

-RESEARCH ARTICLE-

## THE ROLE OF PUBLIC/PRIVATE PARTNERSHIP IN DEVELOPMENT OF TRANSPORT INFRASTRUCTURE: EVIDENCE FROM VIETNAM

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### —Abstract—

Transport infrastructural development is considered a significant driver of economic growth and has therefore, gained the attention of scholars and practitioners alike. With this hindsight, the current article examines the impact of public/private partnerships on the development of transport infrastructure in Vietnam. The current research uses population growth, economic growth, and foreign direct investment (FDI) as the control variables to predict transport infrastructure development in Vietnam. This study has used a secondary source of data collection i.e. the World Bank Indicators (WDI) database. Data thus extrapolated covers the period from 1981 to 2020. This study has used the Augmented Dickey-Fuller (ADF) test to test the stationarity of the constructs and the error correction model (ECM) to test the nexus among the variables. The results reveal that public/private partnership, population growth, economic growth and FDI have a positive association with the development of transport infrastructure in Vietnam. These outcomes can guide the regulators while developing policies related to transport infrastructural development.

**Keywords:** Transport infrastructural development, Public/private partnership, Population growth, economic growth, Foreign direct investment

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**JEL Classification: G21, G28, G32, H44****1. INTRODUCTION**

Transport infrastructure refers to the framework that supports our transport system. According to [Costin et al. \(2018\)](#), Transport infrastructure is composed of the fixed installations of waterways, canals, railways, airways, roads, and terminals, along with pipelines like seaports, refueling depots, trucking terminals, airports, railway stations, and bus stations, etc. Thus, transport infrastructure is a collective term used for road infrastructure, airport infrastructure, aviation infrastructure, pedestrian infrastructure, port infrastructure, rail infrastructure, and horse trails. These forms of infrastructure consist of relevant transport buildings, structures, routes, stations, terminals, stops, and transport devices. Transport is integral to the effective functioning of economic processes and key to ensuring cohesion of population and social well-being. People's daily mobility is ensured by transportation, which is also essential for the production and distribution of goods. Infrastructure is a necessary precondition for transportation systems to function properly. [Umar et al. \(2020\)](#), and [Shair et al. \(2021\)](#) argue that transport infrastructure is critical for the country's faster economic growth and poverty reduction. For economic integration with other economies throughout the world, suitable infrastructure in the form of roads and railways, ports, power, and airports, as well as their efficient operation, is required.

The purpose of this study is to analyze public-private partnership practices like public & private investment in transportation, economic growth, foreign direct investment, and population growth, and their impact on transportation infrastructure development in Vietnam - a developing country. Rapid population growth and economic expansion have put enormous stress on the country's existing transportation infrastructure, and many of the country's ports, motorways, and airports are facing congestion and capacity limits as a result of several years of underinvestment ([Baloch et al., 2021](#); [W. Sun et al., 2020](#)). The government has proposed extensive road network renovations in order to overcome the country's expanding infrastructure gap and to boost regional competitiveness, whereas the current development of a new deep-water seaport in Cai Mep is expected to result in an increase trade flows and reduced shipping costs ([H. Sun et al., 2020](#)). Moreover, a flow of making the new investment for aviation fleet upgrades as well as major preplanned airport advancement just outside Ho Chi Minh City is expected to take the majority of the global traveler arrivals through the existent facilities in years of future must fulfill the increasing travelers' demand ([Chien, Sadiq, Kamran, et al., 2021a](#); [Likhitrungsilp et al., 2017](#); [Zhuang et al., 2021](#)).

The encouragement of fresh private investment into the transport system is a significant policy priority, as reflected in recent measures to improve Vietnam's public-private partnership framework, which is expected to assist the country in implementing new road and airport projects. While the development of this project is limited; it is expected

that it will play an important role in developing up-to-date transport infrastructure, building the path for sustainable long-run development, and creating lucrative up-to-date opportunities for both national and international private investors (Chien, Pantamee, et al., 2021). The Ministry of Transport (MoT) is the designated government body that has the responsibility to oversee road, sea, inland waterway, rail, and air transport systems nationwide. It has the responsibility of formulating regulations and policies pertaining to state-owned infrastructure and overseeing the management of transportation services, driver training, environmental protection, traffic safety, and global collaboration. The MoT includes national entities like the Directorate for Roads of Vietnam, the Vietnam Maritime Administration, the Vietnam Inland Waterways Administration, the Civil Aviation Authority of Vietnam (CAAV), and the Vietnam Railway Authority (Chien, Sadiq, Kamran, et al., 2021b; Nguyen et al., 2017). In addition, investment on the transport infrastructure in Vietnam is increasing with time. Figure 1 depicts the increasing trend in the investment on the Vietnam transport infrastructure.



Source: *Global Infrastructure Outlook 2017*

**Figure 1:** Investment on Transport Infrastructure in Vietnam

For some decades, in Vietnam, the need for more transport facilities has been increasing, but there has been a lack of efficient transportation infrastructure (Sharma et al., 2020). The present transportation infrastructures are insufficient in quantity, and they lack required quality as well. It is stakeholders to pay heed to the development of transport infrastructure. Although public-private partnership can solve transportation problems,

most of the private sectors are still unaware of the utilities of the practices of public-private partnership, particularly with regards to the development of transport infrastructure (Chien, Sadiq, Nawaz, et al., 2021; Yang et al., 2018). Our study seeks to analyse the influences of public-private partnership practices like public & private investment in transportation, economic growth, foreign direct investment, and population growth on the transportation infrastructure development in Vietnam. Several past studies have discussed the contribution of public & private investment in transportation, economic growth, foreign direct investment, and population growth as well as their impact on transportation infrastructure development. However, they have either used an umbrella term of public-private partnership or addressed public & private investment in transportation, economic growth, foreign direct investment, and population growth while analyzing the development of transportation infrastructure. Thus, our study, which addresses the influences of public & private investment in transportation, economic growth, foreign direct investment, and population growth on the transportation infrastructure development under the public-private partnership project, is a substantial contribution to the literature as it does both at the same time.

The remaining study is organized into four sections. The next section throws light on different scholars' arguments about the association between the public-private partnership practices like public & private investment in transportation, economic growth, foreign direct investment, and population growth and their impact on the transportation infrastructure development in Vietnam. The third section describes how the quantitative data in support of the concepts of the study has been collected and analyzed. The fourth section shows the results of the study, extracted on the basis of collected data and its analysis. These results are summarised and their importance is clarified in the last portion.

## 2. LITERATURE REVIEW

Transportation infrastructure is an essential component of any city's or state's transportation system. The importance of transportation as a driver of economic and social development has grown in tandem with the development of society and the strengthening of international interactions as a result of globalization processes. Various aspects of activities connected to the development of transportation infrastructure are progressively being studied by scientists. In economic terms, transportation is both a measure of economic activity and a reflection of economic activity (Mohsin et al., 2021; Verweij et al., 2020; Yetkiner et al., 2020). As a result, both academic and non-academic groups are debating problems such as how to quantify the performance of transportation infrastructure and the relationship between transportation infrastructure and economic growth. Moreover, as the transportation sector is of great importance in any society or economy, there must be a ministry of transport which deals with all matters related to transportation (Nawaz, Hussain, et al., 2021; Nikolić et al., 2020). Public-private partnership projects have been undertaken by the ministry of transportation for the

development of transport infrastructure. There are a number of studies that have dealt with the contribution of public & private investment in transportation, economic growth, foreign direct investment, and population growth on the transportation infrastructure development under the public-private partnership project (Fleta-Asín et al., 2020; Nawaz, Seshadri, et al., 2021; Xiao et al., 2020). The present study cites many of these past studies to support its claims and arguments.

A research study conducted by Geddes et al. (2017) sought to analyze the US public-private partnership (PPP) and its effectiveness in enabling transport legislation and public-private investment in transportation infrastructure. It checks how much public-private investment in transportation is needed to effectively develop transport infrastructure. The data from the analysis of the interrelationship among US PPP, transportation legislation, public-private investment in transportation, and transportation infrastructure development was collected from three case studies conducted by different authors in the context of the economies of Florida, California, and Virginia, three states in the US. According to this literary analysis, PPP puts a favorable contribution to the transportation legislation, encourages public-private investment in the transport of the country, and thus, leads to the growth and development of transportation infrastructure. The authors Da Rocha et al. (2018), discuss the impacts of the investment programs implemented by the Brazilian federal government on private investment in transportation infrastructure and transport infrastructure development. A quantitative research design has been applied by this study to collect data from the Brazilian federal government and transportation statistics. Two quantitative techniques like panel data analysis and cluster analysis, have been applied to analyze data. The study results reveal that private investment along with public investment in transportation facilities encourages innovation in transportation infrastructure.

The research article was conducted by Albalade et al. (2020) to analyze the public-private partnership and its role as a source of transportation investment and transportation infrastructure development. For data collection, 177 US transportation PPP projects were analyzed. These projects were completed between 1998 and 2016. Information was collected from the Public Works Financing monthly newsletter, which includes information about all North American PPP projects, allowing for a comprehensive analysis of PPP-enabling laws' effect on private investment. The study posits that public-private collaboration encourages private entities along with state-owned enterprises to invest in transportation. The enhanced investment as a result of this public-private collaboration enables the country to make progress in the transportation sector. The study was conducted by Navalersuph et al. (2021) to identify governance issues and practices of PPP projects in Thailand and their impact on transportation infrastructure development. Data has been collected regarding the practices of the four PPP transportation projects launched by different agencies during different time periods, therefore, applying a case study approach. The projects selected are DMT, SES, BTS,

and MRT blue line, and information of the cases was acquired on the basis of available literature, project documents, and semi-structured interviews with 11 PPP experts. The results show that effectively implemented PPP transportation projects can help increase public-private investment in transportation and thus lead to development in transportation-related infrastructure.

A study conducted by [Xue et al. \(2018\)](#), tests how the new private capital investment in public transportation brings about improvement or innovation in the transport sector infrastructure. The study applies Evolutionary Game Model (EGM) to quantify the influences of private capital investment on transportation infrastructure. Jinan city is selected for a case study about public and private sectors changing their strategies. The results of the applied model show that the proposed investment strategy according to which both public and private entities must equally invest in transportation is superior to traditional strategies for steering development in the transport infrastructure. The work of [Tan et al., 2019](#) analyzes how public-private partnerships play a supplementary role in improving the transport infrastructure for the economy of China. This article reviews different pieces of literature which deal with the fluctuations of China's PPPs over several decades and consolidates quality information about the contribution of PPPs in transportation development. The study results, which were extracted on the basis of this information, show that PPPs enhances the financial resources to be used in constructing or manufacturing transportation infrastructure like waterways, canals, railways, airways, roads, and terminals, along with pipelines like seaports, refueling depots, trucking terminals, airports, railway stations, and bus stations.

Prominent authors like [Mohmand et al. \(2020\)](#), investigate transport infrastructure in China with an aim to examine the causal relationship between economic growth and transport infrastructure development in the country at national and regional levels. The authors examined the causality of the relationship between economic growth and transport infrastructure in a panel co-integration and Granger causality model applying time-series data throughout the period of 1971-2017. The empirical findings indicate that the increase in the economic growth of the country, on the one hand, enhances the need for transportation facilities and, on the other hand, enhances the financial resources of all the commercial entities, whether they belong to private authorities or under state ownership. These enhanced financial resources enable them to make more investment in the transport infrastructure in order to improve transportation capacity. A study by [Cascetta et al. \(2020\)](#) analyzes the interrelationship among the economic growth, transport accessibility, and the social impacts in Italy after ten years of high-speed railways (HSR). Data pertaining the reformation in the transport infrastructure as a result of the high economic growth was acquired from railway staff and passengers in Italy. The data about the transportation investment as a result of high economic growth were tested in terms of the Gini indexes variations with respect to the distribution of transport accessibility.

A study conducted by [Rehman et al. \(2020\)](#) seeks to identify the causal, linear, and non-linear association of the foreign direct investment inflows on the sectorial level and infrastructure of Pakistan. This study analyzes infrastructure in four types of sectors i.e. transport, financial, energy, and telecommunication sector: autoregressive distributed lag (ARDL) and Granger causality approach to co-integration. The analysis shows that there is bidirectional causality between foreign direct investment and infrastructure, whereas non-linear ARDL proves an asymmetric relationship between foreign direct investment and infrastructure. Thus, higher foreign direct investment assists in improving the quality of infrastructure in the transport, financial, energy, and telecommunication sector. Another research by [Falck-Reyes \(2018\)](#) seeks to investigate the influences of Japanese FDI in Mexico at the macro-level. Its emphasis is on the influences of FDI in domestic trade flow and on the formation of regional networks in the transport industry, particularly within the North American Region. The study applies the fragmentation of Production approach for analysis, and data for analysis was collected from the transport equipment sector in Mexico. The results of the study indicate that foreign direct investment particularly contributes to the formation of regional networks in the transport sector.

A literary workout was produced by [Kyriacou et al. \(2019\)](#) with an aim to tests the efficiency of transport infrastructure developed by the government considering the population strength of the country. A sample of 34 countries has been used to collect data pertaining to population strength, government quality, and the efficiency of the total transport infrastructure for the period of 1996-2010. Data Envelopment Analysis was applied to evaluate governments according to their ability to have the maximum quality of transport infrastructure using the given investment volume. The study results indicate that countries where the population strength is high have better quality transport infrastructure while countries having a low rate of population growth, there is lesser need for, and improvement in transportation related infrastructure. The researchers [Đukičin Vučković et al. \(2018\)](#), in their study, identify how necessary the development of the transport infrastructure is because of the increase in the strength of population and the expansion of Urban Areas. The data for the analysis of the relationship between transport infrastructure development and population growth has been collected from the Kolubara District of Western Serbia. High human population density forces the private and public sectors to pay attention to the development of transport infrastructure to meet the increasing transport-related needs.

### 3. RESEARCH METHODOLOGY

This article examines the impact of public/private partnership, population growth, economic growth and foreign direct investment on the development of transport infrastructure in Vietnam. The current research has taken public/private partnership as the independent variable while population growth, economic growth and FDI have been used as control variables and the development of transport infrastructure has been used

as the predictive variable of the study. This study employs a secondary source of data collection and extracts the data from the WDI database for the years between 1981 and 2020. The equation for the study is given as under:

$$TID_t = \alpha_0 + \beta_1 PPIT_t + \beta_2 EG_t + \beta_3 FDI_t + \beta_4 PG_t + e_t \dots \dots \dots (1)$$

Where;

TID	=	Transport Infrastructure Development
$t$	=	Time Period
PPIT	=	Public-Private Investment in Transport
EG	=	Economic Growth
FDI	=	Foreign Direct Investment
PG	=	Population Growth

The predictive variable of transport infrastructure development is measured as the logistic transport index: quality of transport-related infrastructure (1=low, 5=high) (Kirikkaleli et al., 2021). In addition, an independent variable such as public-private partnership is measured as the logarithm of public-private investment in transport (Current US\$) (Välilä, 2020). Moreover, population growth, economic growth and foreign direct investment have been used as the control variables and measured as the population growth (annual percentage), GDP growth (annual %) and FDI, net (% of GDP). These measurements are mentioned in Table 1.

**Table 1: Variables with Measurements**

S#	Variables	Measurement	Sources
01	Transport Infrastructure Development	Logistic transport index: Quality of transport-related infrastructure (1=low, 5=high)	World Bank Database
02	Public-Private Partnership	Logarithm of public private investment in transport (Current US\$)	World Bank Database
03	Population Growth	Population growth (annual percentage)	World Bank Database
04	Economic Growth	GDP growth (annual %)	World Bank Database
05	Foreign Direct Investment	Foreign direct investment, net (% of GDP)	World Bank Database

The present study has executed the descriptive statistics analysis that show the mean values, standard deviation, minimum and maximum values of all the constructs used by the study. In addition, the current article also examined the correlation among the

constructs with the help of a correlation matrix. Moreover, the present study has also investigated the stationarity of the constructs with the help of ADF. The equation of ADF is established and reproduced below:

$$d(Y_t) = \alpha_0 + \beta t + \gamma Y_{t-1} + d(Y_t(-1)) + \varepsilon_t \dots \dots \dots (2)$$

The stationarity of the constructs has been checked individually. The ADF equations for individual construct are mentioned below:

$$d(TID_t) = \alpha_0 + \beta t + \gamma TID_{t-1} + d(TID_t(-1)) + \varepsilon_t \dots \dots \dots (3)$$

$$d(LOGPPIT_t) = \alpha_0 + \beta t + \gamma LOGPPIT_{t-1} + d(LOGPPIT_t(-1)) + \varepsilon_t \dots \dots \dots (4)$$

$$d(PG_t) = \alpha_0 + \beta t + \gamma PG_{t-1} + d(PG_t(-1)) + \varepsilon_t \dots \dots \dots (5)$$

$$d(EG_t) = \alpha_0 + \beta t + \gamma EG_{t-1} + d(EG_t(-1)) + \varepsilon_t \dots \dots \dots (6)$$

$$d(FDI_t) = \alpha_0 + \beta t + \gamma FDI_{t-1} + d(FDI_t(-1)) + \varepsilon_t \dots \dots \dots (7)$$

Finally, the present research has used the ECM to study the relationships among the constructs. The first assumption for the ECM model is that “all the constructs are stationary at the first difference,” and the results show the same. The ECM equations are given as under:

a) Long Run Estimation Equation

$$Y_t = \alpha_0 + \beta_1 X_t + \beta_2 X_t + \beta_3 X_t + \beta_4 X_t + \varepsilon_t \dots \dots \dots (8)$$

b) Short Run Estimation Equation

$$\Delta Y_t = \alpha_0 + \beta_1 \Delta X_t + \beta_2 \Delta X_t + \beta_3 \Delta X_t + \beta_4 \Delta X_t + \varepsilon_t \dots \dots \dots (9)$$

Moreover, the second assumption for ECM is that “error term should be stationary at the level,” and the present study findings have also highlighted the same outcomes. The equation of ECM by adding the error term is given as under:

$$\Delta Y_t = \alpha_0 + \beta_1 \Delta X_t + \beta_2 \Delta X_t + \beta_3 \Delta X_t + \beta_4 \Delta X_t + \gamma ECT_{t-1} + \varepsilon_t \dots \dots \dots (10)$$

#### 4. RESEARCH FINDINGS

The outcomes of descriptive statistics show the TID average value is 3.294 while PPIT means the value is 0.294. In addition, the average value of PG is 0.337 while EG average value is 1.625, and the mean value of FDI is 0.987. These values are shown in [Table 2](#).

**Table 2: Descriptive Statistics**

Variable	Mean	Std. Dev.	Min	Max
TID	3.294	2.625	0.187	4.663
Log PPIT	0.294	0.085	0.193	0.609
PG	0.337	0.432	0.282	0.732
EG	1.625	0.852	0.489	3.404
FDI	0.987	0.541	0.283	1.989

The results of the current research also show the relationships among the constructs. The figures highlight that PPIT, PG, EG and FDI have a positive association with the TID. These relations are mentioned in [Table 3](#).

**Table 3: Correlation Matrix**

Variables	TID	Log PPIT	PG	EG	FDI
TID	1.000				
Log PPIT	0.276	1.000			
PG	0.291	0.419	1.000		
EG	0.370	0.112	-0.201	1.000	
FDI	0.235	0.176	-0.158	0.675	1.000

This study has used the ADF test to test the stationarity of the constructs. The figures highlight how all the constructs are stationary at first difference because all the probability values are less than 0.05 at first difference. These values are shown in [Table 4](#).

**Table 4: Unit Root Test**

Augmented Dickey-Fuller Test (ADF)	Level	t-statistics	p-values
TID	I(1)	-2.013	0.013
Log PPIT	I(1)	-4.682	0.000
PG	I(1)	-3.699	0.002
EG	I(1)	-4.773	0.000
FDI	I(1)	-5.956	0.000

The present has also examined the co-integration among the variables before applying the ECM. Thus, the Johnson co-integration test has been used because it provides more than one co-integration. The findings highlight the six co-integrations that are evidence to apply the ECM. These figures are shown in [Table 5](#).

**Table 5: Unrestricted Co-Integration Rank Test (Trace)**

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.802545	187.9858	115.3466	0.0000
At most 1 *	0.747755	129.5850	79.34145	0.0002
At most 2 *	0.617248	60.00024	55.24578	0.0005
At most 3 *	0.492809	33.42697	25.01090	0.0011
At most 4 *	0.324110	9.98773	7.39771	0.0121
At most 5 *	0.174088	54885634	1.841466	0.0321

This study uses the ECM to test the nexus among the variables. The results reveal that public/private partnership, population growth, economic growth and FDI have a positive association with the development of transport infrastructure in Vietnam. The R square value has shown that 56.43 per cent variations in transport infrastructure development are due to all understudy predictors. These values are shown in [Table 6](#).

**Table 6: Error Correction Model**

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.653117	0.355765	1.835810	0.0212
D(Log PPIT)	0.558805	0.297587	1.877787	0.0450
D(PG)	0.437786	0.031058	14.095756	0.0000
D(EG)	3.156732	0.760923	4.137681	0.0001
D(FDI)	1.453524	0.153251	9.484597	0.0000
ECT(-1)	-0.561802	0.031878	-17.623502	0.0000
R-squared	0.564336	Mean dependent var		-0.334639
Adjusted R-squared	0.558078	S.D. dependent var		2.309422

## 5. DISCUSSION AND IMPLICATION

The study results have indicated that public-private investment in transport has a positive association with transport infrastructure development. The study implies that the investment in the transport sector made either on the part of the state or the part of the public entities brings improvement in the construction or manufacturing of the transport infrastructure like the waterways, canals, railways, airways, roads, and terminals, along with pipeline like seaports, refueling depots, trucking terminals, airports, railway stations, and bus stations. Thus, increase in investment leads to transport infrastructure development. These results are in line with the previous study of [Belenky et al. \(2019\)](#). This study examines the role of investment in the transport industry, both public and private investment, in developing the transport infrastructure. This study elaborates that for the construction of the transportation roads, bus station, airports, seaports, and

railway stations, or some other buildings used for the regulation of transportation in the country, financial resources are needed. The government uses its earnings collected through taxes or issuance of some bonds to establish buildings, stations, pavements, manufacturing transport products, or introducing new vehicles in the country. At the same time, private individuals or entities can also invest in the construction or manufacturing of the transport infrastructure such as waterways, railways, airways, roads, terminals, seaports, refueling depots, airports, railway stations, and bus stations for social well-being or earning profits from the use of this = transport infrastructure. These results are also supported by the past study of [Peng et al. \(2017\)](#), which shows that the investment in the transportation infrastructure by public institutions is helpful in developing the transportation infrastructure.

The study states that the state, through central or local governments or publicly owned industries or corporations, uses its financial resources to invest the development of transportation for to the public. This investment results in transportation infrastructure development. These results are also approved by the previous study of [Nieto-Garcia et al. \(2019\)](#) which examines the impacts of private investment in transportation on transport infrastructure in the country. The tendency of private institutions to make periodical investments in adding value to or bringing about innovation in their transportation products or services causes improvement in the country's overall transportation industry. This periodical investment assists in enhancing the number of transport infrastructure facilities or improving the quality of transportation facilities in the country. These results are also in line with the literary work of [Newman et al. \(2018\)](#), according to which public or private transportation investment leads to transport infrastructure investment. For the acquisition of up-to-date information, innovative technology, and adoption of value-adding techniques, enhanced financial resources are needed. The investment from both public or private entities assists in obtaining quality information, acquiring innovative technology, and applying innovative techniques for the development and improvement of transport infrastructure and services.

The study results have also indicated that the economic growth of the country has a positive association with transportation infrastructure development. These results show that when a country makes rapid economic development, the financial position of both, the public and the government becomes strong, and they can make heavy investments in the transportation infrastructure to further facilitate the economy. These results are approved by the previous study of [Zhang et al. \(2020\)](#), which show that in a country which has high economic growth, a large number of economic activities are underway. Transportation facilities are essential to undertake these economic activities as these services ensure the mobility of products and services. Thus, an increase in economic growth rate leads to the development of transportation infrastructure like transport buildings, structures, routes, stations, terminals, stops, and transport devices. The study results also show that foreign direct investment has a positive association with the

development of transportation infrastructure. The study further demonstrates that foreign direct investment enables the domestic government and private institutions to spend money on the development of the transport infrastructure such as transport buildings, structures, routes, stations, terminals, stops, and transport devices. These results are in line with the previous study of [Carril-Caccia \(2020\)](#) which was conducted to analyze the role of foreign direct investment in the development of transport infrastructure.

This study posits that the investment from foreigners into the domestic institutions which deal in transportation buildings, vehicles, or transportation products, enhances the financial resources these institutions have to ensure development in the transport infrastructure through innovative machinery, up-to-date resources, and modern techniques. The results of the study have also shown that population growth has a positive association with transport infrastructure development. These results are supported by the past study of [Song et al. \(2020\)](#), which states that the number of people living in a region determines the strength and quality of transportation. A large population needs more facilities for mobility for social or commercial purposes. The increase in population steers economic activities, and in order to undertake these activities, the best quality transportation facilities are needed. Both, the government and private commercial entities should turn their attention towards the development of transportation infrastructure do not hesitate in spending money in this regard. Thus, population growth is one of the most important factors or drivers that lead to high transport infrastructure development.

The current study carries both theoretical and empirical implications. This study occupies a significant position in literature because of its remarkable contributions on the subject. The current study highlights the impacts of public & private investment in transportation, economic growth, foreign direct investment, and population growth on transport infrastructure development. The influences of public & private investment in transportation-on-transportation infrastructure development have long been an interesting topic for investigation and debate among researchers and academics. A number of past studies have addressed the role of the impacts of economic growth, foreign direct investment, and population growth on transport infrastructure development. However, the interrelationship of the public & private investment in transportation, economic growth, foreign direct investment, and population growth, and transport infrastructure development has hardly been examined in a single research study. Thus, our study contributes to the literature which has already been conducted because it deals with the impact of public & private investment in transportation on transport infrastructure along with an analysis of the role of economic growth, foreign direct investment, and population growth in the achievement of higher transport infrastructure development. The current study is of great significance to official authorities or policymakers in developing economies because it highlights how transportation infrastructure can be improved and developed in the future. The study

suggests that transportation infrastructure can be improved through public-private investment in transportation, high economic growth, a large amount of foreign direct investment, and an increase in population growth.

## 6. CONCLUSION AND LIMITATIONS

The present research study is conducted with an aim to study the role of public-private partnership in the development of infrastructure development, and thus, it explores the contribution of public & private investment in transportation, economic growth, foreign direct investment, and population growth on the transport infrastructure development. The study analyzes how the public-private partnerships are functioning within the economy of Vietnam and further examines how public & private investment in transportation, economic growth, foreign direct investment, and population growth influence transport infrastructure development. The quantitative data regarding the impacts of public & private investment in transportation, economic growth, foreign direct investment, and population growth on the transport infrastructure development have been acquired from the economy of Vietnam, and results are extracted accordingly. These results indicate that investment in the transport sector by both public and private sectors brings about an improvement in the construction or manufacturing of transport-related infrastructure such as waterways, canals, railways, airways, roads, and terminals, along with pipelines like seaports, refueling depots, trucking terminals, airports, railway stations, and bus stations. The study results also show that when a country makes rapid economic growth, both public and private entities can spend money on the reformation in transportation policies, and their implementation enhances transportation infrastructure development. According to the findings of the study, in countries where there is a tendency to encourage foreign direct investment, the private sector along with the state can also invest in developing the transportation infrastructure within the country. Similarly, the study concludes that a county having high population growth is more likely to have more developed transportation infrastructure.

Though the present research study proves to be a pioneer study of its kind, it faces a number of limitations and setbacks. These limitations can be addressed and removed in future research studies. This study examines the contribution of public & private investment in transportation, economic growth, foreign direct investment, and population growth in getting high transport infrastructure development. Many other factors like government fiscal policies, the number of enterprises involved in the transportation industry, and import facilities have a deep impact on the development rate in the transport infrastructure. However, a study of these factors is missing here, which confines the scope of the current research. For a more comprehensive study, authors must also analyze additional factors affecting the development of transport infrastructure. This study analyzes the impact of public & private investment in transportation, economic growth, foreign direct investment, and population growth on transport infrastructure development in the context of Vietnam. Limiting the analysis of

the subject under discussion to the Vietnamese economy makes the study outcomes less valid and less comprehensive. For a more comprehensive and reliable study, the authors must analyze the influences of public & private investment in transportation, economic growth, foreign direct investment, and population growth on transport infrastructure development in other countries.

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