

Factors influencing investment attraction in road infrastructure BOT projects: A comprehensive analysis in the southern key economic zone of Vietnam



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ABSTRACT

Over the course of the last two decades, Vietnam has demonstrated a growing interest in public-private partnership (PPP) investments within the domain of road transport infrastructure. However, the overall success rate of these endeavors has remained constrained and, in fact, has displayed a propensity for decline. Understanding the primary determinants behind this phenomenon, particularly the internal factors within the management system, has been a perplexing and protracted process, hindering the development of viable solutions. This research employs a qualitative analysis approach, leveraging in-depth interviews conducted with 250 road traffic infrastructure PPP project managers and experts. The objective is to discern the factors that exert influence over the investment attractiveness of build-operate-transfer (BOT) projects in the vital Southern Key Economic Zone of Vietnam. Subsequently, utilizing the collated data, this study employs a quantitative methodology to measure the impact of these factors via a derived multivariate regression equation. The findings reveal the existence of five distinct groups of factors that affect the investment attractiveness of BOT projects in the Southern Key Economic Zone, classified by their respective levels of influence. These groups encompass factors relating to the role of the state, the legal framework, human resources engagement in PPP ventures, supportive financial instruments, and the allocation of risk. Notably, these outcomes align with previous research efforts, further substantiating the robustness and reliability of the findings presented within this study.

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1. Introduction

The term “PPP” stands for Public-Private Partnership which can be understood by different interpretations. However, the most common understanding is that the state and private investors sign a mutual contract, share the responsibilities, benefits, and risks in building infrastructure or providing public services (Dang et al., 2023).

To date, the national highway network spans approximately 26,000 kilometers in total. Within this extensive network, nearly 2,700 kilometers of roads,

funded through the Build-Operate-Transfer (BOT) mode, have been commissioned, constituting approximately 10% of the overall infrastructure. Moreover, a multitude of road projects, encompassing provincial and rural routes, have received financial backing from state budget allocations and government investment initiatives. This comprehensive transport infrastructure framework has played a pivotal role in bolstering the nation's economic development.

However, a noteworthy predicament has surfaced in recent times. Beginning in 2021, BOT investment initiatives have encountered significant constraints in terms of investor interest, leading to their categorization as unsuccessful ventures in the realm of investment attraction. Specifically, a dozen expressway projects located along the eastern sector of National Highway 1, initially established as BOT investment projects, have necessitated a transition

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to public investment. A comparable scenario has unfolded in various regions, typified by the conversion of projects like the Belt Highway Project 3, traversing Long An province and Ho Chi Minh City, into public investment undertakings.

This situation warrants a meticulous examination, given that the legal framework for public-private partnership (PPP) was already in place, as exemplified by Law No. 64 dated June 2020, and Decree 35, issued on March 29, 2021, providing guidance on PPP investments, in conjunction with other directives from the Ministry of Finance and related governmental bodies. Nonetheless, these measures failed to elicit investment interest via the BOT method. Several experts posit that the current BOT investment approach, based on insights gleaned from executed projects, falls short of its intended objective, primarily due to its inability to draw investors. Hence, it is imperative to identify the root causes and formulate efficacious remedies through a comprehensive study of contentious or failed investment endeavors in Southern Vietnam, with the aim of elucidating the factors impinging on investment attraction. In response to China's distinctive investment landscape, the conventional BOT process has undergone adaptations, resulting in five fundamental variants of BOT models involving the participation of foreign private entities. These models encompass Joint Venture BOT (CJV BOT), Joint Venture BOT (EJV BOT), 100% Foreign unofficial BOT, Formal BOT, and BOT Variation, as expounded upon by [Chen and Doloi \(2008\)](#). A comprehensive exploration of the factors that facilitate or impede the adoption of BOT initiatives in China has been conducted. A survey involving seasoned industry practitioners has underscored that the foremost catalyst for BOT adoption is the imperative need for development capital. Conversely, significant overarching impediments encompass intricate financial arrangements, convoluted contract structures, substantial initial capital outlays, intricate procedural requisites, and elevated risk profiles. Moreover, within the Chinese context, distinct impediments of note include an opaque and incomplete legal framework, an intricate approval system, regulatory constraints on market entry, and subdued market pricing for infrastructure goods and services, as highlighted by [Zhang et al. \(2015\)](#). There are a number of studies that have developed models to determine the reasonable concession period of a BOT project using incomplete information negotiation analysis ([Bao et al., 2015](#)) or optimizing to maximize the aggregate benefits of stakeholders ([Zhang et al., 2016](#)). These models provide an alternative tool for the government to design a concession period prior to BOT bidding, which would reduce post-bid-related negotiations. This is expected to create more negotiating space for the government ([Liu et al., 2022](#)) and franchisees in determining the key socioeconomic characteristics of each BOT contract when negotiating the franchise period. Therefore, the use of the model will increase the total benefit for both parties.

As for the risk allocation mechanism for road transport infrastructure BOT projects has been mentioned by many authors ([Kumaraswamy and Zhang, 2001](#); [Jokar et al., 2021](#); [Wang et al., 2019](#)). Most of the authors shared the view that PPP is a very effective channel to mobilize capital for the development of transport infrastructure ([Cui et al., 2018](#)). In particular, a reasonable risk allocation mechanism is a prerequisite for the success of the project. However, that must be based on a stable political, legal, and economic environment ([Navalersuph and Charoenngam, 2021](#)). The authors also discussed various issues that the government needs to address for the BOT mechanism to work effectively, especially during the project formulation phase ([Dewulf and Garvin, 2020](#)) through relevant examples from the experience of Hong Kong ([Kumaraswamy and Zhang, 2001](#)) and Iran ([Jokar et al., 2021](#)) in developing an effective BOT project management framework for transport infrastructure projects, by ordinal option technique with TOPSIS ideal solution ([Tavana et al., 2022](#)) and social network analysis method ([Wang et al., 2018](#)).

Thus, through a review of the studies of the above authors, it is necessary to identify the factors affecting the ability to attract investment in PPP projects in general ([Rybnicek et al., 2020](#)), BOT transport infrastructure in particular, in order to analyze and evaluate the influence of factors as a basis for proposing solutions to enhance the ability to receive investment in transport infrastructure in the form of PPP.

2. Theoretical basis

2.1. Typical projects in the southern key economic region

2.1.1. Phu My bridge project

The construction of the Phu My Bridge commenced in February 2007, achieving completion and subsequent utilization by September 2009, accomplishing this feat within a span of 30 months. Remarkably, the project was finalized four months ahead of the initially projected schedule. This achievement was made possible through a total investment of 1,806,523 billion Vietnamese Dong (VND), which comprised foreign loans amounting to 1,026,050 billion VND, domestic loans totaling 253,469 billion VND, and equity contributions amounting to 527,004 billion VND ([MOT, 2021](#)).

In accordance with the mutually agreed terms negotiated between the state, represented by the Ho Chi Minh City People's Committee, and the investor, Phu My BOT Company, a coordinated approach was adopted. Specifically, the state committed to concurrently executing the eastern ring road project within the city, coinciding with the construction and completion of the Phu My Bridge. The rationale behind this strategy was the shared location of these projects along the eastern ring route of the city, aimed at ensuring the coherence of the financial plan

and the comprehensive utilization of the entire route. Subsequently, following a trial exploitation phase that commenced in April 2010, Phu My Bridge initiated toll collection activities, with rates established in accordance with Circular 159/2013/TT-BTC. However, complications emerged due to the delayed opening of the eastern ring road, resulting in a significant reduction in vehicular traffic. Coupled with the reduced toll rates prescribed by Circular 159, it became apparent that the toll collection period would extend up to 60 years before the full recovery of capital and the generation of profits could be realized. In response to these challenges, the investors made the resolute decision to terminate the project. Following protracted negotiations, the state ultimately assumed responsibility for repaying the foreign loan, while the fees collected would be allocated to servicing the domestic loan and compensating the investor. Consequently, the project is slated to cease operations in 2026, merely 16 years after its initiation. The aforementioned deficiencies have considerably undermined the project's efficacy, resulting in a loss of state capital. The primary factor contributing to this situation lies in the state's failure to adhere to the terms of the contract, inadequate preparation of essential resources (including human and financial resources), and suboptimal land clearance arrangements, thereby exposing the project to unforeseen risks. Furthermore, manual toll collection procedures have engendered substantial financial losses to the state, including tax revenue. A comprehensive evaluation of the involved parties, encompassing state management and investor entities, reveals a discernible deficiency in the experience and capacity for managing Public-Private Partnership (PPP) initiatives. Key Issues of the Project:

1. The legal framework in place at the time of investment exhibited multiple inadequacies and remained incomplete, thereby posing considerable risks of financial disputes.
2. The state simultaneously assumed the roles of contracting partners with investors and state management authority, resulting in a lack of equity and transparency. This dual role created financial vulnerabilities and conflicted interests.
3. An independent, autonomous agency vested with the authority to manage PPP initiatives and make direct investment decisions was conspicuously absent.
4. The availability of staff possessing the requisite expertise, responsibility, and professional ethics to effectively implement the PPP investment approach remained incomplete.

2.1.2. Ho Chi Minh City-Trung Luong Expressway project

Ho Chi Minh city-Trung Luong expressway project, route length is 61.9km. The starting point of the route is at the intersection of Cho Dem-Binh

Chanh-Ho Chi Minh City, the end point is the intersection of Than Cuu Nghia-Chau Thanh district-Tien Giang province (MOT, 2021).

The project entails the construction of Type A, Grade 1 standard highways, designed for speeds of up to 120 kilometers per hour. Phase 1 encompasses four lanes with two emergency stop lanes (measuring 4 lanes of 3.75 meters in width and 2 lanes of 3.0 meters in width), while the roadbed width varies between 25 to 26.0 meters. However, this project has encountered several limitations, including the following issues:

1. **Environmental Impact Assessment:** The environmental impact assessment process was not rigorously monitored by the evaluating agency. Consequently, the continuous high-pressure lighting along the expressway at night had adverse effects on nearby rice fields, resulting in abnormal growth patterns, uneven flowering, and a high incidence of flat rice. Subsequently, substantial investments were required to rectify the lighting system. This highlights a failure on the part of the evaluating agency to fulfill its responsibility in conducting a comprehensive environmental impact assessment before project approval. Furthermore, it underscores a deficiency in state management mechanisms for holding responsible parties accountable.
2. **Planning Deficiencies:** Inadequate planning has resulted in the absence of connecting infrastructure, thereby failing to facilitate regional integration. Routes intersecting with the expressway leading to the Ben Luc district remain incomplete, necessitating additional construction post-project inauguration. Currently, the project has been halted due to violations of legal regulations by the construction management contractor. This underscores deficiencies in project appraisal, with shortcomings evident in the failure to consider comprehensive connection plans.
3. **Incomplete Operations and Management (O&M) Processes:** The O&M management procedures were inadequately established. Upon the transfer of the project from state ownership, the absence of binding terms has led to a loss in state capital revenue, specifically related to taxation amounting to VND 725 billion. Additionally, inaccuracies in vehicle traffic assessments, arising from the non-application of automatic fee Electronic Toll Collection (ETC), have compounded the issue. This indicates that state management has faltered in the formulation of project transfer contracts and in overseeing toll collection activities.

The presence of these deficiencies underscores gaps within the legal framework and project management and control processes. It is imperative to introduce supplementary measures and adjustments to enhance project transparency and mitigate losses of state assets

2.1.3. Trung Luong-My Thuan Expressway project

The route spans a length of 51.5 kilometers, commencing at the junction adjacent to the Saigon-Trung Luong Expressway in My Tho City, and culminating at the intersection of National Highway 30 in Cai Be District, Tien Giang Province. Initiated in 2009, the project reached a fundamental stage of completion by June 1, 2022, with the final connection works anticipated to conclude in December 2022. During the trial operation period from June 1, 2022, to June 30, 2022, the operational management unit documented the passage of 720,000 vehicles per month, averaging 24,000 vehicles daily and nightly. In terms of traffic safety, 25 incidents were reported, albeit with no human casualties. The total investment for the project amounted to 8,304,856 billion VND, comprising bank loans of 4,781,021 billion VND, equity capital of 1,589,805 billion VND, and other mobilized capital totaling 1,934,029 billion VND (MOT, 2021).

Concerning the toll pricing structure, the Department of Finance of Tien Giang conducted an evaluation in June 2022, leading to the People's Committee's decision to institute a uniform toll fee. Vehicles with less than 12 seats and a load capacity of under 2 tons are subject to a fee of 103,000 VND per turn, while trucks with a tonnage of 18 tons or more and 40-foot container trucks are levied at 334,000 VND per turn. Toll collection officially commenced on August 1, 2022, for the purpose of repaying the project's capital. According to the investor's report, from September 1, 2022, to October 1, 2022, a total of 507,568 vehicles passed through the station, indicating that the actual number of vehicles traversing the station accounts for only 70% of the previously tested fee collection numbers. Consequently, in the event of rising fuel and material costs leading to increased transportation expenses and a corresponding decrease in vehicle traffic, the financial plan may become compromised, potentially triggering disputes between the state and investors.

The elevated toll charges, in comparison to the average rates at other stations, stem from Prime Minister Nguyen Xuan Phuc's announcement No. 99/TB-VPCP dated March 18, 2019, which stipulated a maximum payback period for the project of 15 years. Consequently, the Tien Giang Provincial People's Committee decided on a fee collection period of 14 years and 8 months. Consequently, the toll fee had to be elevated, leading to increased transportation costs. In an effort to mitigate expenses, vehicles have opted to use National Highway 1 without tolls, thereby potentially decreasing the volume of vehicles on the expressway. This can disrupt the project's financial plan, potentially resulting in insufficient funds for future maintenance. Furthermore, the design of Phase 1, featuring a width of 17 meters and four lanes without emergency lanes in both directions, permitting speeds ranging from 60 km/h to 80

km/h, has raised safety concerns. Reports from the Tien Giang Provincial Department of Transport between January 28, 2022, and February 6, 2022, documented four traffic accidents that claimed one life and damaged 10 vehicles during a road test. Subsequently, from April 30, 2022, to June 9, 2022, during the trial toll collection phase, 225 incidents involving vehicle damage and traffic accidents leading to extensive traffic congestion occurred. The absence of emergency lanes for the ingress of emergency vehicles compounded the issue. These incidents have raised alarm among drivers, particularly those transporting perishable seafood and aquatic products from western provinces to Ho Chi Minh City and the southern key economic region. These drivers have grown hesitant to utilize the route due to the potential for accidents and traffic snarls, which can result in damage to seafood products. Given that trucks are prohibited from entering the city for goods return during daylight hours, this restriction could inflict substantial losses on truck delivery companies. These cumulative factors pose a substantial risk to the project's financial plan, engendering potential disputes between the state and investors, and ultimately diminishing its attractiveness for investment. Conversely, investors may be deterred from engaging in the project due to its extended investment duration, the laxity of the legal framework, the elevated risk profile, and the potential for project losses.

2.1.4. Cai Lay bypass project (Cai Lay town, Tien Giang province)

This is a BOT investment initiative aimed at constructing a bypass for National Highway 1 and enhancing a 26-kilometer segment of Highway 1 that passes through Cai Lay town, spanning a total length of 38 kilometers. The project includes the establishment of a new 12-kilometer bypass and the refurbishment of the existing 26-kilometer stretch of National Highway 1. Toll collection for this project was instituted on August 1, 2018, with fees ranging from a minimum of 35,000 VND to a maximum of 180,000 VND per vehicle (MOT, 2021).

Several issues have arisen within the context of this project, notably concerning the toll collection process, which has given rise to social unrest and protests among the local populace. Notably, residents, particularly those residing in the vicinity of Cai Lay town and the protest toll station, have resorted to tactics such as driving their vehicles into the toll station area and subsequently abandoning their vehicles to obstruct the road. This has resulted in traffic congestion at the toll station, and in some instances, violent individuals have issued threats to toll collectors. In response to the ensuing turmoil, local authorities and law enforcement had to intervene on multiple occasions, but the issues persisted. Ultimately, the project was compelled to halt toll collection activities. These circumstances have stemmed from the following factors:

1. Toll Rates: The toll fee structure imposed on vehicles transiting the bypass or those solely navigating within or through Cai Lay town, without traversing the bypass for the purpose of transporting goods or passengers, was uniform. Even vehicles restricted to travel within the town limits were obligated to pay the prescribed toll fee, without the provision of any discount or adjustment.
2. Investment Principle Violation: The section of National Highway 1 subjected to repair and enhancement followed a different investment principle. Rather than employing the BOT investment model, public investment was mandated. However, the Cai Lay bypass BOT project contravened this principle by engaging in investment activities on the existing road (National Highway 1) through the BOT mechanism. Consequently, public sentiment expressed opposition to these actions, engendering social unrest. As a result, the state was compelled to repurchase the project to rectify its transgressions, as the project's financial plan was susceptible to disruption. Presently, the investor has faced legal repercussions, with multiple violations of the law from various perspectives leading to their arrest.

2.2. Assess the issues and determine the influencing factors

Tien Giang province has initiated three road traffic projects under the BOT framework. To date, these projects have exhibited significant challenges, including:

1. Sai Gon-Trung Luong Project: The toll collection period for this project, employing manual toll collection, has expired. An inspection of the project revealed instances of toll collection fraud and tax evasion. Consequently, the project's director and several officers were arrested and subject to criminal prosecution. Furthermore, the project exhibited vulnerabilities in the transfer of exploitation rights during manual fee collection. This situation led to substantial losses, facilitating opportunities for corruption and vested interests. These issues eroded public trust due to unclear legal frameworks and insufficient project control mechanisms across all four phases.
2. Trung Luong-My Thuan Project: This project, marked by a 13-year investment process in Phase 1 and two changes of investors, has recently commenced operations. However, it has failed to meet anticipated levels of efficiency concerning traffic safety, revenue generation, and the reduction of traffic loads on National Highway 1. These outcomes have prompted public skepticism regarding the BOT investment model, resulting in societal losses and doubts about the project's transparency. Key concerns include:

- The government's response in the event of a broken financial plan, considering Minister Mai Tien Dung's notice "The project is not allowed to collect fees for more than 15 years."
- The source of budget funding for compensation to investors, as the legal framework lacks clarity and specificity.
- The potential impact on maintenance costs and the responsible party for managing the project when the financial plan is disrupted.
- Challenges faced when transitioning from Phase 1 to Phase 2, such as the quality of the existing route and bidding prices. Contractors have exhibited reluctance to participate in BOT investments for eastern expressway projects due to lower bid prices compared to reality when the state tightly controls revenue through automated toll collection.

3. Cai Lay Bypass BOT Project: This project commenced toll collection on August 1, 2018, and experienced prolonged protests primarily attributed to the lack of transparency differentiating between public investment and BOT investment. Despite the National Assembly's Resolution 437/2017 suspending PPP investments to re-adjust the legal framework, the state allowed toll collection to proceed. This mishandling by the state administration, spanning approval, appraisal, bidding, construction, acceptance, and toll collection stages, culminated in public protests, opposition, and, ultimately, the state repurchasing the project. The repurchase necessitated reconstruction, including a new toll station, repairing 50% of the damaged bypass road surface, and addressing signage and drainage issues, incurring a loss of investment capital without realizing the project's objectives.

Collectively, these three projects underscore several shortcomings hindering the attraction of investment and impacting project quality and progress. These include:

- Ambiguities in the separation of responsibilities between state management and business management tasks lead to confusion and overlaps.
- The absence of a dedicated team capable of identifying and assigning responsibility, given that staff often operate part-time, further complicates the issue.
- Inadequate capacity among state administration personnel to manage and oversee PPP investments.
- An unclear and inadequately emphasized role for state management in investment management and control, lacking appropriate and scientifically formalized management models.
- A dearth of training and experience-sharing seminars as mandatory tasks for management staff and enforcement officers.

- Insufficiently established financial instruments to support and control investors, especially in economically underdeveloped regions.
- An unstable legal framework that fails to instill investor confidence.
- Loose project appraisal processes that rely on investors, resulting in poor project quality across various stages.
- A lack of transparency throughout the project implementation process, with no definitive solutions or public disclosures.
- Absence of risk management as an integral part of contracts to minimize disputes during contract execution.

Addressing these issues requires comprehensive reforms, stronger oversight, capacity building, and the establishment of transparent, stable legal frameworks to enhance the viability of BOT investments and promote public trust.

3. Factors affecting the collection of BOT investment in the southern key economic region

After analyzing and combining factors of the same nature and arrangement, there are 6 groups of basic factors affecting the attraction of investment under the mode of public-private partnership (BOT). These factors are synthesized in Table 1.

Table 1: Factors causing reduction in investment attraction of BOT projects in the southern key economic region

No.	Influencing factors
1	Group of factors on the role of the state in the management and control of road transport infrastructure BOT investment projects
1.1	The state has not completed the appropriate policies and plans for investment and development of road transport infrastructure in the form of BOT
1.2	The State has not yet established a specialized agency to independently manage BOT road infrastructure projects at all levels from central to local levels
1.3	The State has not developed a mechanism for investment incentives and guarantees (related to taxes, dispute settlement, foreign currency balance, etc.)
1.4	The State has not effectively implemented the communication work to raise awareness, and understanding and create consensus in the community for the BOT form of road transport infrastructure
1.5	There is no separate process to control PPP contracts, which leads to disputes, delays, many intermediary agencies to settle, and delays in putting works into operation
1.6	State management and business management have not been separated, causing inequality between the state and investors, the state also interferes deeply in business management
1.7	The management and control model of PPP investment is not suitable for production practice
1.8	Investment appraisal is formal, and incomplete, causing many consequences in exploitation
2	Group of factors on the legal corridor
2.1	The system of legal documents to manage BOT projects of road transport infrastructure is unstable, frequently changing, and subject to the regulation of many specialized laws, leading to a long time for investment formulation and implementation
2.2	There is no legal requirement to stop the project when there is a lack of publicity and transparency of detailed information about BOT projects and project lists
2.3	The current procedures related to BOT projects are still complicated and involve too many departments
2.4	Road transport infrastructure BOT projects do not have a national master plan, proposed separately by sectors and localities, leading to difficulties in arranging medium-term capital plans
2.5	The State's support mechanism for investment incentives, tax incentives, post-investment service using subsidies, etc. has not been paid attention to for the purpose of stimulating demand
2.6	There are no prerequisites for incentives and support to attract foreign investors
2.7	The support mechanism to ensure minimum revenue for investors has not been carefully studied by the state in order to ensure the harmonization of interests between the state and investors and users of the works
2.8	The disbursement of the state's capital for BOT projects is lengthy, and not close to reality, causing financial difficulties for investors, delaying project progress, and increasing interest costs
2.9	The government guarantee mechanism for investors with international credit institutions has not yet been established.
3	Group of factors supporting financial instruments
3.1	Credit institutions do not have medium and long-term loans available
3.2	Credit institutions are still concerned about the ability of enterprises/investors to pay debts
3.3	Credit institutions have not been proactive in creating conditions for enterprises/investors to access credit capital
3.4	The state does not have policies to encourage, motivate, and ensure mechanisms for investors with credit institutions or large corporations to support
4	Group of factors on risk allocation
4.1	The BOT project contract has not defined (identified) a full list of specific and precise risks from a comprehensive point of view.
4.2	The reasonable allocation of project risks between the State and investors and service users has not been carefully calculated, on the basis of consensus between the parties
4.3	Lack of a risk management process in each transition phase of the construction phase engineering process
4.4	Lack of plans to deal with risks according to project phases such as preparation stage, construction phase, operation phase, transfer stage, etc
4.5	There is no standard and mandatory process for risk identification and resolution presented in the contract
5	Group of factors on investment environment
5.1	The investment environment has a complete and sustainable legal framework; and institutional and political stability
5.2	A fair, democratic, and corruption-free investment environment
5.3	The investment environment has favorable economic policies and stable macroeconomic conditions
5.4	The investment environment has many capable partners to implement BOT projects together with Enterprises/Investors
5.5	The legal framework for preferential treatment has not yet been completed when investing in remote areas and areas affected by the increase of climate change.
5.6	Failing to create conditions and mechanisms for foreign investors to participate
6	Group of human factors to manage, control, and implement BOT projects
6.1	Lack of knowledge and awareness about PPP investment
6.2	Not fully aware of responsibility and professional ethics
6.3	Thinking is slow to change. They still consider investors as contractors in public investment projects
6.4	Pray for safety, avoid responsibility, lack of breakthrough
6.5	Lack of progressive spirit, learning to perform management, control, and enforcement tasks

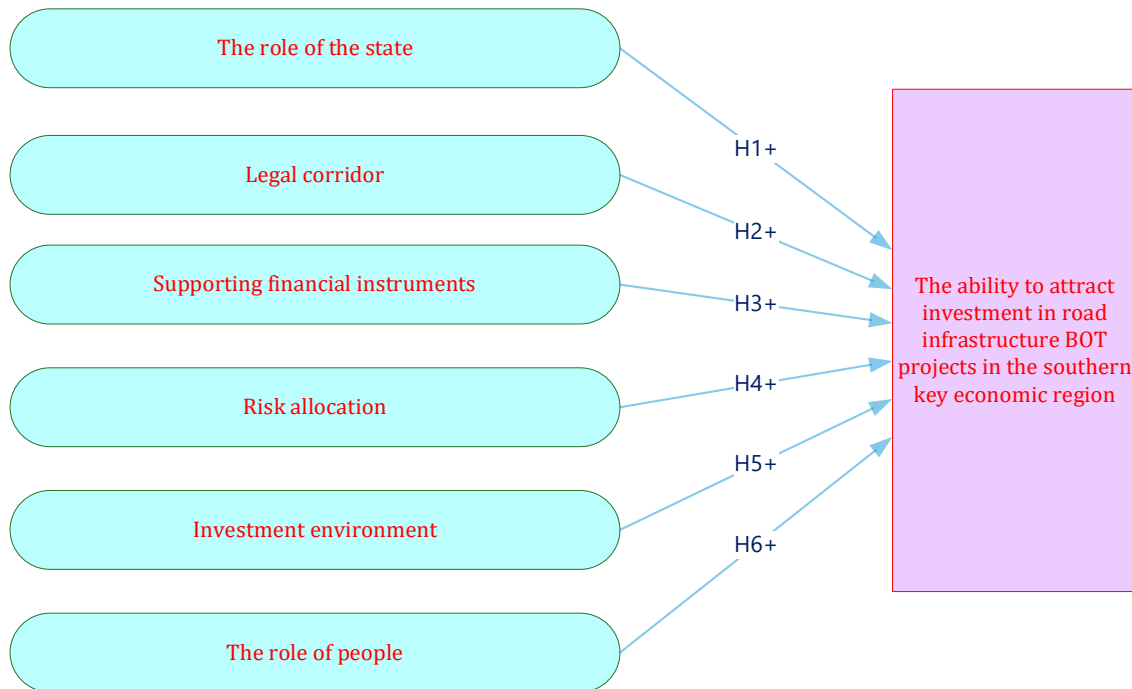
3.1. Research method

From the above analysis results, it is shown that there are many factors affecting the ability to attract investment in road infrastructure BOT projects in the southern key economic region. Through primary and secondary survey methods and combined with

expert consultation, in order to eliminate duplicate factors, it can be summarized into the following 6 groups of factors as Fig. 1.

- Group 1: Group of factors on the role of the state in the management and control of road transport infrastructure BOT investment projects.

- Group 2: Group of factors on the Legal Corridor.
- Group 3: Group of factors on supporting financial instruments.
- Group 4: Group of factors on Risk Allocation.
- Group 5: Group of factors on investment environment.
- Group 6: Group of human factors in managing, controlling, and implementing BOT projects.



+: Representing groups of factors according to the proposed hypothesis, which have a positive impact on the ability to attract investment in BOT road transport infrastructure projects in the southern key economic region

Fig. 1: Research model of factors affecting the ability to attract investment in BOT road transport infrastructure projects in the southern key economic region

3.2. Questionnaire

a) Questionnaire: The questionnaire was built on the following basis:

- Refer to previous studies on factors affecting the ability to attract investment in BOT road transport infrastructure projects.
- Practical implementation of BOT transport infrastructure projects in Vietnam in recent times, as well as in the southern key economic region.
- International experience in implementing road transport infrastructure PPP projects.
- Consult experts with experience in the field of traffic project management in general and BOT project management in particular.

The official questionnaire consists of 37 observed variables, which are mentioned in Table 2, including The role of the state (8 variables); Legal corridor (9 variables); Supporting financial instruments (4 variables); Risk allocation (5 variables); Investment environment (6 variables); The role of people (5 variables).

b) Scale: A Likert scale of 1 to 5 was used to measure these variables (1: Not affected; 2: Very little influence; 3: Medium; 4: High influence; 5: Very high influence)

c) Order of processing survey results: In order to build a multivariate regression equation showing

the influence of factors on the ability to attract investment in road transport infrastructure BOT projects in the southern key economic region, the authors conduct a survey with subjects who have experience in the field of road infrastructure BOT, project management, service users for BOT projects.

Data were collected through the distribution of 250 questionnaires. After collecting, there are 250 valid questionnaires. The encrypted data is processed using SPSS24 software. Procedure includes:

Step 1: Evaluate the reliability of the scale through Cronbach's Alpha coefficient (Cronbach, 1951): In order to measure the internal consistency of variables in the same group, thereby eliminating the intrinsically inconsistent variables of the variables in the same group.

Step 2: Exploratory factor analysis EFA: In order to reduce a set of many interdependent measurement variables into a smaller set of variables, to be more meaningful but still contain most of the information content of the original set of variables.

Step 3: Analyze Pearson correlation: Check the close linear correlation between the dependent variable and the independent variables and identify the problem of multicollinearity when the independent variables are also strongly correlated with each other.

Step 4: Multivariate regression analysis: In order to assess the degree of influence of groups of variables on the state management work on road traffic infrastructure investment projects in Vietnam, at the time of the survey. Through processing with SPSS24 software, following the above steps, the results of

multivariable regression analysis are synthesized in Tables 3-5, showing groups of factors affecting the ability to attract investment in road infrastructure BOT projects in the southern key economic region (Miller Jr, 1997).

Table 2: Groups of factors affecting the ability to attract investment in road transport infrastructure BOT projects in the Southern key economic region

No.	Symbol	Influencing factors
1	VTNN	Group of factors on the role of the state in the management and control of road transport infrastructure BOT investment projects
1.1	VTNN1	The State has not completed the appropriate policies and plans for investment and development of road transport infrastructure in the form of BOT
1.2	VTNN2	The State has not yet established a specialized agency to independently manage BOT road traffic infrastructure projects at all levels from central to local levels
1.3	VTNN3	The State has not developed a mechanism for investment incentives and guarantees (related to taxes, dispute settlement, foreign currency balance, etc.)
1.4	VTNN4	The State has not effectively implemented the communication work to raise awareness, and understanding and create consensus in the community for the BOT form of road transport infrastructure
1.5	VTNN5	There is no separate process to control PPP contracts signed between competent state agencies and investors, leading to disputes, protracted, by many intermediary agencies to settle, slowly putting works into operation and use
1.6	VTNN6	State management and business management have not been separated, causing inequality between the state and investors. The state also interferes deeply in business management
1.7	VTNN7	The management and control model of PPP investment is not suitable for production practice
1.8	VTNN8	The investment appraisal is incomplete, causing many consequences in the exploitation
2	HLPL	Group of factors on the legal corridor
2.1	HLPL1	The system of legal documents to manage BOT projects of road transport infrastructure is unstable, frequently changing, and subject to the regulation of many specialized laws, leading to a long time for investment projects
2.2	HLPL2	There is no legal requirement to stop the project when there is a lack of publicity and transparency of detailed information about BOT projects and project lists
2.3	HLPL3	The current procedures related to BOT projects are still complicated and involve too many departments
2.4	HLPL4	Road transport infrastructure BOT projects do not have a national master plan, proposed separately by sectors and localities, leading to difficulties in arranging medium-term capital plans
2.5	HLPL5	The State's support mechanism for investment incentives, tax incentives, post-investment service using subsidies, etc. has not been paid attention to for the purpose of stimulating demand
2.6	HLPL6	There are no prerequisites to attract foreign investors
2.7	HLPL7	The support mechanism to ensure minimum revenue for investors has not been carefully studied by the State, in order to ensure harmonization of interests between the State and investors and users of the works
2.8	HLPL8	The disbursement of the state's capital for BOT projects is long and not close to reality, causing financial difficulties for investors and delaying the project schedule
2.9	HLPL9	The government guarantee mechanism for investors with international credit institutions has not yet been established
3	CCTC	Group of factors financial instruments to support
3.1	CCTC1	Credit institutions do not have medium and long-term loans available
3.2	CCTC2	Credit institutions are still concerned about the ability of enterprises/investors to pay debts
3.3	CCTC3	Credit institutions have not been proactive in creating conditions for enterprises/investors to access credit capital
3.4	CCTC4	The State does not have policies, incentives, or guarantees for credit institutions or large corporations to support
4	PBRR	Group of factors on risk allocation
4.1	PBRR1	The BOT project contract has not defined (identified) a full list of specific and precise risks from a comprehensive point of view
4.2	PBRR2	The reasonable allocation of project risks between the State and investors and service users has not been carefully calculated on the basis of consensus between the parties
4.3	PBRR3	Lack of a risk management process in each transition phase of the construction phase engineering process
4.4	PBRR4	Lack of plans to deal with risks according to project phases such as preparation stage, construction phase, operation phase, transfer stage, etc
4.5	PBRR5	There is no standard and mandatory process for risk identification and resolution presented in the contract
5	MTDT	Group of factors on investment environment
5.1	MTDT1	The investment environment has a complete and sustainable legal framework; and institutional and political stability
5.2	MTDT2	A fair, democratic, and corruption-free investment environment
5.3	MTDT3	The investment environment has favorable economic policies and stable macroeconomic conditions
5.4	MTDT4	The investment environment has many capable partners to implement BOT projects together with Enterprises/Investors
5.5	MTDT5	The legal regulations on preferential regimes for investment in remote areas and areas affected by the increase of climate change have not yet been completed
5.6	MTDT6	Failing to create conditions for foreign investors to participate
6	CNQL	Group of factors on the role of people in the management, control, and implementation of BOT projects
6.1	CNQL1	Lack of knowledge and awareness about PPP investment
6.2	CNQL2	Lack of responsibility and professional ethics
6.3	CNQL3	Thinking is slow to change, still considering investors as contractors in public investment projects
6.4	CNQL4	Pray for safety, avoid responsibility, lack of breakthrough
6.5	CNQL5	Lack of progressive spirit, learning to perform management and control tasks

Table 3: ANOVA test

ANOVA ^a						
	Model	Sum of squares	df	Mean square	F	Sig.
1	Regression	47.386	6	7.898	89.844	.000b
	Residual	21.361	243	.088		
	Total	68.747	249			

a. Dependent Variable: GTH; Predictors: (Constant), CNQL, HLPL, MTDT, PBRR, TCTD, VTNN; Sig test F=0.000<0.05, so the regression model is significant

Table 4: Model verification

Model summary ^b					
Model	R	R square	Adjusted R square	Std. error of the estimate	Durbin-Watson
1	.830a	.689	.682	.29649	2.085

Predictors: (Constant), CNQL, HLPL, MTDT, PBRR, TCTD, VTNN; b. Dependent Variable: GTH; The adjusted R squared is 0.682=68.2%. Thus, the independent variables included in the regression affect 68.2% of the change of the dependent variable

Table 5: Results of multivariable regression analysis

Model	Coefficients ^a				t	Sig.	Collinearity statistics	
	Unstandardized coefficients		Standardized coefficients	Beta			Tolerance	VIF
	B	Std. error						
(Constant)	.148	.156			.948	.344		
1	.298	.032	.380		9.259	.000	.758	1.319
HLPL	.273	.033	.330		8.258	.000	.802	1.246
CCTC	.133	.032	.173		4.224	.000	.761	1.314
PBRR	.074	.029	.104		2.530	.012	.756	1.323
MTDT	.053	.029	.071		1.814	.071	.837	1.194
CNQL	.138	.032	.179		4.289	.000	.737	1.357

a. Dependent Variable: GTH

Multivariate regression results, which are mentioned in Table 5, show that the variable MTDT is not significant in the model because the sig t-test is greater than 0.05. The remaining variables all have an impact on the dependent variable because the sig t-test of each independent variable is less than 0.05. VIF coefficients of independent variables are all less than 10, and no multicollinearity occurs. The results in Fig. 2 show that, the mean is close to 0, and the standard deviation is 0.988, which is close to 1, so the residual distribution is approximately standard. The distributed data points are centered around the diagonal as illustrated in Fig. 3, there is no large deviation from the diagonal, so the residuals are approximately standard. It can be easily seen that the data points, as shown in Fig. 4, are distributed around the zero coordinate line and tend to form a straight line, assuming the linear relationship is not violated.

So, in the multivariable regression equation, the remaining 5 variables have the form (according to the standardized Beta coefficient), which is represented by Eq. 1 as follows:

$$GTH = 0.38 \times VTNN + 0.33 \times HLPL + 0.179 \times CNQL + 0.173 \times CCTC + 0.104 \times PBRR \quad (1)$$

where,

1. VTNN: State’s role
2. HLPL: Legal corridor
3. CNQL: Humans in PPP management
4. CCTC: Supporting financial instruments
5. PBRR: Risk allocation

4. Solution systems

The solutions proposed by the authors to increase investment attraction for BOT projects in the southern key economic region are shown in Fig. 5.

4.1. The legal corridor needs stability

The current legal framework governing PPP in Vietnam exhibits a brief lifespan, spanning from legislative enactment to decrees, circulars, guidelines, and related documents. Due to the multiplicity of regulatory documents emanating from different laws and being issued by various authorities and entities with disparate levels of PPP awareness, the endeavor to establish a cohesive and stable investment channel under the PPP model faces significant challenges.

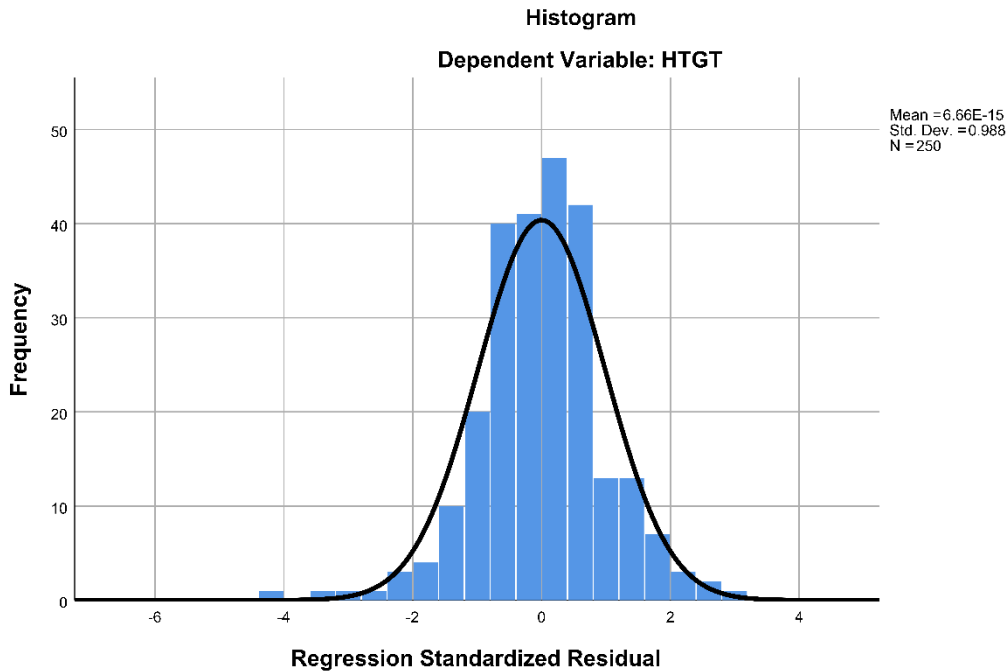


Fig. 2: Histogram of the normal distribution of the residuals

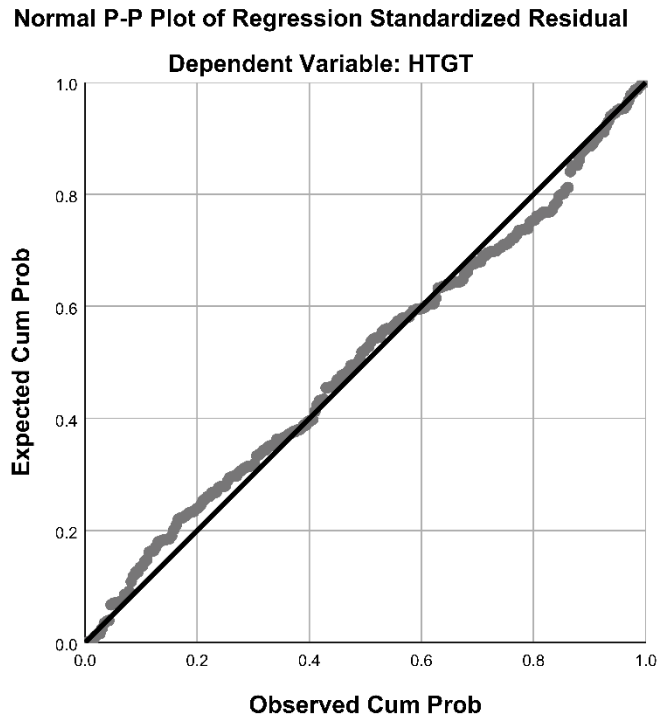


Fig. 3: Normal P-P plot scatterplot

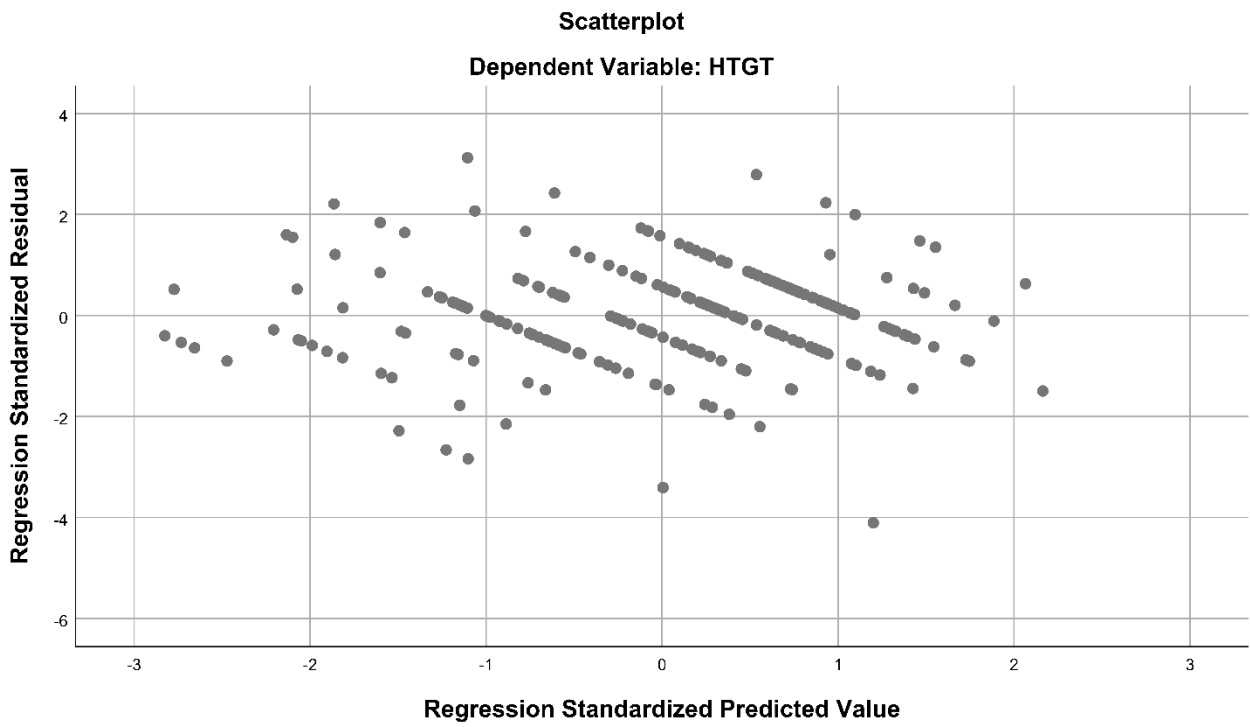


Fig. 4: Scatterplot

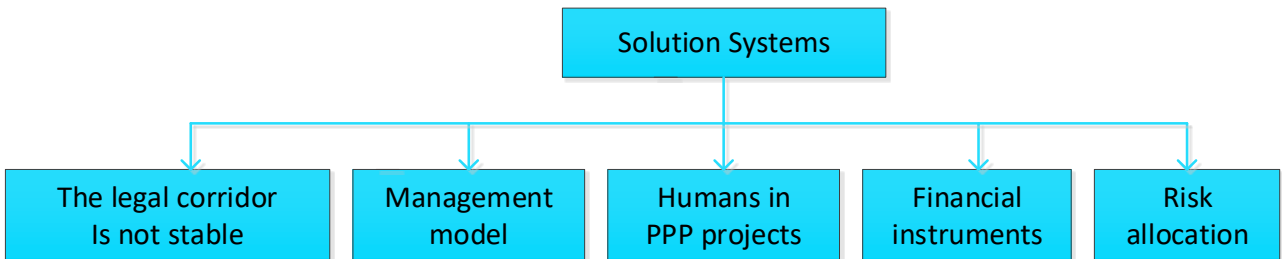


Fig. 5: System of solutions to enhance investment attraction of BOT projects

In response, Vietnam requires a definitive declaration that "PPP constitutes a distinct investment avenue," necessitating a stable and contextually relevant legal framework tailored to the unique characteristics of this investment type. Furthermore, an autonomous PPP board, holding equivalent status to ministries and government departments, should be established to oversee, make decisions on, and organize PPP investments.

Existing ministries and government bodies should primarily assume a pivotal role in reviewing policies, procedures, and related matters, with the Ministry of Planning and Investment spearheading these efforts. Drawing inspiration from countries that have successfully implemented PPP investments, Vietnam should consider establishing an independent entity, the PPP board, responsible for gathering insights and experiences through practical implementation. This entity should collaborate with other investors and experts to craft a distinct body of laws endorsed by the government and the National Assembly. Such legislation should offer an accurate, fully transparent, and enduring legal framework conducive to PPP investments, viewed through the lens of mutual benefits.

A pivotal shift in perspective is required, emphasizing the outcome of the product as the primary focus, as the quality of the work will be evident throughout the exploitation phase, stipulated and closely monitored within the contract's terms and technical standards. This approach represents the sole means by which investment targets can be met, attracting investments through an open, stable, and enticing legal framework, enriched with preferential policies.

In light of these considerations, localities must draw upon collective experience to usher in transformative changes, fostering an enterprising spirit. Consequently, a distinct PPP investment management model, underpinned by a steadfast legal framework, is imperative to bolster Vietnam's capacity to attract investments effectively and sustainably.

4.2. Management model

The model described above distinctly segregates the roles of state management and business management to foster parity between the state and investors or project enterprises (Fig. 6). Consequently, state management responsibilities are assigned to ministries such as the Ministry of Planning and Investment, the Ministry of Finance, the Ministry of Construction, the Ministry of Transport, and others. These ministries are tasked with providing guidance, conducting inspections, and overseeing compliance with the law by both the PPP board and the investors or project enterprises. This model establishes an equitable framework for conducting investments under the PPP method.

Presently, the PPP Board exclusively assumes the role of business management, with a primary responsibility for executing the PPP investment method. Its tasks encompass the orchestration and selection of viable projects. Ministries and sectors, on the other hand, are relegated to advisory roles, proffering project proposals, scrutinizing related issues in accordance with the law, and rendering recommendations.

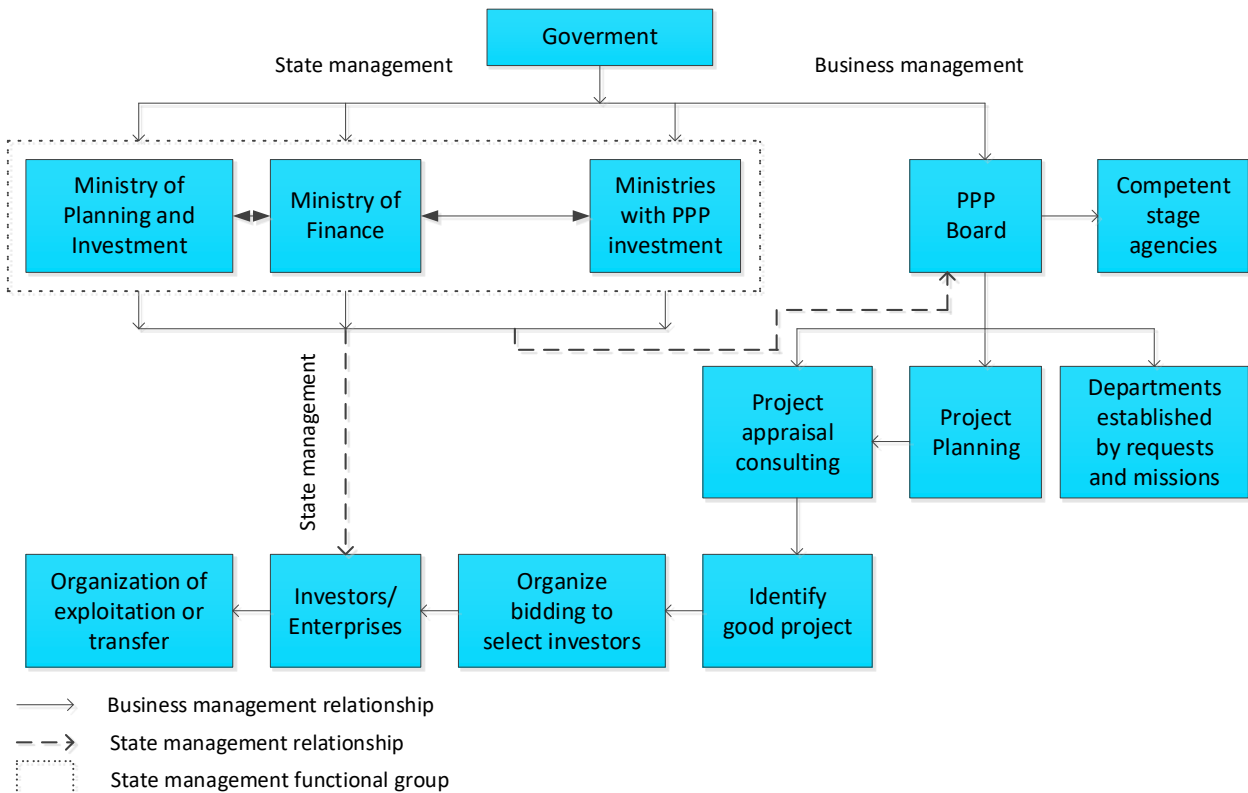


Fig. 6: Investment control and management model under PPP method

The PPP Board oversees the initiation of investment solicitations, project establishment, investor selection through competitive bidding processes, project execution management, operational management, and project return to state control upon the expiration of the operational phase. In essence, the PPP Board bears the onus of shepherding projects from investment attraction to successful fruition.

This model extends beyond the central level and can be decentralized for the implementation of smaller projects at the local government level, following the same paradigm.

In this schema, ministries assume the sole function of state management, providing guidance, overseeing adherence to investment laws, and conducting inspections to detect law infringements necessitating corrective actions.

4.3. Humans in PPP projects

Theory emanates from practical application; thus, to establish a comprehensive and robust legal framework aligned with predefined objectives, it is imperative to enlist individuals possessing the requisite qualifications, professional acumen, and an extensive history of practical experience.

Vietnam urgently needs to address this matter due to the disconnect between the existing legal framework system and the dynamic evolution of the market. Regulatory bodies responsible for planning often exhibit apprehension, hesitance to take responsibility due to their limited expertise, and a proclivity for conservatism. Unfortunately, within this cohort of individuals, there are those actively involved in drafting legislation, decrees, and investment regulations. This participation has, in many instances, impeded operational efficacy, attributed to the absence of clear-cut standards within the legal framework, which invites debate and disputes under the pretext of "differing interpretations" or "lack of experience." While various factors may contribute to a reluctance to assume responsibility, the political apparatus has yet to exhibit the requisite determination and resolve to institute necessary adjustments, potentially impeding the success of the nascent PPP investment model. Therefore, individuals involved in PPP initiatives should meet the following criteria:

- Possess a profound and extensive expertise.
- Demonstrate capacity, experience, innovative thinking, and courage in thought and action.
- Exhibit ethical integrity and a strong sense of professional responsibility.

4.4. Financial instruments

Vietnam embarked directly on a socialist path, bypassing the intermediary phase of capitalist development. Consequently, we experienced a temporary deficiency in inheriting certain industrial

production practices characterized by a propensity for risk aversion and a fear of making mistakes. This eventually led to an avoidance of responsibility.

Our comprehension of surplus value has been incomplete. Every product offered in the market possesses not only its intrinsic value but also a utility value. In the socialist production system, there is a prevailing emphasis on imbuing products with high utility value to equitably serve all segments of society, transcending social classes. Nevertheless, it is imperative to recognize that the production of goods must also account for the profit perspective. This necessitates profitability for product suppliers, thereby ensuring the sustainable stability of enterprises and facilitating expansion for the sake of increasing profits. Such endeavors are vital to cultivating a climate of receptivity and attracting private organizations and businesses to invest. Consequently, financial instruments designed to support investors must genuinely function as effective tools to foster transparency and harmonize profits between investors and societal interests. These instruments should also stimulate demand while ensuring profitability for investors. Consequently, the formula for calculating the cost of traffic products invested in the BOT format can be understood as follows:

- Cost of Traffic Products = Total Cost of Product Manufacturing + Profit from Product Sales
- Profit from Product Sales = Investor Profits + Social Benefits
- Social Benefits = Economic Development Costs + Environmental Regeneration Costs

The dichotomy of "Investor Interests" and "Social Benefits" is inherently characterized by opposing forces that can either mutually enhance or impede one another. Achieving equilibrium between the profits enjoyed by investors and the social benefits, encompassing tax contributions and social responsibilities, necessitates meticulous calculation. This equilibrium encourages investors to engage, invest their resources, and apply their managerial expertise to product development, quality enhancement, and cost reduction. During this phase, the state must create a conducive environment for investors to willingly participate, predicated on well-defined legal constraints.

This endeavor demands a resolute policy framework that can identify suitable financial instruments to support investors. This responsibility falls squarely on the shoulders of the state and its ministries, which must engage in research, calculations, proposals, and the harmonization of the two aforementioned benefit categories. This harmonization entails the creation of support mechanisms through credit institutions, preferential policies, and fair profit-sharing arrangements, where, for instance, improvements and price reductions of finished products are fundamentally enjoyed by investors.

4.5. Risk allocation

Traffic construction projects exhibit distinct characteristics such as substantial costs, protracted manufacturing durations, and reliance on outdoor settings, rendering them susceptible to profound climatic, temperature, and meteorological influences. Moreover, these projects are influenced by domestic and international political and economic dynamics, affecting input material costs, the depletion of natural resources, and advancements in science and technology for material substitution and processing. Nonetheless, it remains exceedingly challenging to comprehensively identify risks, as many unforeseen and uncontrollable risks are inherent in such projects. Consequently, contracts of this nature necessitate transparent provisions to enable timely resolution and settlement, ensuring that progress, quality, and costs remain under control from the estimation and bidding phase. Therefore, it is imperative to delineate the extent and boundaries of transparent provisions within the contract, while clearly outlining the responsibilities of the involved parties. If required, a formula can be devised, contingent on the inverse percentage of contributed capital.

Furthermore, for the purpose of assigning responsibilities among relevant stakeholders, the competent state agency must formulate and implement a comprehensive risk management process encompassing all aspects of construction. Written agreements should be forged with investors and enterprises, explicitly defining the obligations of each party. The risk management process adheres to an eight-step protocol:

1. Identification and classification of objective and subjective risks.
2. Prioritization based on impact severity and occurrence frequency.
3. Risk analysis, incorporating qualitative and quantitative assessments, eliminating variables with negligible impact.
4. Risk mitigation through proactive planning, responsibility allocation, and technological processes.
5. Risk response, delineating feasible treatment options ranging from low to high based on the risk level.
6. Clear assignment of responsibilities to each stakeholder.
7. Monitoring and mitigation of consequences.
8. Formulation of written agreements for resolution and subsequent risk prevention measures.

The aforementioned considerations and arguments are intended to facilitate the development of solutions aimed at risk reduction and equitable risk sharing between the state and investors. This approach prioritizes transparency as a means to attract investment in the form of BOT contracts for traffic construction projects.

5. Conclusions

Based on the findings of this research, several conclusions can be derived as follows:

1. In circumstances where public investment capital is limited, the utilization of the PPP method to attract investment appears to be a reasonably viable solution. However, it is important to note that not all countries have successfully implemented this approach. The experience of Hungary, which had to repurchase four unsuccessful BOT investment projects, along with lessons from other nations, serves as a valuable example, particularly for Vietnam.
2. The article has successfully pinpointed critical issues that warrant further investigation, taking into account the objective dynamics of the market economy and economic principles.
3. Each form of investment possesses its unique characteristics and requirements for successful execution. Consequently, Vietnam must undertake a comprehensive study aimed at developing a distinct legal framework tailored to PPP investments, aligning with the realities of the socialist-oriented market economy and striving to achieve predefined objectives. Key considerations include:
 - Firstly, the legal framework must serve as the foundation, encompassing aspects such as alignment with production practices, recognition of the inherent openness of the market economy, and the equilibrium between social advantages and investor interests.
 - Secondly, the proposed management model and operational processes, presented by the authors for PPP investments, constitute a specialized form of investment designed to mutually benefit both the state and investors. Therefore, the legal basis should reflect this specificity, ensuring fairness, and acting as a catalyst for investment attraction.
 - Thirdly, to attain the intended goals, there is a need to cultivate a dedicated PPP workforce, characterized by profound professional expertise, strong management acumen, unwavering responsibility, ethical integrity, and a drive for innovation, all while valuing labor as a vital contributor to national development.

These conclusions align with the findings of previous studies conducted by authors such as [Cui et al. \(2018\)](#), [Wang et al. \(2019\)](#), and [Tavana et al. \(2022\)](#). This correlation underscores the robustness and reliability of the research outcomes presented in this paper. The research findings lead to the following recommendations:

- Price and profit represent fundamental and pivotal determinants in the attraction of investments. Consequently, the government should implement specific policies aimed at fostering confidence and

incentivizing investors, with particular emphasis on luring international investment.

- Investments conducted through the PPP method typically span extended durations, while the costs of essential input resources remain subject to market fluctuations. Therefore, the government should establish a tiered policy to periodically ascertain the value of an investor's contributions, based on the tasks performed within the contract. This valuation serves both as the foundation for remuneration to the investor upon project completion and as a risk mitigation measure for investors, enhancing project reliability and transparency.
- The legal framework should be tailored to accommodate the distinct characteristics of PPP investments, acknowledging their unique attributes and prolonged capital investment horizons.
- The implementation of supportive policies, encompassing financial incentives, incentives for subsequent projects, and remuneration strategies, should be employed to stimulate investors into actively researching project proposals, bolstered by a proactive and daring approach.
- The government must establish a dedicated source of capital to expedite the approval of urgent project proposals, thereby accelerating economic development.

Compliance with ethical standards

Conflict of interest

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

References

- Bao H, Peng Y, Ablanedo-Rosas JH, and Gao H (2015). An alternative incomplete information bargaining model for identifying the reasonable concession period of a BOT project. *International Journal of Project Management*, 33(5): 1151-1159. <https://doi.org/10.1016/j.ijproman.2014.12.004>
- Chen C and Doloi H (2008). BOT application in China: Driving and impeding factors. *International Journal of Project Management*, 26(4): 388-398. <https://doi.org/10.1016/j.ijproman.2007.07.002>
- Cronbach LJ (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16(3): 297-334. <https://doi.org/10.1007/BF02310555>
- Cui C, Liu Y, Hope A, and Wang J (2018). Review of studies on the public-private partnerships (PPP) for infrastructure projects. *International Journal of Project Management*, 36(5): 773-794. <https://doi.org/10.1016/j.ijproman.2018.03.004>
- Dang TH, Le LH, Le VP, Le TM, Nguyen KH, and Nguyen TA (2023). Identifying factors affecting investment control in form of public-private partnerships for road traffic infrastructure. *International Journal of Advanced and Applied Sciences*, 10(1): 144-156. <https://doi.org/10.21833/ijaas.2023.01.019>
- Dewulf G and Garvin MJ (2020). Responsive governance in PPP projects to manage uncertainty. *Construction Management and Economics*, 38(4): 383-397. <https://doi.org/10.1080/01446193.2019.1618478>
- Jokar E, Aminnejad B, and Lork A (2021). Assessing and prioritizing risks in public-private partnership (PPP) projects using the integration of fuzzy multi-criteria decision-making methods. *Operations Research Perspectives*, 8: 100190. <https://doi.org/10.1016/j.orp.2021.100190>
- Kumaraswamy MM and Zhang XQ (2001). Governmental role in BOT-led infrastructure development. *International Journal of Project Management*, 19(4): 195-205. [https://doi.org/10.1016/S0263-7863\(99\)00069-1](https://doi.org/10.1016/S0263-7863(99)00069-1)
- Liu J, Liu J, Bu Z, Zhou Y, and He P (2022). Path analysis of influencing government's excessive behavior in PPP project: Based on field dynamic theory. *Transportation Research Part A: Policy and Practice*, 166: 522-540. <https://doi.org/10.1016/j.tra.2022.11.011>
- Miller Jr RG (1997). *Beyond ANOVA: Basics of applied statistics*. CRC Press, Boca Raton, USA. <https://doi.org/10.1201/b15236>
- MOT (2021). Project of highway construction in the period of 2021-2025 and orientation to 2030. Ministry of Transport, Ha Noi, Vietnam.
- Navalersuph N and Charoenngam C (2021). Governance of public-private partnerships in transportation infrastructure projects based on Thailand's experiences. *Case Studies on Transport Policy*, 9(3): 1211-1218. <https://doi.org/10.1016/j.cstp.2021.06.008>
- Rybnicek R, Plakolm J, and Baumgartner L (2020). Risks in public-private partnerships: A systematic literature review of risk factors, their impact and risk mitigation strategies. *Public Performance and Management Review*, 43(5): 1174-1208. <https://doi.org/10.1080/15309576.2020.1741406>
- Tavana M, Nasr AK, Mina H, and Michnik J (2022). A private sustainable partner selection model for green public-private partnerships and regional economic development. *Socio-Economic Planning Sciences*, 83: 101189. <https://doi.org/10.1016/j.seps.2021.101189>
- Wang H, Liu Y, Xiong W, and Song J (2019). The moderating role of governance environment on the relationship between risk allocation and private investment in PPP markets: Evidence from developing countries. *International Journal of Project Management*, 37(1): 117-130. <https://doi.org/10.1016/j.ijproman.2018.10.008>
- Wang H, Xiong W, Wu G, and Zhu D (2018). Public-private partnership in Public Administration discipline: A literature review. *Public Management Review*, 20(2): 293-316. <https://doi.org/10.1080/14719037.2017.1313445>
- Zhang S, Gao Y, Feng Z, and Sun W (2015). PPP application in infrastructure development in China: Institutional analysis and implications. *International Journal of Project Management*, 33(3): 497-509. <https://doi.org/10.1016/j.ijproman.2014.06.006>
- Zhang X, Bao H, Wang H, and Skitmore M (2016). A model for determining the optimal project life span and concession period of BOT projects. *International Journal of Project Management*, 34(3): 523-532. <https://doi.org/10.1016/j.ijproman.2016.01.005>