would, then, be more suitable for me to employ the imputation this time since the missing data approach allows me to use the maximum (n = 180) by compensating for the missing values identified through the data-collection with the automatic computation of the SPSS.

It is important to note that Table 6 does not describe the natural log transformation data since the condition of analyzing the R^2 increase per research question with different main study variables (DVs and IVs) under the same CVs needed to be arranged.

Table 7

Descriptive Statistics for DV, IV, and CVs: SPSS Imputed Data

	Min.	Max.	Mean		SD	Skewness		Kurtosis	
			ST	*SE*		*ST*	*SE*	*ST*	*SE*
DV1_GNI	170	11,140	2,447	178.3	2,392	1.86	0.18	3.46	0.36
DV2_ICI	-0.96	1.00	-0.07	0.02	0.29	-1.32	0.18	3.43	0.36
IV1_Ed_Pri	74.90	107.43	93.79	0.44	5.96	-0.54	0.18	1.06	0.36
IV2_Ed_Sec	14.90	129.18	62.28	1.67	22.36	0.23	0.18	-0.40	0.36
IV3_Ed_Ter	-14.49	52.30	22.20	1.02	13.72	0.20	0.18	-0.53	0.36
CV1_GV_1	-2.68	0.47	-0.76	0.06	0.76	-0.30	0.18	-1.12	0.36
CV1_GV_2	-2.34	0.78	-0.54	0.05	0.71	-0.27	0.18	-0.84	0.36
CV1_GV_3	-1.62	1.27	-0.34	0.05	0.70	0.36	0.18	-0.44	0.36
CV1_GV_4	-2.34	0.84	-0.49	0.05	0.71	-0.52	0.18	0.12	0.36
CV1_GV_5	-1.74	0.62	-0.61	0.04	0.57	0.39	0.18	-0.49	0.36
CV1_GV_6	-1.67	0.41	-0.67	0.04	0.47	0.17	0.18	-0.18	0.36
CV2_Indust_1	0.70	32.00	18.14	0.63	8.52	-0.46	0.18	-0.68	0.36
CV3_Labor	59.60	85.90	70.59	0.52	7.04	0.27	0.18	-1.21	0.36
CV4_Infra	-4.04	45.70	14.84	0.65	8.72	0.98	0.18	1.93	0.36
CV5_Indust_2	59.60	85.90	70.59	0.52	7.04	0.27	0.18	-1.21	0.36
CV6_Indust_3	4.30	33.10	17.27	0.50	6.77	0.19	0.18	-0.53	0.36
DV1_GNI_LG1	1.82	2.23	4.05	3.20	0.03	0.42	0.17	-.097	0.18
DV2_ICI_LG1	1.70	-1.40	0.30	-0.08	0.02	0.28	0.08	-3.04	0.18
IV1_Ed_Pri_LG1	0.05	-0.56	-0.51	-.53	0.00	0.01	0.00	-0.98	0.18
IV2_Ed_Sec_LG1	0.94	1.17	2.11	1.76	0.01	0.17	0.03	-0.76	0.18
IV3_Ed_Ter_LG1	2.12	-0.29	1.83	1.53	0.01	0.22	0.05	-3.48	0.18

Note. $N = 180$ in all the variables

Note. *ST* = Statistics, *SD*= Standard Deviation, and *SE*= Standard Error

Note. Imputation was conducted by the SPSS for filling up the missing data from the original dataset.

With the adjustment of the data-collection through secondary data and the imputed method, the descriptive statistics are outlined in Table 7. These statistics display the representative description, including maximum and minimum, range, mean, standard

deviations (*SD*), and skewness and kurtosis values. Primarily, in paying attention to the mean figure, which is often regarded as one of the most significant factors determining the statistical significance by observing the differences in mean values (Masaki, 2017). In focusing on the mean figure, the GNI per capita (DV1_GNI) has the value of US$2,447, while the ICI has -0.07. The mean values of the enrollment rate in primary, secondary, and tertiary education were 93.79%, 62.28%, and 22.20% accordingly. Also, I arranged 11 CVs aside from the DVs and IVs. Table 7 recorded the negative mean figures in the item of Governance (CV1_GV_1 to CV_GV_6), ranging from -0.76 to -0.34. Besides, the values for skewness and kurtosis had various tendencies. The former statistically ranged the figures from -1.32 to 1.86, and the latter did 3.46 as the largest in DV2_IVI and the lowest value -1.21 in CV3_Labor.

Finally, as described in Chapter 3, the unit of analysis employed was the "national economy" since the World Bank (2020) and the United Nations (2020) estimated these data by employing the samples of all the citizens in an entire nation at the macro-level. Table 8 outlines the "Mean Average" for the two DVs and the three IVs for RQ1 and RQ2 across the nine economies in Southeast Asia with the imputed data. Overall, the mean figures reflect the development level in each country. Notably, the values for the GNI per capita (DV1_GNI) showed the appropriate income stages of higher-middle, lower-middle, and low-income groups, while the ICI (DV2_ICI) showed the broader ranges.

For instance, Malaysia had the highest GNI per capita of 7,338 US$ on average, while Cambodia did the lowest values of 708 US$. The mean figures of the enrollment

rate in primary, secondary, and tertiary (IV1_Ed_Pri., IV1_Ed_Sec., and IV1_Ed_Ter.) are also the case. Interestingly, the enrollment rate in primary education (IV1_Ed_Pri.) did not show a stark difference among the samples, while secondary education and tertiary education seemingly differ per income level.

Table 8

Means for DV and IVs per Economy

Economy	*N*	DV1_GNI	DV2_ICI	IV1_Ed_Pri	IV2_Ed_Sec	IV3_Ed_Ter
Cambodia	20	708	-0.019	92.4	35.2	9.9
Indonesia	20	2,181	0.137	93.4	67.3	23.6
Lao PDR	20	1,044	-0.174	86.9	40.9	11.8
Malaysia	20	7,338	0.085	98.1	75.0	34.3
Myanmar	20	1,104	0.058	91.5	47.5	9.3
Philippines	20	2,208	-0.092	91.5	63.1	30.9
Thailand	20	4,033	0.017	97.6	79.0	44.8
Timor-Leste	20	2,248	-0.705	93.7	52.6	16.2
Vietnam	20	1,160	0.044	99.2	100.0	19.0

Note. *uN* = 180 in total in all the variables.
Note. SPSS imputed missing data from the original dataset.

Study Results

The following section provides the information on the results of the assumption testing for the multiple linear regression model and the study's outcome per each research question. It is composed of firstly assessing if the data meet the assumptions for the panel-data analysis. It will find any changes in the data required to complete the assumptions. Then, for each research question, the procedures and the results will finally be shown.

Assumption Testing

There were seven tests executed to determine the validity of the assumption tests for fitting regressions with time-series and cross-sectional data. Namely, seven items of (1) normality, (2) linearity, (3) homoscedasticity, (4) independence error, (5) zero conditional mean, (6) no perfect collinearity, and (7) no serial correlation were tested. To perform each test, I ran a series of statistics and output graphs and the results are as follows:

As for (1) normality, the test was conducted to determine whether the DV and the IVs, including CVs, were normally distorted. For the data to be skewed and kurtotic, the figure is principally ranged +/- 2.00 in the case of the normal curve (Field, 2018). The descriptive statistics in Table 7 summarized the tests of skewness and kurtosis per each variable as well. In focusing on the DVs, the GNI per capita (DV1_GNI) was positively skewed with positive kurtosis, while the ICI (DV2_ICI) was negatively skewed with positive kurtosis. Also, as for the IVs, the enrollment rate in primary education (IV1_Ed_Pri) had the negative skewness but positive kurtosis, while the two variables of the enrollment rate in secondary (IV1_Ed_Sec) and tertiary education (IV1_Ed_Ter) were positively skewed with negative kurtosis.

The histograms confirm that data are centrally distributed with fewer data on the tails, especially the lower tail. The Kolmogorov-Smirnov and Shapiro-Wilk were principally both significant ($p < .05$). Both assumption tests are meant to smooth in these data assumptions' violations. For simplicity, the data imply that the distributions are not

normally distributed with assumption violations that do not affect the overall regression model output for RQ1 and 2, respectively.

Furthermore, I addressed normality assumptions because the data, especially the DVs and the IVs, were transformed. Usually, the tests on the initial data indicated there are problems in normality and DVs and IVs may require transformation to their natural log for use (see Field, 2018). In my case, the primary purpose of conducting the log transformations is to look at the models with and without transformed data to observe how the log transformations did or did not influence the regression model outputs for reference. Therefore, the descriptive statistics and histograms were rerun and summarized in Table 7. As for the GNI per capita (DV1_GNI_Log), the natural log made it negatively skewed with a kurtosis that became negative. As of the ICI (DV2_ICI_Log), there was a negative skewness, while a kurtosis remained positive but had a dramatically higher figure of 8.739.

The other three IVs of the enrollment rate in primary, secondary, and tertiary education (IV1_Ed_Pri, IV1_Ed_Sec, and IV1_Ed_Ter) were all negatively skewed with positive kurtoses. Then, the Kolmogorov-Smirnov and Shapiro-Wilk of the GNI per capita (DV1_GNI_Log) turned out to be non-significant; the variable only became normally distributed. Nevertheless, the Kolmogorov-Smirnov and Shapiro-Wilk of the other four variables of the ICI (DV2_ICI_Log) and all the IVs were still both significant ($p < .05$). Therefore, the transformations did not make the distribution normal.

Secondly, regarding (2) linearity and (3) homoscedasticity, an Ordinary Least Squares (OLS) regression was conducted on the normal data. This process created the

residual information and scatterplot to test the assumption of linearity and homoscedasticity. Figures 5 and 6 demonstrate the scatterplots of the standardized residuals and predicted value from the regression model with the GNI per capita and the ICI as the DVs and the three IVs of the primary enrollment rate secondary, and tertiary education (IV1_Ed_Pri, IV2_Ed_Sec, and IV3_Ed_Ter). There were no scatterplot funnel-shape formations, indicating that a violation of homoscedasticity is not confirmed. Figure 6 did not seem to have the funnel-shaped scatterplot as well. These two graphs do not seem to show a curve and are likely to meet the linearity.

On the other hand, the Levene statistic test was also significant ($p < .05$) from the category of "Based on Mean" especially in GNI per capita (DV1_GNI), ICI (DV2_ICI), and the enrollment rate in secondary education (IV2_Ed_Sec). The figures indicate that the differences gained through the sample variances are unlikely to have occurred based on random sampling from the dataset with equal variances. In this regard, it would be possible to conclude a difference between the variances in the data.

Thirdly, the examination of (4) independent errors assumed that the underlying data came from the sampling methods. Also, the test of (5) zero conditional mean seemed to hold as an assumption based on the residuals' plot against the predictors. Then, for testing, a correlation analysis was executed if there is (6) no perfect collinearity.

Firstly, between the two independent variables of the enrollment rate in primary education (IV1_Ed_Pri) and secondary education (IV2_Ed_Sec), the correlation had the figure of $r = .683$, $p < .001$. Also, between two independent variables of the enrollment rate in primary education (IV1_Ed_Pri) and tertiary education (IV3_Ed_Ter), the

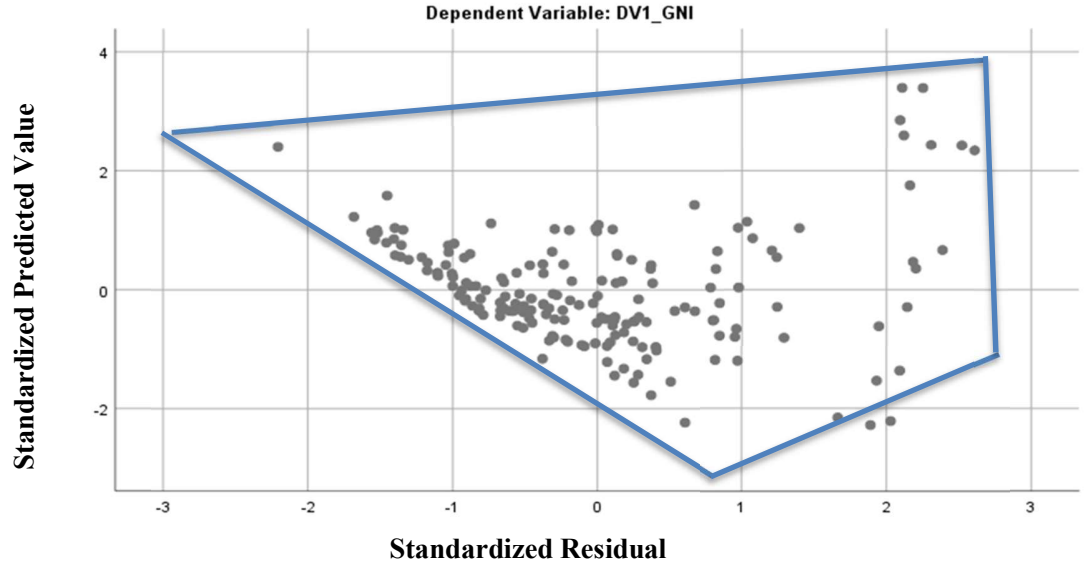
correlation was $r = .419$, $p < .001$. Finally, between two IVs of the enrollment rate in secondary education (IV2_Ed_Sec) and tertiary education (IV3_Ed_Ter), the correlation was $r = .497$, $p < .001$. In the presence of these significant p values, a study weakness resulting from multicollinearity must be considered and further assessed.

Secondly, between the DV of the GNI per capita (DV1_GNI) and the enrollment rate in primary education (IV1_Ed_Pri), the figure of the correlation was $r = .348$, $p < .001$, with the enrollment rate in secondary education (IV2_Ed_Sec) $r = .298$, $p < .001$, and with the tertiary education (IV3_Ed_Ter), the correlation was $r = .713$, $p < .001$. In the presence of these significant p values, a study weakness resulting from multicollinearity must be considered and further assessed.

Thirdly, between the DV of the ICI (DV2_ICI) and the enrollment rate in primary education (IV1_Ed_Pri), the figure of the correlation was $r = .159$, $p = .001$, with the enrollment rate in secondary education (IV2_Ed_Sec) $r = .235$, $p = .001$, and with the tertiary education (IV3_Ed_Ter), the correlation was $r = .024$, $p = .376$. These figures, illustrate significant, yet weak correlations between the DV and the IVs of primary and secondary education, with no significant correlations found between tertiary education and ICI illustrating this IV as a prime independent regression model predictor**.**

Figure 5

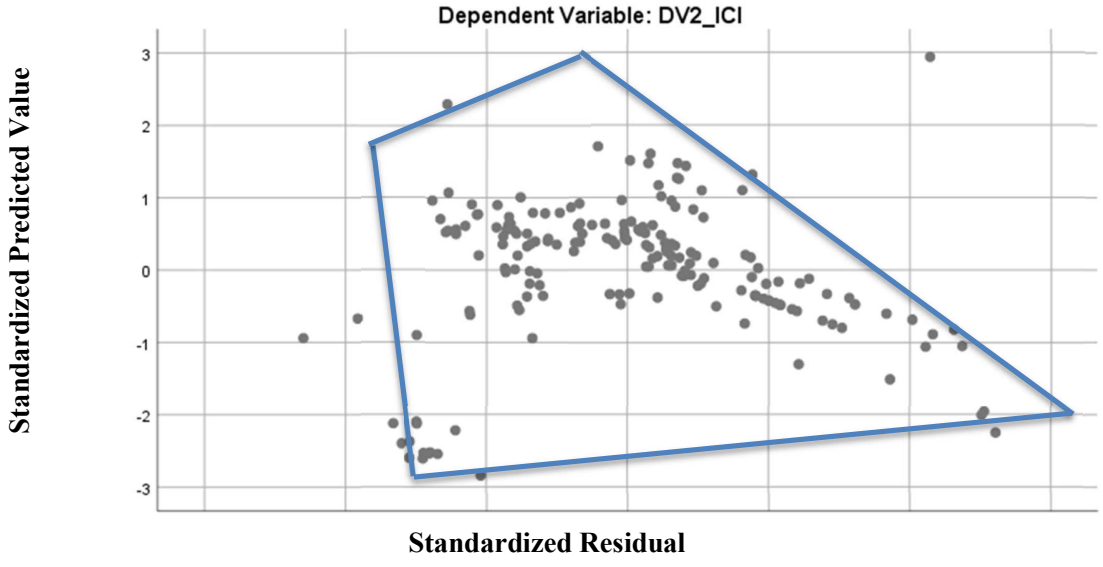
The Scatterplot of Residuals for RQ1



Note. Scatterplot of residuals for testing linearity and homoscedasticity. Adapted from the SPSS output.

Figure 6

The Scatterplot of Residuals for RQ2



Note. Scatterplot of residuals for testing linearity and homoscedasticity. Adapted from the SPSS output.

Finally, as for (7) no serial correlation, the Durbin Watson statistic in Model 4 in Table 9 is .498, while in Table 10 with the figure of .510, respectively. The Durbin Watson criteria with the sample size of 100 or more with the model of less than 1.00 could indicate multicollinearity in one or more of the IVs (Field, 2018). In this way, it is necessary to report this result as a weakness point to be reported in advance.

In total, since the natural log transformation did not make the IVs of the enrollment rate in primary, secondary, and tertiary education (IV1_Ed_Pri, IV1_Ed_Sec, and IV1_Ed_Ter) and the DV of the ICI (DV2_ICI) further normal and made them similarly correlated, I decided to use the DVs and the IVs from the original dataset as my primary data for statistical analyses. Simultaneously, the natural log transformation data were also evaluated for reference to examine for differences in the results between using the data sets with and without transformation. Using the transformed dataset, the Durbin Watson statistics were not dramatically improved, and the data still had an indication of multicollinearity in one or more of the IVs. For this reason, I could not assume the data had independent errors both in the value and the natural log in this variable. On the condition that there is the inherit serial correlation, lack of homogeneity, and lack of independence errors, it is still feasible and reasonable to employ the multiple linear regression model with the SPSS, instead of the standard OLS or the panel-data analysis this time.

Research Question 1

RQ1: Will enrollment rates in secondary education predict a statistically significant percent change in the R^2 variance in Southeast Asian MIT composite scores more than

primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values?

H_0: There is no statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

H_1: There is a statistically significant contribution of the enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian MIT composite scores more than primary and tertiary education when controlling for governance, industrialization, labor market, and infrastructure composite values.

Procedures

For answering RQ1, a multiple linear regression model was employed. The multiple-linear regression model allowed me to estimate the relationship between two or more independent variables and one dependent variable. With the several matched conditions of the assumption testing, including homoscedasticity, normality, independence of errors, and linearity, the multiple linear regression analysis was executed using SPSS. The dependent variable is GNI per capita (DV1_GNI), while IVs are the enrollment rates in primary education (IV1_Ed_Pri), secondary education (IV2_Ed_Sec), and tertiary education (IV3_Ed_Ter). Also, I used eight CVs, including *Governance* (CV1_GV_1 to CV_GV_6), *Manufacturing rate* (CV2_Indust_1), *Labor force participation rate* (CV3_Labor), and *Transport service for infrastructure* (CV4_Infra).

In handling the dataset with the SPSS, CVs were used in model 1 to allow the IVs to be computed freely. With the procedure, all CVs were entered into the "Independents" box first. Once those CVs were entered, I advanced through the regression model formation by putting enrollment rate in primary education (IV1_Ed_Pri), enrollment rate in secondary education (IV1_Ed_Sec), and enrollment rate in tertiary education (IV1_Ed_Ter) as IVs. As previously described, I handled missing data by using the "exclude case pairwise" command.

Results

Table 9 shows the results of the most appropriate models executed. The summary of the output was generated from the SPSS with the imputed data. In paying close attention to the items of “R Square (R^2),” “Adjusted R Square (Adjusted R^2),” and “R Square Change (R^2 Change),” accordingly, Model 1 had the figure .809 in R, while R^2 .655 with adjusted R^2 .636, respectively. With these outcomes, the R^2 change had the value of .655 with Significance in F change .000 eventually. Model 2 is the case of putting the enrollment rate in primary education (IV1_Ed_Pri) with the figure of the R^2 was .655 with adjustment .635, while R^2 change had the value of .000, which is a deduction from the R^2 in Model 1. Then, Model 3 is the case of entering the variable of the enrollment rate in Secondary Education (IV2_Ed_Sec) as well as the one in primary education (IV1_Ed_Pri) with the figure of the R^2 was .673 with adjustment .651. Simultaneously, R^2 change had the value of .018, which is deducted from the R^2 in Model 2. Finally, Model 4 is the case of putting all the IVs, including the enrollment rate in Tertiary Education (IV1_Ed_Ter), with the figure of the R^2 was .780 with

adjustment .764. Then, the R^2 change had the value of .107 deducted from the R^2 in Model 3.

Further, in paying attention to the item of "Sig. F Change," the figures are .657 in Model 2, not significant ($p > .05$). Moving to Model 3 and Model 4, the figures of .003 and .000 illustrated significance. In a word, I can see the significance in the transition of Model 3 with the missing data imputed based on reported data means. To further investigate these significant outputs, I evaluated the regression model ANOVA outputs for RQ1. All ANOVA Models 1 to 4 were significant ($p < .000$) illustrating a significant fit of data (see Field, 2018). With the Durbin-Watson figure computed less than 1.00, I remain cautious in assuming my IVs are acting independently in the overall models.

Examining Model 4 as the final model, the "Adjusted R^2" was 0.764; approximately 76.4% of all the IVs (primary, secondary, and tertiary education) account for the primary predictor variables of GNI per capita in Southeast Asia. In a word, an individual's income is strongly influenced by the accumulated effects of all three educational levels. A remaining 23.6% of the predictive influencers remain unmeasured or otherwise unidentified.

Based on these perspectives for testing the RQ1 hypothesis, however, the alternative hypothesis (H_1) states that there is statistically significant contribution of enrollment rate in secondary education to the percent change of R^2 variance in Southeast Asian Middle-income Trap composite scores more than primary and tertiary education. Despite the confirmation of significance of "Sig F Change" and the higher figure of "Adjusted R^2" in Model 4, because I did not see greater significance of the enrollment

rate in secondary education than that of primary and tertiary education at least in Table 9, it was difficult to be in favor of the H_1 at least from the statistical result. Consequently, for RQ1, I retained the null hypothesis (H_0).

Table 9

Multiple-Linear Regression Model Outputs for RQ1

Model summary [e]									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Model Summary				
					R Square change	F Change	df1	df2	Sig. F Change
1	.809[a]	0.655	0.636	1442.024	0.655	35.816	9	170	0.000
2	.809[b]	0.655	0.635	1445.438	0.000	0.198	1	169	0.657
3	.820[c]	0.673	0.651	1411.889	0.018	9.127	1	168	0.003
4	.883[d]	0.780	**0.764**	1161.754	0.107	81.131	1	167	**0.000**

a. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5

b. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5, IV1_Ed_Pri_LG1

c. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5, IV1_Ed_Pri_LG1, IV2_Ed_Sec_LG1

d. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5, IV1_Ed_Pri_LG1, IV2_Ed_Sec_LG1, IV3_Ed_Ter_LG1

e. Dependent Variable: DV1_GNI

Durbin-Watson value = 0.498.

Note. Adapted from SPSS output

As described earlier, I employed the natural log transformation to compare the results with and without the transformed data. Table 10 below represents that alternative statistical output. The slight difference identified from the results in Table 9 is that the R2 increase shown in Model 2 below is higher than that in Model 3, with .004. Nevertheless,

the Model 2 value of "Sig. F Change" was .133, illustrating similar non-significance as found in the untransformed data set. Model 4 R^2 increase of .060 with "Sig. F Change" .000, remained essentially unchanged between the natural and log transformed data.

Table 10

Multiple-Linear Regression Model Outputs for RQ1 - Log Transformed

Model summary [e]									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Model Summary				
					R Square change	F Change	df1	df2	Sig. F Change
1	.838[a]	.702	.687	.23541	.702	44.601	9	170	.000
2	.840[b]	.706	.689	.23453	.004	2.274	1	169	.133
3	.841[c]	.707	.687	.23514	.000	.124	1	168	.725
4	.876[d]	.767	**.750**	.21027	.060	43.086	1	167	**.000**

a. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5
b. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5, IV1_Ed_Pri_LG1
c. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5, IV1_Ed_Pri_LG1, IV2_Ed_Sec_LG1
d. Predictors: (Constant), CV4_Infra, CV1_GV_2, CV3_Labor, CV1_GV_3, CV1_GV_1, CV2_Indust_1, CV1_GV_6, CV1_GV_4, CV1_GV_5, IV1_Ed_Pri_LG1, IV2_Ed_Sec_LG1, IV3_Ed_Ter_LG1
e. Dependent Variable: DV1_GNI_LG1
Durbin-Watson value = 0.856.
Note. Adapted from SPSS output.

Likewise, in focusing on the "Adjusted R^2" in Model 4, it was 0.764. The figure means that approximately 75.0% of all the IVs (primary, secondary, and tertiary) predict the GNI per capita in Southeast Asia. In other words, an individual's income is strongly influenced by completing all the three educational stages. However, as explained earlier,

despite the confirmation of significance of "Sig F Change" and the higher figure of "Adjusted R^2" in Model 4, the significance of the enrollment rate in secondary education over that of primary and tertiary education (see Table 10) was not sufficiently demonstrated.

All in all, examining these data types in the regression models did alter my interpretive results where my null hypothesis was retained that secondary education would be the more superior regression driver over primary and tertiary education. Therefore, the null hypothesis for RQ1 was retained.

Research Question 2

RQ2: Will the enrollment rate in secondary education predict a statistically significant percent change in the R^2 variance in the Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate?

H_0: There is no statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

H_1: There is a statistically significant contribution of the net enrollment rate in secondary education to the percent change of the R^2 variance in Southeast Asian ICI composite scores more than primary and tertiary education when controlling for labor force participation and the manufacturing employment rate.

Procedures

For answering RQ2, a multiple linear regression was also employed. A similar procedure to RQ1 was executed. The dependent variable is ICI (DV2_ICI), while IVs are the enrollment rates in primary education (IV1_Ed_Pri), secondary education (IV2_Ed_Sec), and tertiary education (IV3_Ed_Ter). I also used two CVs of the "Labor force participation rate" (CV5_Indust_2) and the "Employment rate in the manufacturing industry" (CV6_Indust_3).

In handling the dataset with the SPSS technically, these CVs were placed together in model 1, and then the other three IVs were then be entered one at a time as I progress through the models. These CVs were entered into the "Independents" box first. Once I entered those CVs, I advanced through the regression model formation by putting enrollment rate in in primary education (IV1_Ed_Pri), enrollment rate in secondary education (IV1_Ed_Sec), and enrollment rate in tertiary education (IV1_Ed_Ter) as IVs. As described, I handled missing data by using the "exclude case pairwise" command.

Results

Table 11 shows the results of the most appropriate models executed. The summary of the output was generated from the SPSS with the pairwise deletion. In paying close attention to the items of "R Square (R^2)," "Adjusted R Square (Adjusted R^2)," and "R Square Change (R^2 Change)," accordingly. Model 1 had the figure .521 in R, while R^2 .272 with adjusted R^2 .264, respectively. With these outcomes, the R^2 change had the value of .272 with Significance in F change .000 eventually. Model 2 is the case of putting the enrollment rate in primary education (IV1_Ed_Pri) with the figure of the R^2

was .273 with adjustment R^2 .274. Then, the R^2 change had the value of .015, which is deducted from the R^2 in Model 1. Then, Model 3 is the case of entering the variable of the enrollment rate in Secondary Education (IV2_Ed_Sec) as well as the one in primary education (IV1_Ed_Pri) with the figure of the R^2 was .289 with adjustment .273, while R^2 change had the value of .003, which is a deduction from the R^2 in Model 2. Finally, Model 4 is the case of putting all the enrollment rates, including in Tertiary Education (IV1_Ed_Ter) with the figure of the R^2 was .350 with adjustment .332, while R^2 change had the value of .061 deducted from the R^2 in Model 3.

Further, in paying attention to the item of "Sig. F change," the figures are .059 in Model 2 and .422 in Model 3, were not found to be significant ($p > .05$). Moving to Model 4, the F Change figure of .000 illustrated significance. In a word, I can see the significance only in Model 4 with the missing data imputed. To further investigate these significant outputs, I evaluated the regression model ANOVA outputs for RQ2. All ANOVA Models 1 to 4 were significant ($p < .000$) illustrating a significant fit of data (see Field, 2018). With the Durbin-Watson figure computed less than 1.00, I remain cautious in assuming my IVs are acting independently in the overall models.

Examining Model 4 as the final model, the "Adjusted R^2" was 0.332; approximately 33.2% of all the IVs (primary, secondary, and tertiary education) account for the primary predictor variables of the ICI for industrialization in Southeast Asia. In a word, the international competitiveness in manufacturing industries is influenced by the accumulated effects of all three educational levels with a remaining 66.8% of the predictive influencers unmeasured or otherwise unidentified.

Based on these perspectives for testing the RQ2 hypothesis, however, the alternative hypothesis (H_1) states that there is statistically significant contribution of enrollment rate in secondary education to the percent change of R^2 variance in Southeast Asian International Competitive Index composite scores more than primary and tertiary education when controlling for labor force participation and manufacturing employment rate. With the significance of "Sig F change" and the lower figure of "Adjusted R^2" in Model 4, since I did not find greater significance of the enrollment rate in secondary education than that of primary and tertiary education at least in Table 11, it was difficult to be in favor of the H_1 at least from the statistical result. Consequently, I retained the null hypothesis (H_0).

Table 11

Multiple-Linear Regression Model Outputs for RQ2

Model summary [e]									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square change	F Change	df1	df2	Sig. F Change
1	.521[a]	0.272	0.264	0.25075	0.272	33.034	2	177	0.000
2	.535[b]	0.286	0.274	0.24892	0.015	3.604	1	176	0.059
3	.538[c]	0.289	0.273	0.24917	0.003	0.648	1	175	0.422
4	.592[d]	0.350	**0.332**	0.23885	0.061	16.456	1	174	**0.000**

a. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2
b. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2, IV1_Ed_Pri
c. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2, IV1_Ed_Pri, IV2_Ed_Sec
d. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2, IV1_Ed_Pri, IV2_Ed_Sec, IV3_Ed_Ter
e. Dependent Variable: DV2_ICI
Durbin-Watson value = 0.510

As explained earlier, I employed the natural log transformation to compare the results with and without the transformed data. Table 12 below represents that alternative statistical output. The slight difference identified from the results in Table 11 is that the R^2 increase shown in Model 2 below is higher than that in Model 3, with .010. Nevertheless, the Model 2 value of "Sig. F Change" was .107, as well as .702 in the Model 3, illustrating similar non-significance as found in the untransformed data set. Model 4 R^2 increase of .029 with "Sig. F Change" .008, remained essentially unchanged between the natural and log transformed data.

Table 12

Multiple-Linear Regression Model Outputs for RQ2 - Log Transformed

Model summary [e]									
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Model Summary				
					R Square change	F Change	df1	df2	Sig. F Change
1	.501[a]	.251	.243	.24794	.251	29.733	2	177	.000
2	.512[b]	.262	.250	.24681	.011	2.619	1	176	.107
3	.513[c]	.263	.246	.24741	.001	.147	1	175	.702
4	.540[d]	.292	**.272**	.24320	.029	7.122	1	174	**.008**

a. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2
b. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2, IV1_Ed_Pri_LG1
c. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2, IV1_Ed_Pri_LG1, IV2_Ed_Sec_LG1
d. Predictors: (Constant), CV6_Indust_3, CV5_Indust_2, IV1_Ed_Pri_LG1, IV2_Ed_Sec_LG1, IV3_Ed_Ter_LG1
e. Dependent Variable: DV2_ICI_LG1
Durbin-Watson value = 0.318.

Likewise, in focusing on the "Adjusted R^2" in Model 4, it was 0.272. The figure means that approximately 27.2% of all the IVs (primary, secondary, and tertiary) predict

the ICI for industrialization in Southeast Asia with a remaining 72.8% of the predictive influencers unmeasured or otherwise unidentified.

In other words, the international competitiveness in manufacturing industries is not significantly impacted by completing all the three educational stages. However, as explained earlier, despite the confirmation of significance of "Sig F Change" and the higher figure of "Adjusted R^2" in Model 4, the significance of the enrollment rate in secondary education over that of primary and tertiary education (see Table 12) was not fully demonstrated.

All in all, examining these data types in the regression models did alter my interpretive results where my null hypothesis was retained that secondary education would be the more superior regression driver over primary and tertiary education. Therefore, the null hypothesis for RQ2 was also retained.

Summary and Transition

For answering the first research question on the effect of the enrollment rate in secondary education and primary and tertiary education on the GNI and ICI in Southeast Asian economies, multiple linear regression models were employed. In the beginning, I observed the assumption testing from the seven types of normality, linearity, homoscedasticity, independence error, zero conditional mean, no perfect collinearity, and no serial correlation. I confirmed several violations, notably in normality, while linearity, homoscedasticity, independence error, and zero conditional means seemed significant. Also, while there seems to be some collinearity and correlations, I did not observe the perfect conditions in these two tests. From these points of view, overall, there is no

problem identified in conducting the assumption testing this time, it might be challenging to generalize the findings beyond the samples this time, though.

Before running the actual analysis, I explained the methodological change for answering RQ1 and RQ2. Despite the description of my plan to use the panel-data analysis for time-series and cross-sectional data, I changed to the multiple-linear regression model this time. The primary purpose of the research questions is to see the R^2 increase for the dependent variables of GNI per capita and ICI, instead of *t*-value for finding the prediction through the panel-data analysis. In this way, I justified using the multiple linear regression model with the SPSS.

In analyzing RQ1, the model's summary was shown in highlighting the R^2, the adjusted R^2, and the R^2 increase. Despite identifying the significance in IV for the enrollment rate in secondary education, I observed that the R^2 increase in Model 4 was higher than the ones in Model 2 and 3. Also, the item of "Sig. F Change" in Model 4 was significant. Examining the Model 4 as the final model, the “Adjusted R^2” was 0.764; approximately 76.4% of all the IVs (primary, secondary, and tertiary education) account for the primary predictor variables of GNI per capita in Southeast Asia. In other words, an individual’s income is strongly influenced the accumulated effects of all three educational levels. Despite the confirmation of significance of “Sig F Change” and the higher figure of “Adjusted R^2” in Model 4, because I did not identify greater significance of the enrollment rate in secondary education than that of primary and tertiary education at least in Table 9, it was difficult to be in favor of the H_1 at least from the statistical result. Consequently, for RQ1, I retained the null hypothesis (H_0).

Also, for RQ2, a similar result to the RQ1, I observed that the R^2 increase in Model 4 was higher than that in Model 2 and 3, and the item of "Sig. F Change" in Model 4 proved to be significant. Examining Model 4 as the final model, the "Adjusted R^2" was 0.332; approximately 33.2% of all the IVs (primary, secondary, and tertiary education) account for the primary predictor variables of the ICI for industrialization in Southeast Asia. In a word, the international competitiveness in manufacturing industries is not sufficiently influenced the accumulated effects of all three educational levels. With the significance of "Sig F Change" and the lower figure of "Adjusted R^2" in Model 4, since I did not see greater significance of the enrollment rate in secondary education than that of primary and tertiary education at least in Table 11, it was difficult to be in favor of the H_1 at least from the statistical result. Consequently, for RQ2, I retained the null hypothesis (H_0).

Aside from these results summaries, if allowed to include several more views that can potentially be additional possible factors, I will make a broader interpretation of the respective research questions. Potentially, observing only one aspect of R^2 increase cannot tell everything relevant to my study on education and development in developing countries, especially in the context of Southeast Asian economies. From this point of view, the comprehensive interpretation needs to be further made.

Based on the study results, in Chapter 5, the discussion of the interpretation of research questions and theoretical frameworks I made in Chapter 2 will first be conducted. Then, I will provide limitations of this study and recommendations for research to practice by making some suggestions, especially for other interested

researchers. Finally, I will make implications for theory, practice, and social change before concluding this study.

Chapter 5: Discussion, Conclusions, and Recommendations

In this study, I aimed to overcome the MIT and promote further industrialization in Southeast Asia in accordance with the nature of quantitative study research using a nonexperimental design to analyze the impact of the enrollment rate of secondary education on the MIT and the ICI for industrialization in Southeast Asia. As previously explained, the nonexperimental design has several advantages of obtaining more generalizability of the results than an experimental design without the intentional manipulation of the variables (Tanaka, 2015).

Because the study's research purpose and the research questions quantitatively pursued the relationship between the enrollment rate in secondary education and the MIT as well as the ICI for industrialization on the national scales in East Asia, I chose a nonexperimental design. This design allowed me to analyze secondary education's impact on the GNI per capita and ICI in Southeast Asian economies. As a result, in focusing on the values of the R^2, the adjusted R^2, the R^2 increase, and Sig. F change, for RQ1, I observed that the figures for the R^2 increase in Model 4 were higher than those in Models 2 and 3. Also, the Sig. F change proved to be significant in Model 4 in controlling the alternative factors of governance, industrialization, employment, infrastructure, and the labor market.

Therefore, I retained the null hypothesis this time. A similar result was also confirmed in RQ2, and thus the null hypothesis was retained. Also, with the use of the natural log transformation data, both RQ1 and RQ2 remained essentially unchanged,

despite the slight R^2 and Sig F change output computations. Based on these results, I concluded that the null hypotheses for these RQs were retained.

I discuss the interpretations of the findings that relate to previous studies in Chapter 5, especially from the aspects of the research outcomes of both research questions and the relation to the theoretical frameworks describing the relationship between development stages of an economy and education level and between industrial development stages per the ICI and education level that I showed in Chapter 2. Then, limitations and recommendations for future research are discussed based on the interpretations. Notably, as for the recommendations, three perspectives of an evaluation of variables and research methods, education policies in Southeast Asian economies, and the industrialization for overcoming the most significant topic of the MIT are focused on. Finally, areas of social change relevant to the study are summarized, primarily implications to theory, practice, and society. The MIT is not as simple as a movement in one or two variables. Thus, in this chapter, I highlight the complications of further socioeconomic development in Southeast Asian society and the other regions.

Interpretation of Findings

I identified several significant components in this study. First, the multiple linear regression model allowed me to observe the effect of the secondary education enrollment rate on the GNI per capita and the ICI in Southeast Asian countries only from the value of the R^2 increase as the coefficient of determinations. Through the study, I retained the null hypotheses for both research questions. Nevertheless, as mentioned earlier, before wrapping up Chapter 4, aside from the R^2 increase, several more perspectives from a

broader interpretation for the respective research questions are added for discussion. The R^2 increase might not tell everything relevant to my study on education and development in undeveloped countries, especially in Southeast Asian economies. Indeed, many parts of the world's development issues are complicated, and many factors are considered. Thus, I summarize each research question and touch on how to analyze the broader interpretive components in the theoretical frameworks I created in Chapter 2.

Research Question 1 Interpretations

In setting up RQ1, I identified other researchers' works, papers, and articles relevant to the MIT, industrialization, and secondary education, primarily in Southeast Asian economies. Through the review of literature, as described in Chapter 2, it is necessary to assume that other factors might also have some other contributions to the MIT and the ICI, including infrastructure, governance, or employment, the labor market, as well as the enrollment rate in secondary education. The ADB (2017) demonstrated some other factors, including "low level of economic diversification," "insufficiently advanced infrastructure" "weak institutions," and "inefficient labor market" (pp. 18-19), contributing to the DVs of the MIT (GNI per capita) and the ICI. In this way, I had expected a smaller effect of education on these two DVs. Nevertheless, it was worth analyzing the educational factors predicting the GNI per capita and the ICI because there is much less literature on these topics.

Furthermore, it is worth sharing the other important outcomes of the analysis through the SPSS, despite the indirect impact on the dependent variable of the GNI per capita. The other study factors of the enrollment rates in tertiary education had a more

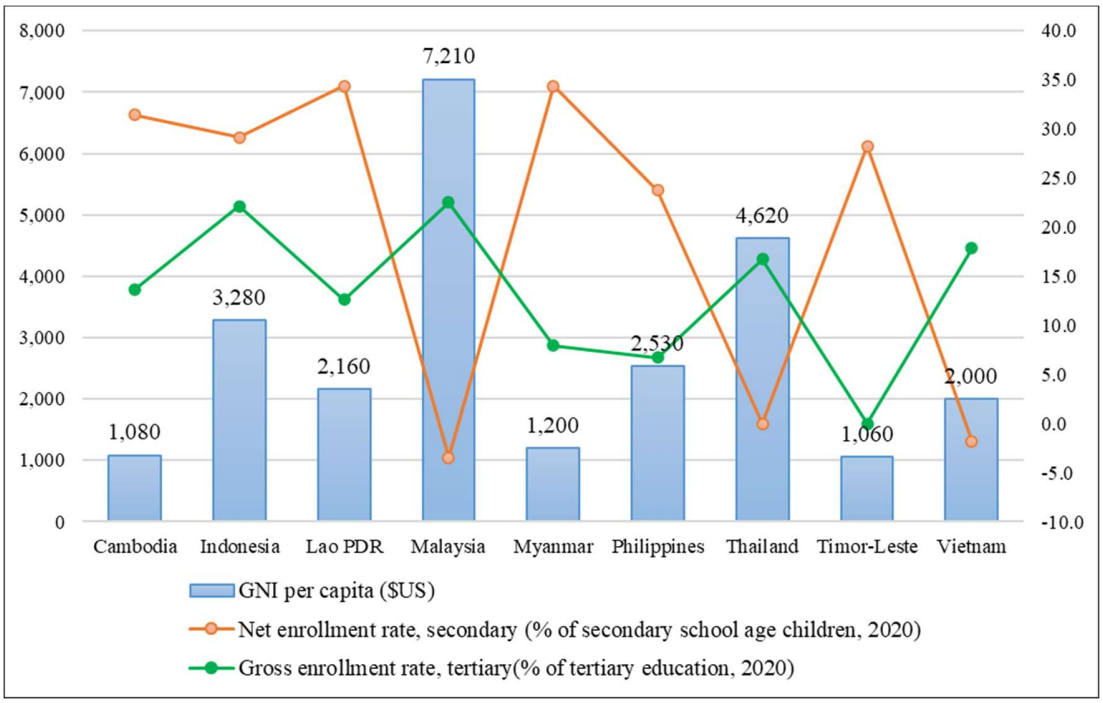
substantial influence on the GNI per capita rather than the one in secondary education, despite its higher value than that in primary education. Promoting tertiary education, as well as secondary education, has allowed the nine Southeast Asian economies to be further developed, notably in technological development. The industrial revolution in the United Kingdom and Western European countries led to the expansion of employment and productivity in the manufacturing industry since the 1700s from a historical perspective (Allen, 2012).

In Southeast Asian economies, Tran (2016) also stressed the significance of accelerating higher education for enhancing technological advancement, especially in HMIEs, including Thailand, Malaysia, and China. On the other hand, there are higher enrollment rates in primary education both in LMIEs and HMIEs in Southeast Asia as the fundamentals, especially improving the literacy and numeracy in youth, which are indispensable for obtaining the jobs.

Vietnam had the highest enrollment rates in secondary education over the past 20 years, with a rate of at least over 95%, despite the lower GNI per capita of U.S. $2,360 in 2018 (World Bank, 2020). The Vietnamese government has promoted compulsory education for elementary and junior high school to all people since the Education Law in 1998. As shown in Figure 7, despite compulsory education, there has been a slight increase in the value of US$ by U.S. $2,000 over the 20 years (UNESCO, 2012).

Figure 7

Difference Between 1999 and 2018 in GNI per Capita, Enrollment Rate in Secondary and Tertiary Education in Southeast Asia



Note. Original dataset.

A similar case was identified in Thailand and Malaysia. Specifically, I obtained the enrollment rate data in secondary education in these countries only from 2006 to 2015 with 69.6% in 2006 to 77.3% in 2015. There was a slight increase in the enrollment rate by 7.7% (World Bank, 2016). Despite the slight increase in the secondary education enrollment rate, Thailand raised the GNI per capita from US$1,980 in 1999 to US$6,600 in 2018. The other cases, mainly including the Philippines, Lao P.D.R, Timor-Leste, and

Myanmar, showed that there was a slight increase in the value of US$ for 20 years, despite the drastic increase in the secondary education enrollment rate.

It was easier to expect that the null hypothesis could be retained from the individual cases relevant to the education and income increase in each country of Southeast Asia when relying on the results in Table 9. In this way, there can still be an impact on the enrollment rate in secondary education in these developing countries.

Research Question 2 Interpretations

In the case of the RQ2, it can be clear that the ICI is one of the smallest values in all the components prepared for the analysis. Indeed, the figure ranges from -1 to 1 by using the difference in import and export with the total sum division (Tran, 2016). One substantial difference from the RQ1 is the number of CVs, far less than those in RQ1. I used two CVs of "Labor force participation rate for ages over 15" (CV5_Indust_2) and "Employment Rate in Manufacturing Industry" (CV6_Indust_3). It was evident that the other study factors of the enrollment rates in secondary education also had a more substantial influence on the GNI per capita rather than the ones in primary and tertiary education.

One of the most significant factors predicting ICI is how a nation can enhance manufacturing industry productivity with efficient human resource management and increase export overseas. Nevertheless, it was interesting to observe that Table 11 demonstrated the highest R^2 increase with Sig. F Change to be significant in Model 4. Still, since the Model 4 includes three levels of education contributing to the ICI, the

enrollment rate in secondary education was not clearly identified as the strongest of the three predictor variables. Thus, I retained the null hypothesis.

On the other hand, the enrollment rate in secondary education had no increase in the figure of R^2. There was a slight increase in the R^2 rise in tertiary education with .003 this time. Frankly, it might be challenging to interpret this study result. At the same time, it can potentially imply that primary education can pave the way for international competitiveness by increasing export overseas. Even in paying attention to the difference from 1999 to 2018 in each country of Southeast Asia, I found several patterns.

The first pattern is that there seems no correlation or impact between secondary education and ICI improvement. For instance, the three LMIEs of the Philippines, Indonesia, and Timor-Leste had a significant increase in the enrollment rate in secondary education over 20 years, while there was a decrease in the ICI figure in the period. The second patter demonstrates that the other three economies of Cambodia, Lao P.D.R, and Myanmar increase the ICI figure along with the enhancement in the enrollment rate in secondary education for 20 years. The third patter is, finally, that the rest of the three economies of Thailand, Malaysia, and Vietnam decreased the ICI figure, while the value of the enrollment rate in secondary education remained almost the same for 20 years within almost 3% up and down.

These three patterns I explained can potentially imply that it might not be possible to see the profound relationship between the enrollment rate in secondary education and the improvement in the ICI, at least in Southeast Asian economies. Indeed, the enhancement in the ICI through the expansion of the export can boil down to the

industrial policies handled by the government, including taxation, the foreign direct investment (FDI), technological advancement, business easiness, including governance, business transparency, etc. aside from the educational factors (Ohno, 2009). Indeed, Ohno (2010) stressed the significance of enforcing industrial export through vocational training and education, as well as school education, in developing countries. The opportunity for on-the-job-training (OJT) can upgrade the quality of job performance, resulting in the enhancement in productivity (Kuroda & Yokozeki, 2005).

In this respect, the educational factors, especially school education from elementary, junior and high-school, and to college level, can potentially be the minimum basic for upgrading the industrial export level, while some other factors should further be considered. Therefore, the impact on the ICI by identifying the R^2 increases was found to be significant, while I retained the null hypothesis of the RQ2 as a significant factor predicting the ICI because of the lack of the evidence of the more impact of secondary education than those of primary and tertiary education from the statistical outputs. Thus, it would further be necessary for me to see how to upgrade the ICI in Southeast Asian economies from various perspectives.

Interpretations Related to the Theoretical Frameworks

As described in Chapter 2, in quickly reviewing the theoretical frameworks representing the relationship between development stages of an economy and education level and the one between industrial development stages per ICI and education level that I showed in Chapter 2, my interpretations are as follows: The first framework was created based on three frameworks of Psacharopoulos (1985), Schultz (1971), and Tran (2016). It

represents the relationship between the economic development stage and education levels by income levels, which was primarily applied by Tran's model (2016). This theoretical framework can show the connection between the individual income's key variables and the enrollment rate in secondary education. With the main variables of the Gross National Income (GNI) per capita (Atlas Method, US$) used for the MIT and the enrollment rate in secondary education, the quantitative approach, the first research purpose, and the research question are connected to this framework, notably in observing the impact of the enrollment rate in secondary education on the GNI per capita.

In confining to the case of accepting the results of the analysis shown in Table 9, this theoretical framework would hypothetically be available as long as the R^2 increase in Model 4 to be significant when controlling the other factors. Straightforwardly, this framework can be workable with the broader interpretation of being used as one hypothetical milestone by categorically visualizing the relationship between education stage and income levels in developing countries. Indeed, from the historical perspective, the educational factors affecting the income increase in the 1970s to 1980s in East Asia, including Japan, Taiwan, and South Korea, these countries experienced the upgrade of people's education levels and wages along with the progress of industrialization (Otsuka and Kurosaki, 2003). From this point of view, the framework can hypothetically be used as a categorical milestone in Southeast Asia.

On the other hand, I hypothetically crystalized the second theoretical framework based on Ohno's (2009) theories and Tran (2016). It demonstrates the conceptual relationship between the industrial development stages through the ICI and education

levels, which is mainly applied from Tran's model (2016). What is emphasized in this theoretical framework is to suggest that the enhancement in the enrollment rate in secondary education is fundamentally the essential contribution to the industrial development in developing countries to be further developed. As Ohno (2009) implied, secondary education can play a significant role in developing employees' fundamental skills for industrialization in east Asia.

Similar to the RQ1, in confirming the case of accepting the results of the analysis shown in Table 11, as well as Table 12, this theoretical framework can also be available as long as the R^2 increase in Model 4 was higher than Model 2 and 3 with the Sig. F change to be significant this time. Nevertheless, the ICI can potentially be further enhanced through vocational training in the worksites and school education. On behalf of on-the-job-training (OJT) opportunities employees can improve job performance quality, resulting in productivity improvement in the extended period. In this regard, it would further be necessary for me to justify the formulation of the second framework by observing different potential factors that I did not employ as study variables this time in the future, despite the justification of the developing the hypothetical framework that I made.

Limitation of the Study

As previously described in Chapter 1, there should be several notes for describing this study's limitation. For a quick review, I raised two possible limitations to be explained as follows: Firstly, a potential limitation is that this study focused on the impact of the enrollment rate in secondary education on the MIT on condition that

increasing the quantity of education is prioritized. Thus, the quality of education, including the way to enhance teaching performance, teaching methods for improving students' grades, will not be centered on this research discussion. Nonetheless, I emphasized the importance of increasing educational opportunities through quantitative expansion in developing countries to overcome MIT's further development in Southeast Asia. The quality of education was not evaluated and serves as an opportunity for future research.

Secondly, since this study focused on MIT in Southeast Asia, the other economies in the other regions, including Eastern Europe, South America, Middle East, and sub-Saharan Africa, might have different results in examining the same analysis. Namely, there might potentially be other culprits of the MIT in these regions, including demographic factors, entrepreneurship, and external institutional anchors studied by Gill and Kharas (2017), aside from the enrollment rate in secondary education. In this regard, the availability of this study's results might be limited in examining the MIT in the other areas with the different cultural, historical, and social norms and backgrounds as potential biases to be considered.

Finally, one more thing to be reported through the actual study here is that the imputed data I employed has several weaknesses in the study results both for RQ1 and 2. Notably, I can see it in the way that the imputed data did not change the facts that Model 3 in Table 9 and Table 2 and 3 in Table 11, relevant to the primary variable of secondary education shown in Table 9, 10, 11, and 12, were all significant in the actual data. In this

regard, further investigation in future studies on how to handle the missing data for analysis will be made.

Nevertheless, these three limitations can positively be interpreted as the research protocol on education and economic development in developing countries in further expanding the potential of the relevant research through this study. Education can be considered the congregation of the output of the repeated training and lessons gained through communications and encounters with various types of stakeholders, including teachers, families, other students, etc. In a word, education can multi-dimensionally influence individuals' choices of their lives and societies' transformation in the more extended period, and thus directly affecting their values and income, and social status. In this way, it can typically be challenging for researchers to deal with education as research material. Despite the difficulty, it is still worth researching the impact of education quality, including teaching styles, family environments, classroom environment, testing types, subjects, and student academic performance. Also, the relationship between students' academic performance and life-time wage variance can be a significant catalyst in affecting education and development in the developing world.

With the framework relevant to education stages and economic development stages I created in Chapter 2, further findings pertinent to education and economic development in each Southeast Asian economy from different points of view can positively be expected in future studies. The quantitative method can also be used in the other regions of the middle-income economies for further discovery and comparison with different areas.

In South Asia and sub-Saharan Africa, some countries have recently become the lower-middle-income economies as an entry-level, especially Kenya, Nepal, Tanzania, etc., under the new categorization by the World Bank (Serajuddin & Hamadeh, 2020). These countries have sufficient labor supplies, while the required abilities of literacy and numeracy need to be further improved for finding some jobs with higher productivity. In these areas, educational opportunities would be significant in developing the human capital and income level. Simultaneously, the other factors relevant to external environments cannot be ignored. In these respects, further research in other regions should further be progressed.

All in all, the limitations described above in this study can positively be regarded as future research potential from different points of view and make up for the downsides to being covered. No perfect research is available globally, while it is still feasible for researchers to catch up on the relevant study. In this regard, this study can become a protocol regarding education and development in the developing world.

Recommendations

For other students and researchers who are interested in this study on education and economic development in developing countries, here are several recommendations for further consideration in conducting the research both from the research-oriented and practical-oriented aspects.

Evaluation of Variables and Research Methods

As previously explained in Chapter 2, the DV I chose for RQ1 was GNI per capita (in US$) in the Southeast Asian economies since this value was considered one of the

principal barometers to assess the impact of education on the MIT. For RQ2, I selected the ICI in the context of industrialization in Southeast Asia as a DV. For IVs, I chose the representative educational factors of enrollment rates in primary, secondary, and tertiary education incorporated as the official IVs for RQ1 and 2 in common. Meanwhile, the alternative elements, including *governance, industrialization, labor market,* and *infrastructure*, were selected as the CVs to demonstrate a substantial contribution to MIT in the previous studies for RQ1. Two additional variables of "Labor participation rate for those aged over 15" and the "Employment rate in manufacturing industries" were chosen as relevant factors to evaluate in predicting the ICI.

In reviewing these variables, several recommendations can be given. From the aspect of data collection, it was not that challenging to access the public open data, primarily from several international organizations of the World Bank (2020) and the United Nations (2020) this time. Nevertheless, it was not ignorable to describe that several items had a certain amount of missing data, especially the enrollment rates in three educational stages as main study variables. It was challenging to make up for the missing data in creating the dataset from the developing countries in Southeast Asian economies. Indeed, the dataset publicly provided, representatively by the World Bank, IMF, ADB, and the United Nations had the missing data, notably in educational and infrastructural categories, since they rely on the census data from the official government statistical surveys. At the same time, the investigations are incomplete in filling up the data gaps.

In developing countries, government agencies often do not have enough capacity to collect the household survey entirely. Notably, several countries with plenty of islands and broader populations in rural areas, including the Philippines, Indonesia, Myanmar, etc., have had difficulty sharing the complete version of educational fields every year. In this regard, before collecting the data from the developing countries, further consideration of difficulty in managing enough data and preparedness of the missing data should be made.

For the methodology, I chose the quantitative analysis with a non-experimental design and then using the multiple-regression model with the SPSS, instead of the panel-data analysis to find the education factors predicting the MIT and the ICI with the R^2 increase this time. It was appropriate for me to employ the quantitative analysis with the regression model, especially in dealing with the unit of analysis of a national economy and time-series for 20 years and cross-sectional data for nine economies. Employing the CVs helped me address the research problems by catching up with the developing world's real economic issue.

Nevertheless, for those interested in analyzing focusing on several areas or provinces in one country, the other methodologies can also be considered. For example, a mixed methods approach could be a significant catalyst in finding something that has not been identified, despite the narrower research population and areas. One reason for this would be that employing the mixed method allows researchers to see the research concern and problem-settings from different points of view, especially from cultural, social, and historical contexts other than the quantitative study, by employing the

qualitative analysis as well. In this respect, while economic reviews often require the scholars to reply on the statistical and econometric skills for research, utilizing the other methods can also benefit a broader range of the public policy study, depending on the specific areas or populations to be studied.

Education for Economic Progress in Southeast Asian Economies

As previously described in Chapter 2, the selected nine economies (Cambodia, Indonesia, Lao P.D.R, Malaysia, Myanmar, the Philippines, Thailand, Timor-Leste, and Vietnam) for the quantitative analysis are in the Association of Southeast Asian Nations (ASEAN) economic community (AEC). Since 2016, the ASEAN has continuously attempted at promoting the infrastructural construction, free-trade association, the cooperation of energy, the protection of intellectual property, the alleviation of income discrepancies between the poor and the rich, etc. with the ASEAN blueprint for overcoming the MIT (ASEAN Secretariat, 2013; Tran, 2016). With this background, I will demonstrate the recommendations of education policy for these economies to be industrialized by focusing on the educational issues per each economy and then showing several solutions both for practice and research.

Firstly, Cambodia is the only economy with a low-income level in Southeast Asia. Since the 2010s, due to the deterioration of the investment environment because of the higher wage in the neighboring economies, the government has started promoting other industries than the sewing industry (Hatsukano et al., 2012). Then, in 2015, the Cambodian government has launched the “Cambodia Industrial Development Policy 2015-2025,” along with the formulation of the AEC (RGC, 2015). Unfortunately, plenty

of educational issues have been identified, e.g., the insufficient number of teachers, their teaching style, the insufficient number of school buildings, the more considerable discrepancy in the educational access, etc. (SVA, 2017). The insufficient number of qualified teachers has been one of the most serious problems, especially both in elementary and junior-high-school in rural areas (Kitamura, 2016).

Secondly, as for the LMIEs, including Indonesia, Lao P.D.R, Myanmar, the Philippines, Timor-Leste, and Vietnam, the education policies need to be further enhanced. Representatively, these economies were categorized as LMIEs (Tran, 2016), with the lower figures of the GNI per capita, approximately US$ 1,000 to 2,000 in 2018 (World Bank, 2020). This income level is close to the low-income group, which means that they have substantial labor resources with insufficient work skills that need to be further developed by enhancing educational opportunities for secondary education. However, on average, these three economies have approximately 60% of the enrollment rate in secondary education (World Bank, 2020). In gaining insight into the education policy, several issues can be identified; Firstly, Lao P.D.R. geographically has a large proportion of land-rock and mountainous areas where the access to education for children and people with low academic backgrounds is not approachable (Suzuki, 2014). Specifically, the proportion of the investment in Vientiane's capital and the other areas has stark discrepancy (Kyophilavong et al., 2018).

Timor-Leste is a small island with a smaller population of approximately 1.2 million (MOFA, 2019). It became independent from Portugal in 1975 and Indonesia in 2002, respectively, and re-built the national economy since independence. With the

unstable political institution and the repetitive domestic conflict, economic and educational activity have also been premature. Indeed, one-fourth of the people in this economy are still illiterate (UNICEF, 2019). Finally, in Myanmar, the recent transition to the market economy, the promotion of industrialization has been done, especially since the early 2010s (Mieno, 2013), primarily through foreign capital investment, including vehicles, real estates, construction, and other businesses, etc., notably in the special economic zones of Yangon and Nepido (Mitsuhashi, 2013). Still, educational policy needs to be further improved. Notably, the completion rate has been low, with 60% on average over the past ten years (World Bank, 2010). This higher rate of drop-out can affect the enrollment rate in secondary education.

The other three LMIES (the Philippines, Indonesia, and Vietnam) have been under the LMIT for over 20 to 30 years (Tran, 2016). Firstly, the enrollment rates in secondary education in 2018, both in Indonesia and the Philippines, were about 74% and 78%, respectively (World Bank, 2020). It is challenging for these economies to expand secondary education entirely due primarily to the island countries' inappropriate budget allocation for education (White et al., 2005). Then, interestingly, Vietnam differs from the other Southeast Asian economies. Indeed, this country had the highest figure of the enrollment rate in secondary education with at least over 95% for 20 years, despite the lower GNI per capita of US$2,360 in 2018 (World Bank, 2020). Despite compulsory education since 1998, there is a slight increase in the value of US$ by US$2,000 for 20 years (UNESCO, 2012).

Finally, as of the HMIEs, especially Thailand and Malaysia, the education policies have been progressed. Indeed, Thailand has introduced the continuous education system by which students can automatically move on to junior- and senior-high-school for free granted by the government (Vorapanya and Dunlap, 2014). As Tran (2016) explained, however, the HMIEs should improve the employment environment by expanding capital-intensive industries, promoting high technology industries, and cultivating human resources for higher levels of productivity (Tran, 2016). For technology and innovation to be advanced, one of the best ways is to exchange high schools and colleges with some developed economies. For instance, several universities in these economies, including Malaya National University, Chulalongkorn University, and others have conducted exchanging programs with some prestigious universities in the United States, the U.K., and Japan (Kuroda et al., 2018). In this regard, the exchanging programs can drive technological innovation for industrial promotion with high-skilled laborers in these economies.

Since early 2020, the outbreak of pandemic has occurred in many parts of the world and has suffered plenty of people (WHO, 2020). Under this situation, it is hugely challenging for Southeast Asian economies to promote educational development policies that incorporate building school facilities, face-to-face teaching, and physically taking care of children. With this serious pandemic situation and educational issues to be addressed for promoting further economic progress in the region, here are several recommendations as follows:

It would be indispensable for all the income stages to accelerate online education per each education level for practice. In particular, the governments in the low-income and the LMIEs should swiftly increase the budget for online education and the mobile infrastructure. It would also be a significant catalyst for alleviating educational opportunity discrepancies between urban and rural regions. For instance, in Cambodia, the higher drop-out rate in primary education should swiftly be addressed by analyzing the factors influencing the higher drop-out rate with the statistic model, e.g., pupil-teacher ratio (Opanuga et al., 2019), but also by introducing technological support for practical solution. One essential solution for this would be to use the ODA provided by some developed nations (Tran, 2016). Meanwhile, it would be more beneficial for researchers to observe online education's possible effects on students' academic performance and income for economic progress and exchange opinions for a better educational environment with the practitioners. Then, sharing the study analyses for policymaking through enhancement in teaching, resource, technical issues, etc., should continuously be made in the future.

Industrialization for Overcoming the MIT in Southeast Asia

Industrialization was one of the most critical keywords in overcoming the MIT in Southeast Asia in this study. Historically, as Perkins (2013) stressed, industrialization has played a significant role as an economic driver for East Asian development and foundation over the past 60 years, especially in Japan, South Korea, and Taiwan. Experts, including Ohno (2010), Otsuka (2014), and Tran (2016), have paid attention to the relationship between economic progress and industrial development in the developing

world, notably in the broader regions of China, Southeast Asia, South America, and sub-Saharan Africa. In consideration of the literature and my study results from the perspective of industrialization, several recommendations can be made below:

Firstly, when employing the ICI for answering the RQ2 relevant to the effect of the enrollment rate in secondary education, I used the data on the amount of import and export for the manufacturing industry as a total sum. However, in dealing with industrialization, breaking down the export materials into more specific categories or manufacturing industries can optionally be recommendable. Indeed, the manufacturing industry is composed of two segments of heavy chemical industries and light industries (UN Comtrade, 2020). The former is primarily composed of generators for power plants, machine tools, information equipment, electronics, transporting machines, etc. (UN Comtrade, 2020). On the other hand, the latter deals with apparel and fibers, shoes, wood-made furniture, travel tools, etc. (UN Comtrade, 2020). In breaking the export structures into the manufacturing items above, it would be possible to see the various exporting structure per each economy.

Tran (2016) studied the MIT by observing the export structure trend in Vietnam from 2000 to 2013. In the Southeast Asian developing countries, theoretically, the industrial development needs to be further made for overcoming the MIT, notably by enhancing the technological progress and manufacturers' skill development (Ohno, 2010). Indeed, in HMIEs, including Thailand and Malaysia, developing the skills is critical in further promoting industrialization (Tran, 2016). In this regard, in upgrading the manufacturing structure, it would also be beneficial to select several specific

manufacturing industries for further analysis as long as studying one country can be recommended case-by-case.

Secondly, under globalization since the early 2010s, a new discussion of introducing Artificial Intelligence (AI) and robot should not be ignored onward. In a word, the relationship between technology and human resource management should further be studied. Several developing countries, especially China and India, have worked on robot development with the developed nations of the United States, Japan, Singapore, and the U.K. According to the previous study by the Massachusetts Institute of Technology and the Boston University (Acemoglu and Restrepo, 2018), one of the world's hottest issues is how many jobs are deprived of by AI and robots. Nevertheless, the AI and robots' introduction seem to be slightly too early for developing countries. Even in Southeast Asia, especially in the LMIEs, the manufacturing items are human made, while the FDI promotion has enabled the local laborers to handle the state-of-the-art machines and gadgets in manufacturing the items in the future. In this regard, employing the data relevant to AI and robots can be recommendable in surveying several corporations for a case-study analysis in future studies.

Implications

Finally, the study's implications for social change will be discussed, especially from the three aspects of significance to theory, practice, and society as follows.

For Theory

For a quick review, as previously described in Chapter 1, the potential contribution to the crystallization of a theoretical foundation is to capture the whole

picture of the relationship between national income stages and education stages, primarily by gaining insight into the middle-income trap and the enrollment rate of the secondary education as seen in Figure 1 in Chapter 2. In the current study, far less research of MIT's causes from human capital development was identified, thus being considered a significant research problem. Through this study's quantitative analysis, not concluding that secondary education is the primary predictive driver over primary or tertiary education remains an opportunity for further study particularly in light of the framework. It is possible that a workable solution using a broader interpretation could be obtained by categorically visualizing the relationship between education stage and income levels in developing countries based on the previous studies. In this regard, this research problem can be a significant catalyst for creating a framework that theoretically describes the causality between income levels and education levels.

Secondly, theoretical research regarding the relationship between industrialization and secondary education through studying the influence of the enrollment rate in secondary education on the ICI was conducted. Despite the significance of facilitating industrialization, the theoretical foundation between ICI and secondary education was not identified in reviewing the research problem. Thus, I also crystalized another conceptual framework of the relationship between the industrial development process per ICI and education levels visually as seen in Figure 2 in Chapter 2. The framework explains that the enrollment rate in secondary education is essentially a significant catalyst for improving the ICI for industrialization under any industrial stage.

Through the quantitative study, with the lower figure of R^2 increase for the enrollment rate in secondary education is lower than those for primary and tertiary education, this framework should be further considered. Unlike the first theoretical framework, the ICI can be enhanced through vocational training in the worksites, instead of general school education. As described earlier, on behalf of the opportunity for training through on-the-job-training (OJT), employees can improve the quality of job performance, resulting in an enhancement in productivity. Nevertheless, this study can potentially contribute to the new aspect of ICI's conceptual framework by introducing the concept of enhancing the opportunity for secondary education as a cornerstone of education and industrialization.

For Practice

Similarly, as stated in Chapter 1, firstly, contribution to promoting the education policy by improving the enrollment of the secondary education in Southeast Asia, leading to the successful escape from the MIT in Southeast Asia in the longer-term. In practice, emphasizing the enhancement of the enrollment rate in secondary education for public policy can potentially be made. As previously described, investing in human capital development is invisible, thus taking longer for the governments to see the investment outputs. Nevertheless, there is a more significant potential for maximizing human capital development in overcoming the MIT, notably in Southeast Asian economies through the study. Therefore, addressing the necessity to enhance the enrollment rate in secondary education for practice, notably in the context of overcoming the MIT, can further be expected.

Secondly, the contribution to promoting industrialization through the enhancement of the enrollment rate in secondary education will potentially be made. In reviewing the research problem, despite the significance of facilitating industrialization, the specific problems of how to promote industrialization in the middle-income economies in Southeast Asia were not addressed in the economic studies. Enhancing the ICI through the enhancement of the enrollment rate in secondary education can potentially be a solid catalyst for the middle-income economies to be encouraged to draw further attention to the viewpoint of the ICI and secondary education for practice. In this way, the contribution of facilitating the industrialization by focusing on the ICI and secondary education will potentially be made.

For Society

Finally, for society, this study can have the implication for social change in addressing the most significant development issue of economic progress and education in the undeveloped world. Primarily, it gains insight into the most fundamental phenomenon of the MIT facing, especially in Southeast Asia, from impacting secondary education. Since this perspective has still not been addressed in the existing study, the research can be a significant catalyst for further development in the region.

Also, addressing the significance of enhancing laborers' skills through secondary education for contributing to the improvement primarily in the ICI can help the middle-income economies appropriately arrange the human resource management for promoting the industrialization in the private sectors. From this perspective, this practical study will

be transferable to the other lower-middle-income economies for managing human resources.

Overall, despite the common recognition of the importance of education as a driver for economic development in many parts of the world, it is often pointed out that education is not considered as the mainstream in international development. Several reasons can be possible; As previously described, unlike the alternative development factors, including infrastructure, governance, employment, labor market, and industrialization, education is an invisible investment, despite the long-term process. Therefore, out-of-school children and people have still not yet been eradicated in many parts of the world. Thus, on a larger scale, this study can have a potential to help other researchers, students, and practitioners for international development and cooperation re-realize the significance of further investment in education.

Conclusions

This chapter summarized the conclusion of this study, discussing the several points of interpretations of RQ1, RQ2, and theoretical frameworks, Limitations of this study, Recommendations, and Implications for social change from the aspects of significance to theory, practice, and society. Overall, I addressed the research problems of overcoming the MIT from the perspective of economic development and improving the ICI for industrialization from human capital development in Southeast Asia. The study clarified the influence of enrollment in secondary education on the MIT and the ICI, to be examined through quantitative analysis as a path to promote further industrialization in Southeast Asia in particular. As a result, the study showed a lower figure of R^2 increase

for the enrollment rate in secondary education than those in primary and tertiary education.

While my regression analyses demonstrated the need to retain both null hypotheses, I concluded that frameworks can be workable with continued refinement to seek additional independent variables and to overall reduce areas of multicollinearity. Notably, the first framework of education and economic development in developing countries can be implied as one hypothetical milestone by categorically visualizing the relationship between education stage and income levels in developing countries based on the previous studies. Meanwhile, the second framework relevant to the ICI and education should further be considered, especially from technological advancement, vocational training, and business environment. Nonetheless, the framework can be justifiable and implacable as a cornerstone of education and industrialization in developing countries.

As for this study's limitations, three points were discussed: (a) the quality of education was not explored, only the reported completion of three education levels; (b) study results can vary depending on the areas of study other than Southeast Asia; and (c) the use of imputed data presented a weakness in identifying the study's overall generalizability. Simultaneously, however, these limitations offer the potential for future studies relevant to education and development in developing countries. In this way, these limitations can be covered in another opportunity to study.

As for the recommendation, three perspectives of research variables and methods, education policy for economic progress in Southeast Asia, and industrialization were addressed. I underlined this study's potential as the cornerstone of the research on

education and development, while it can further synergistically work in the case of employing the other method, especially the mixed method for gaining insight into more specific areas or objects to be investigated as a case study. Also, in each case of Southeast Asian economies within a larger scale of the ASEAN community, education policies were finally addressed for a recommendation. Then, as for industrialization, I raised the discussion of breaking down the manufacturing industry into the specific components by the export structure and a hot issue of how to deal with the AI and Robot relevant to human resource management job-opportunity.

Finally, the implication for social change from the aspects of significance to theory, practice, and society. Admittedly, education is not the mainstream in development policies in many parts of the world due to the common recognition of invisible investment. Nevertheless, the opportunity for out-of-school children and people should not be ignored with the research's back-up on education and development. In this way, it would be necessary for me to continuously work on this research issue to realize the social change in the world.

References

Acemoglu, D., & Restrepo, P. (2018). Artificial intelligence, automatic, and work. *The Economics of Artificial Intelligence*. 197-236. https://doi.org/10.7208/chicago/9780226613475.001.0001

Acemoglu, D., & Robinson, J. (2012). *Why nations fail: The origin of power, prosperity, and poverty*. Crown Business.

Allen, R. C. (2011). *Global economic history: A very short introduction*. Oxford University Press.

Angus, M. (2003). *Development center studies: The world economy historical statistics.* OECD Publishing.

ASEAN Secretariat. (2013). *Fact sheet - ASEAN socio-cultural community (ASCC)*. 1-4. https://www.asean.org/storage/images/resources/ASEAN%20Publication/2013%20(10.%20Oct)%20-%20Fact%20Sheet%20of%20ASCC%20(2nd%20Reprint).pdf

Asian Development Bank. (2011). *Middle-income trap, Asia 2050: Realizing the Asian century*.

Asian Development Bank. (2017). Escaping the middle-income trap: Innovate or perish, *ADBI Working Paper Series*, 685, 1-35.

Banergee. A. V., & Duflo, E. (2012). *Poor economics: A radical rethinking of the way to fight global poverty*. Public Affairs.

Becker, G. S. (1964). *Human capital*. Columbia University Press.

Behrman, J. R., Foster, A. N. D., Rosenzweig, M. R., & Vashishtha, P. (1999). Women's schooling, home teaching, and economic growth. *Journal of Political Economy, 107*(4), 682-714. https://doi.org/10.1086/250075

Bevans, R. (2020). An introduction to multiple linear regression. *Statistics.* https://www.scribbr.com/statistics/multiple-linear-regression/#:~:text=What%20is%20multiple%20linear%20regression,variables%20using%20a%20straight%20line

Breierova, L., & Duflo, E. (2004). The impact of education on fertility and child mortality: Do fathers really matter less than mothers. *NBER Working Paper* No. 10513. https://doi.org/10.3386/w10513

Cambridge Dictionary. (2020). https://dictionary.cambridge.org/dictionary/english/trap

Collier, P. (2008). *The bottom billion: Why the poorest countries are failing and what can be done about it*. Oxford University Press.

Cohen, J. (1992). A power primer. Quantitative methods in psychology. *Psychological Bulletin*, *112*(1), 155-159. https://doi.org/10.1037/0033-2909.112.1.155

Coxhead, I. (2007). A new resource curses? Impacts of China's boom on comparative advantage and resource dependence in Southeast Asia. *World Development, 35*(7), 1099-1119. https://doi.org/10.1016/j.worlddev.2006.10.012

Deolalikar, A. (1993). Gender differences in the returns to schooling and in school enrollment rates in Indonesia. *Journal of Human Resources, 28*(4), 899-932. https://doi.org/10.2307/146297

Department of Education in the Philippines (DepEd). (2019). *K to 12 basic education curriculums*. www.deped.gov.ph

Dickson, A., Emad, K. H., & Joe, A. A. (2018). Theoretical and conceptual framework: Mandatory ingredients of a quality research. *International Journal of Scientific Research, 7*(1), 6-9. https://www.doi.org/10.36106/ijsr

Dollar, D. (2015). Institutional quality and growth traps. *Paper for the PAFTAD 37 Conference*. Institute of Southeast Asian Studies. No. YF37-07

Doner, R., & Schneider, B. R. (2015). The middle-income trap: More politics than economics. *World Politics, 68*(4), 1-44. Cambridge University Press. https://doi.org/10.1017/s0043887116000095

Duflo, E. (2001). Schooling and labor market consequence of school construction in Indonesia: Evidence from an unusual policy experiment. *NEBR Working Paper,* No. 7860. https://doi.org/10.3386/w7860

Emmerson, D. K. (1984). Southeast Asia: What's in a name? *Journal of Southeast Asian Studies, 15*(1), 1–21. Cambridge University Press. https://doi.org/10.1017/S0022463400012182

Enders, C. K. (2010). *Applied missing data analysis*. Guilford.

Esposito, L., Kebede, B., & Maddox, B. (2011). Literacy practices and schooling: A case study from Mozambique, *World Development, 39*(10), 1796-1807. https://doi.org/10.1016/j.worlddev.2011.04.011

Estudillo, J. P., & Otsuka, K. (1999, April). Green revolution, human capital, and off-farm employment: Changing sources of income among farm households in

central Luzon, 1966-1994. *Economic Development and Cultural Change, 47*(3), 497-523. https://doi.org/10.1086/452417

Estudillo, J. P., Quisumbing, A. R., & Otsuka, K. (2001). Gender differences in land inheritance and schooling investments in the rural Philippines. *Land Economics, 77*(1), 130-143. https://doi.org/10.2307/3146985

Field, A. (2018). *Discovering statistics using IBM SPSS statistics* (5th ed.). SAGE

Fitzmaurice, G. M., & Laird, N. M. (2001). Multivariate analysis: Discrete variables (logistic regression). *International Encyclopedia of the Social & Behavioral Sciences*. https://doi.org/10.1016/b0-08-043076-7/00476-9

Furlough-Morris, S. (2017). Examining poverty, entrepreneurship, and multinational corporation participation in South Africa. *Walden Dissertations and Doctoral Studies Collection*, Walden University, 17&18.

General Statistics Office of Vietnam. (2020). *Number of classes, direct teaching teachers and pupils of general education as of 30 September*. https://www.gso.gov.vn/en/px-web/?pxid=E1003&theme=Education

Gill, I., & Kharas, H. (2007). *An East Asian renaissance: Ideas for economic growth.* The World Bank.

Gill, I., & Kharas, H. (2017). The middle-income trap turns ten. *Policy Research Working Paper 7403*, 1-27. https://doi.org/10.1596/1813-9450-7403

Glewwe, P. (2002). Schools and skills in developing countries: Education policies and socioeconomic outcomes. *Journal of Economic Literature, 40*(2), 436-482.

http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.202.2180&rep=rep1&type=pdf

Global Infrastructure Hub (GIH). (2020). Forecasting infrastructure investment needs and gaps. *Infrastructure outlook*. https://outlook.gihub.org/

Google Scholar. (2020). https://scholar.google.co.jp/

Groningen Growth & Development Centre (GGDC). (2018). *Statistics on world population, GDP, and per capita GDP, 1-2008 AD.* http://www.ggdc.net/maddison/oriindex.html

Hanushek, E. A. (1995). Interpreting recent research on schooling in developing countries. *The World Bank Research Observer, 10*(2), 227-246. https://doi.org/10.1093/wbro/10.2.227

Harris, J. R., & Todaro, M. P. (1970). Migration, unemployment, and development: A two-sector analysis. *American Economic Review, 60*(1), 126-142.

Hatsukano, N., Kuroiwa, I., & Tusbota. (2012). Economic integration and industry location in Cambodia. *Economic Integration and the Location of Industries: The Case of Less Developed East Asian Countries*. IDE-JETRO Series. Palgrave Macmillan. 88-120. https://doi.org/10.1057/9780230389427_5

Hayami, Y., & Aoki, M. (1998). Rural industrialization in East Asia. *The institutional foundations of East Asian economic development.* Springer.

Huang, B., Morgan, P. J., & Yoshino, N. (2018). 5. Manufacturing as the key engine of economic growth for middle-income economies. *Avoiding the middle-income*

trap in Asia - The role of trade, manufacturing, and finance. Asian Development Bank Institute.

Inoki, T. (1991). Personnel management under new technology: Training, wages and worker's mobility in France and Japan. *Osaka Economic Papers, 41*(2-3), 276-315.

International Monetary Fund (IMF). (2019). *World economic outlook database.* https://www.imf.org/external/pubs/ft/weo/2019/01/weodata/weoselser.aspx?c=566&t=1

Kamil, P., & Jakub, Z. (2017). Middle-income trap: Review of the conceptual framework *ADBI Working Paper Series No. 760*. Asian Development Bank Institute (ADBI), 1-21.

Kang, H. (2013). The prevention and handling of the missing data. *Korean Journal Anesthesiol (KJA). 64*(5): 402–406. http://doi:10.4097/kjae.2013.64.5.402

Kitamura, Y., Edwards Jr., D.B., Williams, J.H., & Sitha, C. (2016). *The Political Economy of Schooling in Cambodia: Issues of Quality and Equity*. 15-34. Palgrave Macmillan.

Kojima, K., & Ozawa, T. (1985). Toward a theory of industrial re-structing and dynamic comparative advantage. *Hitotsubashi Journal of Economics, 26*(2), 135-145.

Krugman, P. (1994). The myth of Asia's miracle. *Foreign Affairs, 73*(6), 1-12. https://doi.org/10.2307/20046929

Kuroda, K., Sugimura, M., Kitamura, Y., & Asada, S. (2018). Internationalization of higher education and student mobility in Japan and Asia. *Background Paper Prepared for the 2019 Global Education Monitoring Report.* UNESCO & JICA.

Kurosaki, T. (2001, July). Effects of education on farm and non-farm productivity in rural Pakistan. *FASID Discussion Paper Series on International Development strategies*, No. 2001-002, Foundation for Advanced Studies on International Development.

Kvalseth, T. O. (1985). Cautionary note about R^2. *The American Statistician. 39* (4). Part 1. 279-285. https://doi.org/10.1080/00031305.1985.10479448

Kyophilavong, P., Ogawa, K., Kim, B., & Nouansavanh, K. (2018). Does education promote economic growth in Lao PDR: Evidence from cointegration and granger causality approaches. *The Journal of Developing Areas. 52*(2). 1-11. https://doi.org/10.1353/jda.2018.0018

Lewin, K., & Caillods, F. (2001). *Financing secondary education in developing countries: Strategies for sustainable growth*. UNESCO Publishing.

Lewis, A. W. (1954). Economic development with unlimited supplies of labor. *Manchester School of Economics and Social Studies, 22*(2), 139-191. https://doi.org/10.1111/j.1467-9957.1954.tb00021.x

Little, R. and Rubin, D. (2014). *Statistical analysis with missing data.* John Wiley; Sons.

Matthew, D. (2018). 7.3. Unit of analysis and unit of observation. *Scientific Inquiry in Social Work.* Pressbooks.

Meyer, J. W., & Hannan, M. T. (1979). *National development and the world system: Education, economic and political change 1950-1970*. University of Chicago Press.

Mieno, F. (2013). Toward Myanmar's New Stage of Development: Transition from Military Rule to the Market. *Asian Economic Policy Review, 8*(1). 94-117. https://doi.org/10.1111/aepr.12009

Mikesell, J. L. (2012). Chapter 8: Taxation: Criteria for evaluating revenue options. *Fiscal Administration.* Wadsworth Cengage Learning.

Mincer, J. (1974). *Schooling, experience, and earnings*. National Bureau of Economic Research.

Ministry of Foreign Affairs of Japan. (MOFA). (2019). Basic Data. *Japan- Timor-Leste Relations*. https://www.mofa.go.jp/region/asia-paci/e_timor/index.html

National Economic and Development Authority (NEDA). (2017). *The Philippine economic outlook and the Philippine development plan (PDP) 2017-2022. 32*.

Ohno, K. (2009). The middle-income trap: Implications for industrialization strategies in East Asia and Africa. *GRIPS Development Forum*.

Ohno, K. (2010). Avoiding the middle-income trap: Renovating industrial policy formulation in Vietnam. *ASEAN Economic Bulletin, 26*(1), Institute of Southeast Asian Studies, 25-43. https://doi.org/10.1355/AE26-1C

Ohshima, H. T. (1987). *Economic growth in monsoon Asia: A comparative survey.* The University of Tokyo Press.

Opanuga, A. A., Okagbue, H. I., Oguntunde, P. E., Bishop, S. A., & Ogundile, O. P. (2019). Learning analytics: Issues on the pupil-teacher ratio in public primary schools in Nigeria. *International Journal of Emerging Technologies in Learning (iJET), 14*(10). 180-199. https://doi.org/10.3991/ijet.v14i10.10129

Otsuka, K., & Banerjee, A.V. (1998). Rural industrialization in East Asia. *The Institutional Foundations of East Asian Economic Development*. Palgrave Macmillan. 447-481. https://doi.org/10.1007/978-1-349-26928-0_14

Otsuka, K., Liu, D., & Murakami, N. (1998). *Industrial reform in China: Past performance and future prospects*. Clarendon Press.

Parish, W. J., & Willis, W. J. (1993). Daughters, education, and family budgets. *Journal of Human Resources*, *28*(4), 863-898. https://doi.org/10.2307/146296

Perkins, D. (2013). *East Asian development: Foundations and strategies.* The Edwin O. Reischauer Lectures.

Philippine Statistic Authority (PSA). (2018). *Statistics*. https://psa.gov.ph/

Psacharopoulos, G. (1985). Return to education: A further international update and implications. *Journal of Human Resources*, *20*(4), 583-604.

Psacharopoulos, G., & Patrinos, H. A. (2004). Returns to investment in education: A further update. *Education Economics, 12*(2), 111-134. https://doi.org/10.1080/0964529042000239140

Ranis, G., & Fei, J. H. C. (1961). A theory of economic development. *American Economic Review, 51*(4), 12-27.

Robert, M. S. (1956). A contribution to the theory of economic growth. *Quarterly Journal of Economics, 70*(1), 65-94. https://doi.org/10.2307/1884513 http://piketty.pse.ens.fr/files/Solow1956.pdf

Rodrik, D. (2007). *One economic many recipes*. Princeton University Press.

Rostow, W. W. (1956). *The stage of economic growth: A non-communist manifesto.* Cambridge University Press.

Royal Government of Cambodia (RGC). (2015). Market orientation and enabling environment for industrial development. *Cambodia Industrial Development Policy 2015 – 2025*. https://www.eurocham-cambodia.org/uploads/97dae-idp_19may15_com_official.pdf

Sachs J. (2012), Government, geography, and growth: The true drivers of economic development. *Foreign Affairs, 91*(5), 142-150.

Sachs J. (2015). 8: Education for all. *The Age of Sustainable Development.* Columbia University Press.

Schultz, P. (2004). School subsidies for the poor: Evaluating the Mexican progress poverty program. *Journal of Development Economics*, *74*, 199-249. https://doi.org/10.1016/j.jdeveco.2003.12.009

Schultz, T. W. (1971). *Investment in human capital*. Free Press.

Sen, A. (1999). *Development as freedom*. Oxford University Press.

Serajuddin, U. and Hamadeh, N. (2020). New World Bank country classifications by income level: 2020-2021. *World Bank Blog*.

https://blogs.worldbank.org/opendata/new-world-bank-country-classifications-income-level-2020-2021

Simon, M. K., & Goes, J. (2011). Assumptions, limitations, delimitations, and scope of the study. *Dissertation and Scholarly Research: Recipes for Success*. Dissertation Success, LLC.

Sonobe, T., Kawakami, M., & Otsuka, K. (2003, October). Changing roles of innovation and imitation in industrial development: The case of the machine tool industry in Taiwan. *Economic Development and Cultural Change, 52*(1), 103-128. https://doi.org/10.1086/380105

Strauss, J., & Thomas, D. (1995). Human resources: Empirical modeling of household and family decisions. *Handbook of Development Economics, 3*(34), 1883-2023.

Studwell, J. (2013). *How Asia works: Success and failure in the world's most dynamic region.* Profile Books.

Surbhi, S. (2016). Difference between primary and secondary data. *Key Differences.* https://keydifferences.com/difference-between-primary-and-secondary-data.html#KeyDifferences

Tran V. T. (2013). The middle-income trap: Issues for members of the association of Southeast Asian nations. *ADBI Working Paper Series*, No. 421, 1-31. https://doi.org/10.2139/ssrn.2266239

Tregenna, F. (2011). Manufacturing productivity, deindustrialization, and reindustrialization. *Working Paper* No. 2011, *57*, United Nations University.

Ueshima, Y., Funaba, T., & Inoki, T. (2006). New technology and demand for educated workers: The experience of Japanese manufacturing in the era of high-speed growth. *Journal of the Japanese and International Economies, 20*(1), 50-76. https://doi.org/10.1016/j.jjie.2004.09.002

UN Comtrade Database. (2020). *International trade in goods and services based on UN Comtrade data*. https://comtrade.un.org/labs/dit-trade-vis/

UNESCO Institute for Statistics (UIS). (2020). Secondary education (ISCED 2 and 3). *Glossary*. http://uis.unesco.org/en/glossary-term/secondary-education-isced-2-and-3

United Nations Development Programme (UNDP). (2019). 2018 Statistical update. *Human Development Reports.*

United Nations (UN). (2018). *Sustainable development goals: Sustainable development knowledge platform*. https://sustainabledevelopment.un.org/?menu=1300

United Nations (UN). (2019). *The sustainable development goals report 2019*. United Nations Publications.

United Nations, Educational, Scientific and Cultural Organization (UNESCO). (2012). *EFA global monitoring report 2012 youth and skills: Putting education to work*, UNESCO, 138-169.

United Nations, Educational, Scientific and Cultural Organization (UNESCO). (2017). World poverty could be cut in half if all adults completed secondary education. *News*. http://uis.unesco.org/en/news/world-poverty-could-be-cut-half-if-all-adults-completed-secondary-education

United Nations, Educational, Scientific and Cultural Organization (UNESCO). (2020). *World inequality data of education (WIDE)*. https://www.education-inequalities.org/

UNICEF Timor-Leste. (2019). Quality education: Realizing rights to quality education for all children. *What We Do.* https://www.unicef.org/timorleste/quality-education

Vorapanya, S., & Dunlap, D. (2014). Inclusive education in Thailand: practices and challenges. *International Journal of Inclusive Education, 18*(10). 1014-1028. https://doi.org/10.1080/13603116.2012.693400

White, A.T., Christie, P., D'Agnes, H., Lowry, K., & Milne, N. (2005). Designing ICM projects for sustainability: Lessons from the Philippines and Indonesia. *Ocean & Coastal Management. 48*(3–6). 271-296. https://doi.org/10.1016/j.ocecoaman.2005.04.007

William, M. K. T. (2020). Unit of analysis. *Research Methods Knowledge Base*. Conjoint.ly. https://conjointly.com/kb/unit-of-analysis/

Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach*. South-Western Pub. 484-500.

World Bank. (1992). *Governance and development.* A World Bank Publication. 1-3. http://documents.worldbank.org/curated/en/604951468739447676/pdf/multi-page.pdf

World Bank. (1993). *The East Asian miracle: Economic growth and public policy.* A World Bank Policy Research Report.

World Bank. (2002). *World development report 2002: Building institutions for markets*. Oxford University Press.

World Bank. (2007). 10 years after the crisis: Special focus: Sustainable development in East Asia's urban fringe. *East Asia and Pacific Update*.

World Bank. (2020). Control of corruption. *Worldwide Governance Indicators*. https://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=cc.pdf

World Bank. (2020). *Doing business 2019: Comparing business regulation in 190 economies.* World Bank Group. https://openknowledge.worldbank.org/bitstream/handle/10986/32436/9781464814402.pdf

World Bank. (2020). *Education statistics*. World Bank Group. https://datacatalog.worldbank.org/dataset/education-statistics

World Bank. (2020). Government effectiveness. *Worldwide Governance Indicators*. https://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=ge.pdf

World Bank. (2020). Political stability and absence of violence/terrorism. *Worldwide Governance Indicators*. https://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=pv.pdf

World Bank. (2020). Regulatory quality. *Worldwide Governance Indicators*.

https://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=rq.pdf

World Bank. (2020). Rule of law. *Worldwide Governance Indicators*. https://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=rl.pdf

World Bank. (2020). Transport services (% of commercial service exports). *Data catalog*. World Bank Group. https://datacatalog.worldbank.org/transport-services-commercial-service-exports-0

World Bank. (2020). Voice and accountability. *Worldwide Governance Indicators*. https://info.worldbank.org/governance/wgi/Home/downLoadFile?fileName=va.pdf

World Bank. (2020). *World bank open data*. https://data.worldbank.org/

World Bank. (2020). *World development indicators (WDI) 2019.* http://wdi.worldbank.org/tables

World Bank. (2020). *World governance indicators (WGI) 2019.* http://info.worldbank.org/governance/wgi/#home

World Bank & PRC. (2012). *China 2030: Building a modern, harmonious, and creative high-income society*. The World Bank & Development Research Center of the State Council.

World Economic Forum. (2014). *Global competitiveness report 2014-2015*. World Economic Forum.

World Health Organization (WHO). (2020). Coronavirus disease (COVID-19) pandemic. https://www.who.int/emergencies/diseases/novel-coronavirus-2019

Yamamura, E., Sonobe, T., & Otsuka, K. (2003a). Human capital, cluster formation, and international relocation: The case of the garment industry in Japan, 1968-1998. *Journal of Economic Geography, 3*(1), 37-56. https://doi.org/10.1093/jeg/3.1.37

Ziliak, J. P. (1997). Efficient estimation with panel data when instruments are predetermined: An empirical comparison of moment-condition. *Journal of Business and Economic Statistics, 15*(4), 419-431. https://doi.org/10.1080/07350015.1997.10524720

Japanese

井出 穣治 (Ide, J.). (2017).『フィリピン- 急成長する若き「大国」』(*The Philippines - "The young and big Economy" with rapid growth*). 中公新書 (Chuukou-Shinsho).

大塚啓二郎 (Otsuka, K.). (2014).『なぜ貧しい国はなくならないのか? 正しい開発戦略を考える』(*Why do the impoverished countries never disappear? Thinking about the right choice of development strategies.*), 日本経済新聞社 (The Japanese Economy Newspaper).

大塚啓二郎・黒崎卓 (Otsuka, K. & Kurosaki, T.). (2003),『教育と経済発展ー途上国における貧困削減に向けて』(*Education and economic development: For poverty reduction in developing countries.*), 日本経済新聞社 (The Japan Economic Newspaper).

大野健一 (Ohno, K.). (2010).「中所得のわなを回避する ために: ベトナムの産業政策策定能力の強化」(For avoiding the middle-income trap: Capacity-building of the industrial policy-making in Vietnam).

大坪滋・木村宏恒・伊東早苗編 (Otsubo, S., Kimura, H., & Ito, S.). (2009).『国際開発学入門－開発学の学際的構築』(*Introduction to international development studies – An interdisciplinary approach to development studies*). 勁草テキスト・セレクション (Keiso Text Selection).

奥井亮 (Okui, R.). (2015).「固定効果と変動効果」(Fixed effect and random effect)『日本労働研究雑誌』(*The Journal of Japanese Labor Study.*) No. 657. 6-9.

苅込俊二 (Karikomi, S.). (2017).「中所得国における持続的成長のための基盤・要件に関する研究」(Conditions for the sustainable economic growth in the middle-income economies.). 早稲田大学審査学位論文（博士） (Referee Doctoral Dissertation at Waseda University). 19, 20, & 21.

北村 行伸 (Kitamura, Y.). (2006).「パネルデータの意義とその活用－ なぜパネルデータが必要になったのか」(The meaning and availability of the panel data analysis – Why has the panel data analysis has become necessary?),『特集●あらためて「データ」について考える』(*The Series of Reconsideration of "Data"*), 6-16.

黒田 一雄・横関 祐美子 (Kuroda, K. & Yokozeki, Y.). (2005)『国際教育開発論－理論と実践』*(International education for development - Theory and practice*), 有斐閣 (Yuhikaku), 122-140.

桑森啓・内田陽子・玉村千治編 (Kuwamori, H., Uchida, Y., & Tamamura, C.). (2014). 「第5章：RCA指数の比較方法に関する一考察」 (Chapter 5: A study on the comparative method of the RCA index),『貿易指数データベースの作成と分析－東アジア地域を中心として－(中間報告) 』, (*Making the RCA database for analysis in East Asia (Mid-term)*), 調査研究報告書 (Working Paper for Research), アジア経済研究所 (Institute of Developing Economies), 111-113.

公益社団法人 シャンティ国際ボランティア会 (Shanti Volunteer Association (SVA)). (2020).「カンボジア－国の歴史と教育問題」(Cambodia – the national history and educational issues). https://sva.or.jp/activity/oversea/cambodia/background.html

澤田康之 (Sawada, Y.). (2004).「ミレニアム開発目標 (MDGs)と応用計量経済学 (Millennium development goals and applied econometrics).『日本経済学会2004年春季大会接待セッション』(*2004 Japanese Economic Association Spring Meeting Session*).

ジェトロ・アジア経済研究所 朽木昭文・野上裕生・山形辰史 (JETRO Economic Research Institute/ Kuchiki, A. Nogami, H., & Yamagata, T.). (2010).「第4章：人的資源」 (Chapter 4: Human resource),『テキストブック開発経済学』(*Development Economics*) 有斐閣ブックス (Yuhikaku Books)

鈴木 有理佳 (Suzuki, Y.). (2019).「第 1 章：フィリピン労働力人口の最終学歴と就業先 」 (Chapter 1: Final academic background and job-choice of the labor population in the Philippines). 柏原千英編 (Kashiwabara, C.)『フィリピンにおける就労状況・労働市場と経済発展』(*Working condition, labor market, and economic development in the*

Philippines) 研究会調査研究報告書 (Working Paper for Research) アジア経済研究所 (JETRO).

スタッツギルド (Stats Guild). (2020).「欠損値の分析や多重代入法に対応するSPSSオプション」(IBM SPSS Missing Values). *IBM SPSS Statistics 27*. https://www.stats-guild.com/ibm-spss/option-missing-values

田中 隆一 (Tanaka, R.). (2015).「第9章　パネルデータ分析―繰り返し観察することでわかること」(Chapter 9: Panel data analysis- Findings through the repetitive observation).『計量経済学の第一歩：実証分析のススメ』(*The first step for econometrics: A recommendation of the empirical analysis*). 有斐閣 (Yuhikaku).

トラン ヴァントゥ (Tran, V. T.). (2010).『ベトナム経済発展論－中所得国の罠と新たなドイモイ』(*Development and transition in the Vietnamese economy*). 勁草書房 (Keiso Shobo).

トラン ヴァントゥ (Tran, V. T.). (2016),「アジア新興国と中所得国の罠」(Emerging economies and the middle-income trap in Asian perspective). 日本国際経済学会 国際経済 第67巻 (*The Japan Society of International Economics – International Economics, Vol. 67*). 69-103.

トラン ヴァントゥ (Tran, V. T.). (2016),『ASEAN経済新時代と日本－各国経済と地域の新展開』(*The new horizon of the ASEAN economies and Japan – The new development of each economy and area*), 文真堂 (Bunshindo Publishing).

独立行政法人経済研究所 (Research Institute of Economy, Trade, and Industry (RIETI)). (2017).「アジア経済の展望とアジア開発銀行の役割」（The economic perspective in Asia and the ADB's roles）. https://www.rieti.go.jp/jp/events/bbl/17091501.html

野村友和 (Nomura, K.). (2011).「計量経済学とは? ー計量分析演習」(What is econometrics? – An econometric analysis review and tasks). https://happylibus.com/doc/973280/

正木郁太郎(Masaki, I.). (2017).「「統計的に有意」とは何か？」(What does “statistically significant” mean?). Business Research Lab. https://www.business-research-lab.com/single-post/20190124

松下幸敏 (Matsushita, Y.). (2015).「多重回帰と操作変数法」(Multiple-regression and instrumental variable method).『日本労働研究雑誌』(*Journal of Labor Research in Japan*). No. 657. 10-11.

三橋貴明 (Mitsuhashi, T.). (2013).『ミャンマー 驚きの素顔 現地取材 アジア最後のフロンティア』(*Myanmar The Amazing Real Face through Local Coverage – A Final Frontier in Asia.*). 実業之日本社(Jitsugyo no Nihon Sha, Ltd.).

水本篤・竹内理 (Mizumoto, A. & Takeuchi, S.). (2010).「効果量と検定力分析入門 ー統計的検定を正しく使うためにー」(An introduction of effect size and power analysis – for appropriate use of statistic test)『より良い外国語教育研究のための方法』(*Methods for Foreign Languages Education Research*). 外国語教育メディア学会 (Languages Education Team) 関西支部 (Kansai Branch) メソドロジー研究部会 (Methodology Research Group), 2010 年度報告論集 (A Summary of Reports for Year of 2010). 47ー73.

山田満・苅込俊二 (Yamada, M. & Karikomi, S.). (2020).『アジアダイナミズムとベトナムの経済発展ートランヴァントゥ先生退職記念論文集』(*The Asian dynamism and economic development in Vietnam*). 文眞堂 (Bunshindo).

渡辺利夫 (Watanabe, T.). (2012).『開発経済学入門』(*Introduction to development economics*). 東洋経済新報社 (Toyo Keizai Shinposha).

Appendix A: Reprint Permission From Tran Van Tho

【Gentle Inquiry】Reprint Permission of Using Data in Your Working Paper) (Masatoshi Hara/Walden University)

差出人: Tran Van Tho <[redacted]>
送信日時: 2020年5月8日 22:20
宛先: Masatoshi Hara <[redacted]>
CC: Masatoshi Hara <[redacted]>
件名: Re: 【(Gentle Inquiry)】(Reprint Permission of Using Data in Your Working Paper) (Masatoshi Hara/Walden University)

Dear Masatoshi Hara,
Your request for "Reprint Permission" on my paper (and related figures and tables) cited below was confirmed.
Tran Van Tho

- Table 1: Economic Growth Rate and Income Level in East Asian Nations. (P. 71)
- Table 2: The Trend of Income Level in Emerging Economies in Asian Countries (P. 74)
- Figure 2: Development Stages of an Economy (P. 78)
- Figure 3: Pattern of International Competitiveness of a Sustained Growth Economy(P. 86)

On Fri, May 8, 2020 at 9:53 PM Masatoshi Hara wrote:

> Dear Dr. Tran Van Tho,
>
> Here is my gentle request to reply to me to get permission from you to use several data and models you made in your previous study when you were working at Waseda University in Japan.
>
> Due to the university policy of getting "Reprint Permission" from you officially for me to avoid plagiarism in my doctoral dissertation relevant to Middle-income Trap and education at Walden University in the United States, kindly allow me to use the following data used in your following working paper and data below:
>
> Paper Title: "Emerging Economies and the Middle Income Trap in Asian Perspective" (2016)
> *The Japan Society of International Economics – International Economics Vol. 67.*
>
> - Table 1: Economic Growth Rate and Income Level in East Asian Nations. (P. 71)
> - Table 2: The Trend of Income Level in Emerging Economies in Asian Countries (P. 74)
> - Figure 2: Development Stages of an Economy (P. 78)
> - Figure 3: Pattern of International Competitiveness of a Sustained Growth Economy(P. 86)
>
> These data will be employed for making a new framework in my doctoral dissertation.
> Also, kindly permit me to use this e-mail as official evidence of reprint permission from you.
>
> Your kind understanding and reply would be appreciated.
> Thank you and Best regards
>
> Masatoshi Hara
> Ph.D. Student
> School of Public Policy and Administration
> Walden University

Appendix B: Reprint Permission From the University of Groningen

【Gentle Request)】Reprint Permission of Using Data (Masatoshi Hara/Walden University)

差出人: P.J. Woltjer <[redacted]>
送信日時: 2020年5月11日 17:43
宛先: Masatoshi Hara <[redacted]>
CC: Masatoshi Hara <[redacted]>
件名: Re: 【Gentle Request)】 Reprint Permission of Using Data (Masatoshi Hara/Walden University)

Dear Masatoshi Hara,

I hereby grant permission to utilize the Maddison data you cited. Note that we license our data under the Creative Commons Attribution 4.0 International License meaning users have permission to share and adapt any of our data as long as it is properly cited.

Best regards,
Jop

Dr. Pieter (Jop) Woltjer | Post Doctoral Researcher | University of Groningen | E: [redacted] | W: [redacted]

On 2020-05-08 15:14, Masatoshi Hara wrote:

> Dear Sir/Madam
>
> This is Masatoshi Hara, a Ph.D. student at Walden Univerisity in the United States.
> Here is my gentle request to reply to me to get permission from you to use several data you made in your study.
>
> Due to the university policy of getting "Reprint Permission" from you officially for me to avoid plagiarism in my doctoral dissertation relevant to Middle-income Trap and education at Walden University in the United States, even if it is the publicly-open data, kindly allow me to use the following data below:
>
> Data Name: "Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD
> (Horizontal file, copyright Angus Maddison, University of Groningen)"
> Retrieved from http://www.ggdc.net/maddison/oriindex.htm
>
> These data will be employed for showing a simple statistic data of GDP in my doctoral dissertation.
> Also, kindly permit me to use this e-mail as official evidence of reprint permission from you.
> Kindly also let me know if there is a specific procedure for allowing me to use the publicly-open data for my academic study.
>
> Your kind understanding and reply would be appreciated.
> Thank you and Best regards
>
> Masatoshi Hara
> Ph.D. Student