International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 6 Issue 22 (September 2023) PP. 125-137
DOI: 10.35631/IJEMP.622009

INTERNATIONAL JOURNAL OF ENTREPRENEURSHIP AND MANAGEMENT PRACTICES (IJEMP)
www.ijemp.com

DETERMINANTS OF FOREIGN DIRECT INVESTMENT INFLOWS: CASE STUDY OF ASEAN+3 COUNTRIES

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Article Info:

Article history:
Received date: 31.07.2023
Revised date: 20.08.2023
Accepted date: 24.09.2023
Published date: 27.09.2023

To cite this document:

Kamis, S., & Yusuf, D. H. M. (2023). Determinants Of Foreign Direct Investment Inflows: Case Study Of Asean+3 Countries 4 (32), 12-19. *International Journal of Entrepreneurship and Management Practices, 6* (22), 125-137.

DOI: 10.35631/IJEMP.622009.

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Abstract:

Foreign direct investment (FDI) has the potential to stimulate economic growth and create employment opportunities. The recent significant decline in FDI inflows within Asean+3 (AS3) countries raise concerns about its potential impact on regional economic development. Numerous prior studies have examined a wide range of factors that can affect FDI, including interest rate, market size, inflation, and infrastructure. Notably, innovation has been overlooked as a potential factor in these previous studies. In this review, the patent serves as a proxy for innovation. The sophistication of the research and development can be of interest to foreign investors. This study examines whether improvements in terms of research and development can significantly affect foreign direct investment in the region. Based on previous empirical research, the results the decision is not yet conclusive for determinants of FDI inflows in AS3 countries. However, it's worth highlighting that there is currently a dearth of research in the context of AS3 countries on this subject. For the sake of examining the long-run relationship between the independent and dependent variables the auto regressive distributed lag (ARDL) model is applied in this study. The Panel Autoregressive Distributed Lag (Panel ARDL) is a statistical model employed for analyzing the connections between variables in a panel dataset.

Keywords:

Innovation; Interest Rate; Inflation; Market Size; Infrastructure

Introduction – Innovation

According to UNCTAD's findings in 2021, foreign direct investment (FDI) is a key component within a nation's financial account as part of its balance of payments. FDI involves foreign investments that entail long-term ownership interests and a significant degree of control by

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International Journal of Entrepreneurship and Management Practices
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EISSN : 2600-8750
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foreign direct investors. It's worth noting that FDI excludes foreign investments made in the stock market. FDI can be classified into two main categories: inward FDI, which represents the value of direct investments made by investors who are not residents of the host country.

Numerous studies have pointed out the strong connection between innovation, technology, and various economic factors (Singh, 2019). Contrary to some studies, it has been found that countries with a favorable environment for innovation and high levels of economic development tend to experience an increase in FDI (Loukil, 2020). However, not many studies have examined the effect of innovation as a determinant for FDI inflows. Even more scarce are studies looking at innovation conducted among Asean+3 (AS3) countries. Therefore, a new study is needed to enhance our understanding of the influence on innovation on the inflow of FDI, specifically, into AS3 countries.

Moreover, there is a lack of consensus among researchers regarding the most appropriate measure for innovation. While the majority of previous studies have used research expenditure as the proxy for innovation (Grace, 2019), there has been limited research that relies on patents as a proxy (Burhan, Singh, & Jain, 2017; Ghimire & Paudel, 2019). Innovation and research expenditure are distinct concepts. Innovation involves the creation, development, and implementation of new products, processes, or services with the aim of enhancing efficiency, effectiveness, or gaining a competitive advantage. On the other hand, research and development (R&D) encompass the activities undertaken by companies to innovate and introduce new products and services. It often serves as the initial stage in the development process, with the primary goal being to introduce new products and services to the market and contribute to the company's financial performance. Furthermore, an unanswered question remains concerning the relationship between innovation and foreign direct investment (FDI) inflows in AS3 countries. The absence of studies that use patents as a measurement of innovation in AS3 countries contributes to this knowledge gap.

Literature Review

According to Jaiblai & Shenai (2019), in their article on Foreign Direct Investment (FDI), the authors noted that investment entails establishing enduring relationships between two countries, indicating a sustained interest. This investment is managed either by a resident entity within an economy, such as a foreign direct investor or holding company, or by a resident enterprise distinct from FDI, including FDI companies, foreign affiliates, or associates. According to Polyxeni & Theodore (2019), FDI refers to the ownership of capital or a significant stake in a country by investors originating from different countries. Besides, Vasileva (2018) stated that FDI is not the sole powerful instrument in promoting economic relations between two global economies. It also has the potential to contribute to higher productivity, increased employment, and a boost in GDP. FDI can serve as a catalyst for economic growth, making it a subject of significant interest for numerous researchers who seek to explore various factors influencing FDI., such as market size, infrastructure, etc (Bakar, Mat, & Harun, 2012; Jaiblai & Shenai, 2019; Kumari & Sharma, 2017; Polyxeni & Theodore, 2019). However, they produced inconsistent findings. From the review of previous literature, several factors that can potentially influence FDI, such as innovation, interest rate, market size, inflation, and infrastructure, have been identified as follows:

Innovation

According to World Investment Report (UNCTAD, 2018), innovation is an idea that has been transformed into practical reality. For a business, this is a product, process, or business concept,

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or combinations that have been activated in the marketplace and produce new profits and growth for the organization. Innovation has interlinkage explanations it can be something new ideas, method, process, and device. Since globalization, most of countries must deal with global competition, which forces them to reach a higher performance level each day.

Mohamad & Bani (2017) investigated the impact of high inflows of FDI and absorptive capacity on technological innovations in developing economies. The study utilizing panel data from 1997-2014 for a sample of 39 developing countries and applying the System-GMM estimator. The estimated results show that FDI and absorptive capacity do not have significant effect on technological innovation when estimated separately.

Similarly Nadia Elmi (2017) examined the impact of innovation and FDI on the export of high-technology products Asian-10 countries.. The result showed that FDI and innovation of importer countries have a negative and significant impact on exports of high-technology Asian-10. Based on discussion on previous study above, it is expected that innovation will have a positive relationship with FDI inflows.

Interest rate

Real interest rates are usually used as the measurement of how credible a country's economic policy is for investors. The interest rate is also used to predict the future economics of the country, including policy changes (Grace, 2019).

Fazira & Cahyadin (2018) analysed the impact of economic growth, interest rate, and CPI on FDI in ASEAN-6 in 2004-2016. ASEAN-6 were six of ASEAN member countries: Indonesia, Singapore, Malaysia, Thailand, Philip- pines, and Vietnam. The secondary data was collected from the reports of the World Bank, UNCTAD and Transparency International. This research used panel data with Fixed Effect Model (FEM). This research concluded that economic growth and interest rate had a positive and significant impact on FDI while CPI had a negative and significant impact on FDI.

Vidhya & Inayath Ahamed (2019) investigated the relationship of interest rate, exchange rate, GDP and FDI with respect to Chinese economy. The study employs Linear and Multiple Regression analysis, Correlation test, Co-integration, Granger casualty and Impulse analysis in this research. This result indicated that interest rate has an effect of FDI.

Market Size

Numerous earlier studies have reached the consensus that market size plays a pivotal role in positively influencing FDI (Goh & Wong, 2011; Nasir, 2016; Nketiah-Amponsah & Sarpong, 2019; Petrović-Ranđelović, Janković-Milić, & Kostadinović, 2017). In these investigations, economic growth and GDP were commonly used as proxies to measure market size. Many of these studies adopted panel data analysis techniques to explore the relationship between market size and FDI. Nasir (2016) used the OLS approach to investigate the effect of market size on FDI in Malaysia from 1980 to 2010. The study found that market size can positively and significantly influence FDI.

Subramaniam, Rasiah, Selvaratnam, & Ramachandran (2021) examines the long-run relationships and short run dynamic interactions between FDI and its determinants comprising of market size, trade openness, stock market capitalisation and financial development over the period 1970 to 2019. The study applies the dynamic heterogeneous panel estimation techniques

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of Mean Group (MG), Pooled Mean Group (PMG) and Dynamic Fixed Effects (DFE) to analyse a set of macro panel data of the ASEAN-5 countries, to establish the possible relationships between these variables. An analysis of the results reveals the existence of a long-run causality between FDI and its predictors, indicated by the significant error correction terms for the models tested in this study. There is evidence that market size and stock market capitalization significantly contribute to FDI, with market size being the most dominant contributor. Interestingly, the study also reveals that trade openness and financial development are not significant in determining FDI in the selected countries.

Economou, Hassapis, Philippas, & Tsionas (2017) applied standard fixed effects as well as a dynamic panel approach to study 24 Organisations for Economic Cooperation and Development (OECD) and 22 developing nations (non-OECD) from 1980 to 2012. The study considered a group of developing countries to improve their proportion of global FDI inflows. Nketiah-Amponsah & Sarpong (2019) supported the finding, examining the impact of market size on FDI in 85 developing countries by using the panel OLS method from 1981 to 2014. The results disclosed that market size is an essential determinant of FDI. Petrović-Ranđelović et al. (2017) also employed the same method and obtained the same results. However, Seref Akin (2010) argued that market size does not relate to FDI. The study used the panel OLS method to analyse data from developing countries, and the results revealed that a larger market size does not significantly impact FDI. Sasana & Fathoni (2019) analysed whether market size can influence FDI in the ASEAN countries, namely Cambodia, Indonesia, Malaysia, Philippines, Thailand, and Vietnam, from 2007 to 2016. The method used to analyse the data was multilinear regression. This study shows that market size positively affects FDI based on the results. This research suggests that a more expansive market size will benefit foreign investors to make more products.

Inflation

Despite the multitude of studies that have investigated the correlation between inflation and FDI (Alshamsi, Hussin, & Azam, 2015; Omankhanlen, 2011; Vasileva, 2018), there remains a lack of consensus regarding whether inflation can indeed impact FDI. Certain studies, such as the one conducted by Alshamsi et al. (2015), discovered no significant relationship between inflation and FDI. In their research, they utilized the ARDL method to analyze data spanning from 1980 to 2013, and their findings indicated that inflation does not exert any effect on FDI in the United Arab Emirates. This suggests that, as long as inflation remains below a certain threshold, it may not pose a detrimental impact on FDI. Consequently, it becomes imperative for the government to implement measures that ensure inflation does not exceed the current or recent inflation rate, as doing so could deter FDI inflows.

Agudze and Ibhagui's research in 2021 (Agudze & Ibhagui, 2021) uncovered a connection between inflation and FDI. They conducted an examination into how inflation impacts FDI across 74 countries, which were categorized into developed and developing economies. The results of their study revealed that the relationship between inflation and FDI is not straightforward; instead, it exhibits evidence of threshold effects in both developed and developing nations. According to their findings, there exists an inflation threshold in the developing world that is approximately five times higher than that observed in the developed world. Beyond this threshold, inflation tends to have a diminishing effect on FDI in industrialized economies. In contrast, in developing countries, inflation negatively influences FDI even before reaching the threshold, suggesting a mixed, long-term relationship between inflation and FDI in these regions.

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In Malaysia and Iran, Hong & Ali (2020) looked at the impact of inflation on FDI. The study's testing period spanned from 1986 to 2016. The short-run and long-run relationships between the variables were investigated using Johansen cointegration and Granger causality based on VECM approaches. Finally, the variance decomposition was carried out. The findings of this study indicate that inflation can have a lasting impact on FDI. Given that FDI plays a significant role in contributing to a country's economic growth, it is imperative for the government to implement supply-side measures aimed at reducing inflation and stimulating FDI. These supply-side policies are designed to enhance long-term competitiveness and productivity, ultimately alleviating inflationary pressures over time.

By improving economic competitiveness through these policies, the nation can also boost productivity and aggregate supply. This heightened economic competitiveness will attract a greater number of international investors, thereby leading to an increase in FDI. Consequently, the implementation of these measures can result in a rise in foreign direct investment, contributing positively to the country's economic growth.

Infrastructure

One of the factors that can influence FDI is infrastructure. This has been evidenced by many previous studies as reported by A. W., Aimon, & Triani (2018); Afiqah Ahmad, Lee Yim Mei, & Hamid Mar Iman (2015); Bakar et al. (2012); Mohammadvandnahidi, Jaberikhosroshahi, & Norouzi (2012); Ngangue (2016); Nguea (2020); Nourzad, Greenwold, & Yang (2014); Ogunjimi & Amune (2019); Rahman (2011); Rehman, Ilyas, Mobeen Alam, & Akram (2011); Sabir, Rafique, & Abbas (2019); Wekesa, Wawire, & Kosimbei (2016). They produced mixed findings on the effect of infrastructure on FDI, albeit with different methods. Rehman et al., (2011) used the ARDL approach to analyse data from 1975 to 2008 and investigated the impact of infrastructure on FDI in Pakistan. The results revealed that there is a positive impact of infrastructure on FDI. The results were supported by Bakar et al. (2012), who also investigated the effect of infrastructure on FDI. Bakar et al. (2012) used a different method, namely OLS, to analyse data from Malaysia. The results of the study revealed a robust and positive correlation between FDI and the quality of infrastructure. This implies that nations with a higher standard of infrastructure are more likely to attract FDI because better infrastructure enables multinational corporations (MNCs) to operate at their highest levels of efficiency and effectiveness.

Infrastructure has been demonstrated to have a notable impact on FDI in Nigeria, as supported by research conducted by Ogunjimi & Amune (2019), using data spanning from 1981 to 2014. Their study employed the ARDL method to investigate the long-term relationships between various variables. The results of their research indicated the existence of a long-term relationship between infrastructure and FDI in Nigeria. The specific infrastructure components examined in this study encompassed electricity production, telephone lines, and tractors, which play pivotal roles in driving production within the manufacturing, services, and agricultural sectors.

Furthermore, another study by Nguea (2020) divided infrastructure into three categories: energy, transportation, and communication. However, the findings presented in this study were somewhat mixed. Nguea (2020) employed the ARDL approach to analyze data covering the period from 1984 to 2014. The results showed that communication infrastructure had a positive and significant impact on FDI in both the long and short run. However, energy infrastructure

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EISSN : 2600-8750
Volume 6 Issue 22 (September 2023) PP. 125-137
DOI: 10.35631/IJEMP.622009
was found to have a substantial negative impact on FDI, persisting in both the long and short run.

The research conducted by Sabir et al. (2019) explored the influence of infrastructure on FDI inflows in developed countries. They categorized the countries into two groups: high-income and upper-middle-income countries and examined data spanning from 1996 to 2016. Their findings indicated that infrastructure has a positive impact on FDI in developing countries. Enhancing and developing infrastructure can lead to increased productivity within a country, consequently making it more attractive to foreign direct investment. Notably, the study observed that the coefficient of infrastructure in high-income countries had a more substantial effect compared to that in upper-middle-income countries, underscoring the greater significance of infrastructure in driving FDI in higher-income nations.

Research Methodology

Methodology is a set of rules or system to overcome the research problem. In order to achieve the objectives, with is to identify the determinants of FDI inflows in the AS3 countries and to see the impact of the variables on the inflows of FDI in the AS3 countries. This study needs to choose from the various procedures, models, and method of research methodology. Therefore, this study has to point out the steps of method used in the process of analysing the data. In this chapter the question of how to collect data, the reason of choosing this method to obtain data, techniques used to analyse sets of data and any others question will be answered. The previous researcher has provided the effective ways to collect and analyse the data thus it makes the researcher can easily choose and make decision in the right position that may prepared a strong answer to the research question. Other than that, the following subtopics will be discussed on the research design, method of data collection, data processing and methods of data analysis.

This study employs explanatory and quantitative analysis to present dependable and comprehensive findings. Its objective is to investigate the determinants of FDI in the AS3 countries, namely innovation, interest rate, market size, infrastructure, and inflation. The selected independent variables for this research include innovation, interest rate, market size, infrastructure, and inflation, while the dependent variable is the net inflow of FDI in the AS3 countries.

Study Framework

The study framework is displayed below, outlining the relationship between the proposed dependent variable (FDI Inflow) and the independent variables (IVs) for this research, namely innovation, interest rate, market size, inflation, and infrastructure.

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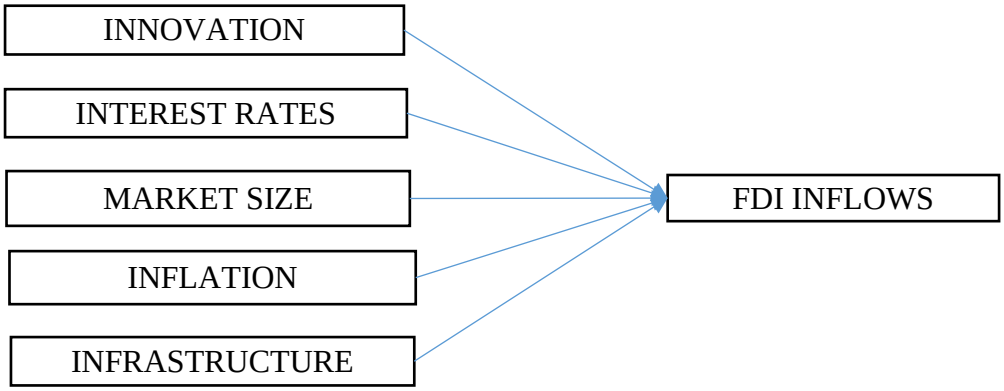

Figure 3: Proposed Study Framework

Data Source

For this study, a panel data set containing AS3 countries from 1995 to 2018 is employed. The data is sourced from the World Bank Development Indicator (World Bank, 2020). The main interest of this research lies in examining five independent variables: innovation, interest rate, market size, inflation, and infrastructure. These variables are crucial to the study and form the core focus of the analysis.

Data Analysis

Panel Data analysis

This study adopted a panel approach by utilizing panel data (also referred to as longitudinal or cross-sectional time series data). Panel data enables the observation of entities (such as states, companies, individuals, or countries) over time, allowing for the identification of distinct characteristics and variations among the data points. This approach provides greater flexibility in exploring the relationships between explanatory variables and the dependent variable.

In this study, multiple regression models were employed to test the relationships between FDI and other independent variables. The use of multiple regression models was necessary due to the five independent variables that required testing. The researcher chose to use STATA 14 for the analysis as it allowed for more accurate and precise assimilation of the collected data, enabling a thorough examination of the relationship between the dependent and independent variables. Additionally, STATA 14 offers a wider range of statistical analysis, simplifying the overall analysis process. The interpretation of the regression analysis was based on Multiple Regression Analysis, T-test, Coefficient of Determination (R^2), and F-test. These tests were utilized to provide evidence supporting or refuting the study's hypotheses.

Descriptive Analysis

This study employed descriptive analysis to provide a concise summary of the given data set, whether it represents the entire population or a sample. Descriptive analysis includes measures of central tendency, such as the mean, median, and mode, offering insights into the data's typical or central values. Additionally, measures of variability, such as the standard deviation, variance, as well as the minimum and maximum variables, will be used to understand the data's spread or dispersion.

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Panel Unit Root Test

In this study, the Panel Unit Root Test was implemented as the chosen method to examine whether a financial variable demonstrates a random walk behavior. If the test does not reject the presence of a unit root in the series, it indicates that the series indeed follows a random walk pattern. It is important to note that in probability theory and statistics, a unit root is a feature observed in certain stochastic processes, such as random walks, which can pose challenges when making statistical inferences involving time series models.

Panel Co-Integration Analysis

In this study, Panel Co-Integration Analysis was employed. The application of cointegration techniques to examine long-run relationships among integrated variables has become increasingly popular in empirical research. However, when expanding the time horizon to include pre-war data, there is a potential risk of introducing undesired changes in the data relationships due to shifts in regimes. Considering these data limitations, it is reasonable to consider an alternative approach, wherein additional data from similar cross-sectional sources is utilized instead of extending the time periods, to address specific cointegration hypotheses effectively.

Panel ARDL/Pool Mean Group (PMG)

This study adopted a panel ARDL model, specifically utilizing the Pooled Mean Group (PMG) estimation method introduced by Othman, Norashida; Yusop, Zulkornain; Andaman, Gul; Ismail (2016). The panel ARDL model was chosen due to its ability to effectively capture both the long-term and short-term relationships among the variables of interest.

Additionally, the PMG model was deemed a suitable approach for analyzing time series data, considering its capacity to handle potential variations in the level of serial correlation among different groups or individuals. By allowing for individualized responses rather than imposing uniform assumptions, the PMG model avoids potential biases in the results. As a result, cases where the model assumptions are appropriately met remain unbiased, leading to more robust and accurate outcomes.

Correlation Analysis

In this research, Correlation Analysis was employed, entailing the calculation of a sample correlation coefficient, specifically utilizing the Pearson Product Moment correlation coefficient. Represented as "r," this sample correlation coefficient ranges from -1 to +1, serving to assess both the intensity and direction of the linear association between the two examined variables.

The relationship between two variables can show a positive correlation (meaning higher values of one variable correspond to higher values of the other) or a negative correlation (meaning higher values of one variable correspond to lower values of the other). The correlation coefficient's sign indicates the direction of the relationship, while its magnitude reflects the strength of the association. For example, a correlation coefficient of r = 0.9 suggests a strong, positive association between the two variables, while a correlation coefficient of r = -0.2 indicates a weak, negative association. Additionally, a correlation coefficient close to zero suggests that there is little to no significant linear association between the two continuous variables.

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Regression Analysis

Regression Analysis was utilized in this study as a statistical tool to examine the relationship between variables. R-squared, a significant statistical measure, indicates the proportion of the variance in the dependent variable that can be explained by the independent variable.

In the context of investing, R-squared serves as a valuable indicator, representing the percentage of a fund or security's movements that can be attributed to movements in a benchmark. Additionally, the F-test was employed to determine whether there is a significant relationship between the independent and dependent variables. Moreover, the F-test was utilized to assess the overall significance of this relationship. Furthermore, the test was used to compare the means of two groups, determining whether a significant difference exists between them.

Multi-Co Linearity Test

Multi-collinearity arises when two or more predictors within the model exhibit correlation, leading to the provision of duplicated information regarding the response variable. Detecting multi-collinearity is crucial to identify potential issues in the model. In this study, the researchers utilized Variance Inflation Factors (VIF) to assess the presence of multi-collinearity and its impact on the model's validity. By employing VIF, the study aimed to determine the extent of correlation among predictors, ensuring the reliability of the analysis and the accuracy of the results.

Model Specifications

This study adopted a panel approach, utilizing panel data (also known as longitudinal or cross-sectional time series data) that observed the behavior of entities (states, companies, individuals, or countries) over time. The utilization of panel data allows for the identification of unique characteristics and variations in the data points, thereby providing greater flexibility to explore the relationships between explanatory variables and the dependent variable.

According to Gujarati & Porter (2009) panel data is particularly advantageous as it offers more informative data, greater variability, consistency, and reduced collinearity among explanatory variables. Additionally, panel data allows for enhanced efficiency and a higher degree of freedom. Furthermore, it enables the control of unobserved individual heterogeneity that may differ across entities but remains constant over time, mitigating the risk of omitted variable bias and facilitating the detection and measurement of effects.

The primary objective of this study is to investigate the determinants of FDI inflows in AS3 countries. To achieve this goal, the researchers adopted a model derived from Kumari & Sharma (2017) to estimate the factors influencing FDI inflow into AS3 countries:

$$FDI1it = \beta1 + \beta2\ INVit + \beta3\ RIit + \beta4\ MSit + \beta5\ INFLit + \beta6\ INFRAit + \delta1\ YDVt + \mu it$$

where and $\beta1$, $\beta2$, $\beta3$, $\beta4$, $\beta5$, $\beta6$ and $\delta1$ are the coefficients of scalar. The subscript i denotes individual countries and subscript t denotes time of data periods. *YDV* are the year dummy variables.

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Measurement of Variable

The proposed measurements for all the variables are as per Table 2.

Table 2: Proposed Measurement of Variables

Variable (Symbol)	Description	Unit of Measurement	Source
FDI Inflow (FDI)	FDI, net inflows (Bop, current FDI inflow US$)	USD	(World Bank, 2020)
Innovation (INV)	Patent applications are worldwide patent applications filed by the Patent Cooperation Treaty procedure or with a national patent office for exclusive rights for an invention.	Number of pattern applicant	(World Bank, 2020)
Interest rate (IR)	The real interest rate (%) is computed by taking into account inflation, as measured by the GDP deflator, and adjusting the lending interest rate accordingly.	Percentage	(World Bank, 2020)
Market size (MS)	The logarithm of GDP (current US$) and GDP at purchaser's prices is the total of gross value added by all resident producers in the economy, including any product taxes, and deducting any subsidies not included in the value of products.	USD	(World Bank, 2020)
Infrastructure	The number of fixed telephone subscriptions per 100 people was chosen as the measurement to evaluate the effectiveness of communication between home (foreign investors) and host (destination) countries. This indicator is considered valuable in assessing the level of communication connectivity between the two nations.	Number of fixed telephone subscriptions per 100 people	(World Bank, 2020)
Inflation	The CPI-based inflation rate denotes the yearly percentage change in the cost of acquiring a basket of goods and services for the average consumer. This basket of goods and services may remain fixed or undergo specified adjustments, such as on an annual basis.	Percentage	(World Bank, 2020)

Key Contribution to The Literature

FDI plays an important role in boosting up a countries' economic growth and its development. Nowadays, developing countries depend on FDI largely to improve their 78 economic performances. To put it into perspective, many developing countries are facing a shortage in capital in the progress of development. FDI does not only create an expansion of capital, but it transfers the technology and skills to developing countries. In this research FDI will be examine

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EISSN : 2600-8750
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DOI: 10.35631/IJEMP.622009

because based on my knowledge there are lack of information about the FDI especially in selected ASEAN+3 Countries.

Conclusion

As a conclusion, this research found that the determinants of FDI inflows to selected ASEAN+3 countries had influenced. Based on the importance of understanding determinants of FDI inflows to selected ASEAN+3 countries and the expected contribution to knowledge and practice, it is believed that the proposed study is deemed time and therefore relevant. Thus, it can be concluded based on above analysis inflation, infrastructure, market size, innovation and interest rate are found as important and significant affecting factors of Foreign Direct Investment Inflow in selected ASEAN+3 Countries.

Acknowledgements

I would like to express my sincere appreciation to the co-authors and the Faculty of Business and Communication University Malaysia Perlis for their support and contributions during the research process.

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International Journal of Entrepreneurship and Management Practices
IJEMP
EISSN : 2600-8750
Volume 6 Issue 22 (September 2023) PP. 125-137
DOI: 10.35631/IJEMP.622009

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International Journal of Entrepreneurship and Management Practices
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EISSN : 2600-8750
Volume 6 Issue 22 (September 2023) PP. 125-137
DOI: 10.35631/IJEMP.622009

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