

Significant factors affecting the Vietnam Roads Infrastructure Construction Cost Overrun - A Review

Hung Huu Nguyen¹, Tuan Anh Nguyen^{*2,3}, Thien Chi Nguyen³

¹DEOCA Group, Vietnam

²Ho Chi Minh City University of Transport, Ho Chi Minh City, Vietnam

³The SDCT Group Research, Ho Chi Minh City University of Transport, Vietnam

ARTICLE INFO

Article History :

Accepted: 02 Feb 2024

Published: 14 Feb 2024

Publication Issue :

Volume 11, Issue 1

January-February-2024

Page Number :

214-224

ABSTRACT

Cost overrun represents a significant challenge faced in construction projects, particularly in the realm of transportation infrastructure. The investigation into the causes of cost overruns in such projects has garnered substantial attention from both academics and the general public. Various studies conducted globally have identified diverse factors contributing to cost overruns. This article undertakes a critical review of the literature on cost overruns in construction projects, encompassing cases from different countries with a specific focus on Vietnam. The aim is to identify and comprehend the primary potential causes of cost overruns in construction projects across various geographical contexts, providing insights into both commonalities and distinctions within the identified factors. According to the findings of this study, the ten identified factors encompassing Delay in site clearance certificates, Change Management, Delay in Payment, Extension of the project implementation schedule, Construction Material Price Fluctuation, Effects of inflation and price slippage, Poor construction site management, Poor project management capacity of the investor, Poor financial capacity of the investor, Geological complexity are deemed highly influential and warrant close scrutiny during the implementation of projects in Vietnam. The insights gained from this study will serve as invaluable recommendations for active entities within the construction industry to adopt a more holistic approach to project management, cost control, and cost overrun management. By addressing quantitatively these factors in the forthcoming research, organizations in construction industries in Vietnam can effectively minimize project costs overrun in the future.

Keywords: Cost Overrun, Construction Projects, Infrastructure, Project Management, Factors.

I. INTRODUCTION

The Construction Industry in Vietnam plays an extremely important role in the process of developing facilities and infrastructure for the entire society, serving the process of industrialization and modernization of the country. This is an area with large investment capital, accounting for a high proportion of the state budget as well as the annual capital plan of enterprises. Therefore, cost management is always of concern to the state and investors, in which construction investment consulting costs are one of the important components of construction estimates. In recent years, as the country is increasingly developing, investing in transport infrastructure is an inevitable and urgent need of society.

As reported by the Ministry of Transport, significant resources have been allocated by the National Assembly and government for highway development from 2020 to the present. The highway system now totals 1,729 kilometers in length after this expenditure of 566 kilometers. The government has set a target for Vietnam to have over 3,000 kilometers of highways by 2025, necessitating the construction and completion of an additional 1,270 kilometers within the next three years. According to the road network expansion plan for 2021-2030, with a vision toward 2050, the eastern North-South Expressway, stretching from Huu Nghi Border Gate in Lang Son to Ca Mau, is slated to be 2,063 kilometers long. The implementation of the expressway project will encompass the execution of various component projects and sections. [1]

There have been many road projects with planning for investment capital of up to trillions of VND (Table I).

TABLE I. HIGHWAY PROJECTS PLANNED FOR INVESTMENT 2021 - 2025 [2]

Name of Projects	Estimated length (km)	Preliminary total investment (Billion VND)
Bai Vot - Ham Nghi	36	7403
Ham Nghi - Vung Ang	54	10185
Vung Ang - Bung	58	11785
Bung – Van Ninh	51	10526
Van Ninh - Cam Lo	68	10591
Quang Ngai - Hoai Nhon	88	20898
Hoai Nhon - Quy Nhon	69	12544
Quy Nhon - Chi Thanh	62	12298
Chi Thanh - Van Phong	51	10601
Van Phong - Nha Trang	83	12906
Can Tho - Hau Giang	37	9768
Hau Giang - Ca Mau	72	17485

A. Statement of the problem

During its developmental trajectory, Vietnam is diligently endeavoring to establish comprehensive connectivity across every corner of the nation through these crucial transportation arteries. Nonetheless, amidst the escalation in both the quantity and magnitude of infrastructure projects, the persistent issue of transportation constructions exceeding the designated overall investment allocation has emerged as a matter of paramount concern. For publicly disclosed major projects, the financial overruns often ascend to staggering amounts, frequently reaching into the realm of billions of VND. A formidable challenge in the meticulous management of these projects lies in the fact that a significant proportion of contractors fail to bring the projects to completion, or if completed, do so at disproportionately high costs. This, in turn, results

in meager or, in some instances, negative profit margins, ultimately leading to an inability to meet the stringent quality requirements set forth for the respective projects.

Several studies have investigated cost overruns during the construction of projects in Vietnam, like the one conducted by Long Le-Hoai (2008) [3]. This study identified the reasons behind overall cost overruns in the entire construction industry, as acknowledged by the Ministry of Construction Industry. Additionally, Tai Le-Huu (2022) [4] investigated and outlined the causes leading to increased costs and delays in construction progress for public investment projects. However, there's a gap in research as there haven't been many studies specifically examining cost overruns during the construction phase for traffic works in general, and road projects in particular.

B. The Objective of the Study

The primary aim of this research is to analyze the elements influencing cost management in the context of highway road construction projects. Additional objectives encompass the following:

- Investigating the cost management methodologies employed by various construction sectors in Vietnam, as evidenced by a comprehensive literature review.
- Assessing the implications of these practices on cost management within their respective organizational frameworks.
- Identifying the repercussions of these factors on the overall cost management of diverse construction projects across Vietnam.

Furthermore, recommendations will be provided on strategies to enhance cost management specifically tailored for highway road construction projects.

II. LITERATURE REVIEW

A. What is Cost Overrun

Cost overrun [5] is one of the critical challenges encountered in construction projects, referring to the exceedance of actual costs beyond the approved budget. Several publications have referred to this phenomenon as cost escalation, cost development, or cost increase [6, 7]. The difference between actual and projected project expenses is known as a cost overrun [8]. Flyvbjerg (2002) [6] characterizes cost development as the disparity between actual and projected approved costs presented as a percentage of project defined costs, while cost escalation is delineated as the actual costs subtracted from estimated costs represented as a percentage of estimated costs.

The issue of project cost overrun is not exclusive to Vietnam but is prevalent worldwide, particularly in the construction industry. Failure to address this conflict adequately may result in project suspension or even cancellation. Projects frequently encounter cost overruns due to a multitude of factors, including deficient estimation techniques or assumptions, scope creep or change requests, insufficient contingency or reserve funds, unforeseen risks or uncertainties, inflation or currency fluctuations, delays or rework, resource shortages or inefficiencies, poor communication or coordination, and contract disputes or claims. The ramifications of cost overruns can be diverse, negatively impacting the project's performance, quality, and reputation. These effects may include diminished profitability or return on investment, dissatisfaction, or erosion of trust among stakeholders, tarnished reputation or image, heightened litigation or arbitration, reduced scope or quality, compromised safety or compliance, escalated stress or conflict, and loss of market share or competitive advantage.

B. The Situation of Cost Overrun in Vietnam

Previous studies conducted earlier in Vietnam reveal a prevalent issue of cost overruns in many road construction projects. The table II illustrates instances of this issue across various projects collected.

TABLE II

THE COST OVERRUN SITUATION OF SOME SURVEYED PROJECTS IN VIETNAM

Name of Projects	Project length (km)	Initial Budget (Billion VND)	Updated Budget (Billion VND)
Thang Long Avenue	30	5249	7527
Ho Chi Minh City - Trung Luong Highway	61.9	6500	9900
Trung Luong - My Thuan Highway	51.5	9.668	12668
Long Thanh - Dau Giay	54.9	9890	20630
Cao Lanh - An Huu Highway	27.4	5886	7496

Source: Collected data from Authors

Moreover, the collective investment capital for the five metro line projects in Hanoi and Ho Chi Minh City surged by 80 trillion VND (\$3.47 billion) beyond initial projections. This increase is attributed to delays in land clearance, challenges in securing funding, and a lack of responsibility on the part of investors. Consequently, the construction progress for all five projects in both of these cities lags behind schedule and has exceeded the initially estimated investment figures by a significant margin [9].

C. Summary of the Literature Review

Numerous scholars worldwide have conducted research on cost management in cost overrun across diverse countries. Recognizing the pivotal role of cost management in the project lifecycle, this chapter aims to delineate various factors influencing cost overrun. By identifying and drawing conclusions from these factors, the groundwork will be laid for future research in Vietnam addressing a current gap in this field. This initiative is intended to contribute valuable insights to the burgeoning construction sector industry in Vietnam.

Since 2002, S. M. Vidalis and F.T. Najafi [10] conducted a comprehensive study on 708 highway projects funded by the Florida Department of Transportation (USA).

Their investigation yielded eight distinct categories of factors contributing to cost overruns in highway projects, each categorized at different levels. Among these, the three primary culprits were change in construction conditions (34%), design modifications (39%), and insufficient supervision and inspection (6%).

In his study in 2005, Garry Creedy [11] examined 238 transportation projects in Queensland, Australia, spanning from 1995 to 2003. He identified 38 risk factors contributing to increased investment levels in transportation projects. Among them, four major influencing factors were highlighted, including: Changes in project scale/design (31%), Higher tender prices than estimated (11%), Changes in drainage system design (10%), and increased project activities (10%).

Yehiel Rosenfeld (2013) [12] conducted a cross-sectional survey that involved 200 local construction professionals to evaluate the perceived significance and effects on cost overruns of 15 common underlying factors. According to the survey results, the primary causes identified in the local setting were as follows: Firstly, premature tender documents emerged as the leading cause, followed by excessive alterations in

owners' specifications as the second factor, and finally, the third cause was linked to tender-winning bids being unrealistically low, a practice colloquially termed as "suicide tendering."

Aljohani, A. et al. (2017) [13], in their literature review addressing cost overrun in construction projects across diverse countries, aimed to identify the primary potential causes. The analysis indicates that numerous factors have played a role in the suboptimal performance of these projects. Across seventeen contexts, a total of 173 causes of cost overrun were identified. The key potential causes encompass regular modifications in design, financial obstacles faced by contractors, payment delays for completed work, insufficient experience of contractor, poor cost estimation, inaccurate tendering documentation, and inadequate management of materials.

In 2018, a study conducted by Sohu et al. [14] in Pakistan identified a comprehensive list of 64 factors contributing to the influences on cost management in highway projects. However, upon careful analysis, the research revealed that several factors stood out as particularly impactful. These key factors included fluctuations in material costs, change in project design, delays in material supply, inadequate contract management, disputes between project participants and stakeholders, variations in currency, incorrect time assessment of the overall project, delayed payments for completed works, the expertise of the project manager and sub-contractors, inaccurate cost estimations, and deficiencies in on-site management and supervision.

Pranav K. Lende and Aradhana D. Rathod conducted a study on cost overruns in road construction projects in India [15]. Through a questionnaire survey, the study identified the top seven critical factors contributing to cost overruns. These factors include changes in the cost of services, delay in payment, design modifications during construction, change in quantity due to actual site conditions, delay in design and approval processes,

delays in relocating existing utilities, and inadequate communication between government bodies.

Herrera et al. (2020) with the research methodology comprised a systematic review comprising five primary stages: (1) formulating research questions; (2) comprehensive search for relevant documents; (3) selection of pertinent documents; (4) collecting, analyzing, and synthesizing evidence; and (5) reporting of results [16]. Through this process, thirty-eight factors contributing to cost overrun were identified and categorized into 14 distinct groups. As per the influence indicator, the five most significant and recurrent factors contributing to cost overrun were: Failures in design (12.78%), fluctuations in material prices (6.67%), insufficient project planning (5.56%), changes in project scope (5.56%), and modifications in design (4.44%).

In recent years, there has been a notable increase in research focusing on the matter of project cost overruns in Vietnam. Numerous studies have been conducted to analyze and understand the factors contributing to cost overruns in various projects.

In their 2008 research report titled "Delays and cost overruns in large projects in Vietnam: comparison with some other countries," Long Le-Hoai et al [3] conducted a survey involving 21 factors and identified five main factors contributing to delays and cost overruns in large projects in Vietnam. These key factors encompassed poor construction site management and supervision, inadequate project management support, financial difficulties of the investor, financial constraints faced by the contractor, and changes in project design. The study shed light on these crucial elements, emphasizing their significant role in influencing the challenges of delays and cost overruns in sizable projects within the Vietnamese context.

Binh Ho-Anh (2011) [17] identifies common causes and their respective levels of influence on the escalation of

investment during the construction phase of road traffic projects in Vietnam. A survey involving 39 factors revealed that five causes exhibited a high frequency of occurrence and exerted a substantial influence on the increase in investment levels during the construction phase of traffic works. These significant causes were identified as follows: long project implementation time, fluctuations in raw material prices, the impact of inflation and price slippage, and issues related to other technical infrastructure projects. The study thus emphasized the critical role these factors play in influencing the rise in investment levels in the context of road traffic projects in Vietnam.

Van Luu-Truong (2013) [18] conducted the research and identified 25 crucial factors that affect construction sites' performance. These factors were categorized into six different categories and placed in the order: management, technology, resources of contractor, material/equipment, finance, and design. Through ranking the importance of these factors, the article aids contractors in directing their attention towards the most crucial elements to enhance their competency.

The empirical results presented by Vu Hong-Anh et al. (2016) [19] highlight the seven primary factors exacerbating the risk of cost overruns during construction stages, derived from analysis of 54 indexes. According to the study, these risk factors are categorized as follows: risk associated with infrastructure construction investment management systems, risk related to survey and design schemes, risk linked to land acquisition, risk pertaining to the fiscal and management capabilities of construction units, risk associated with capital and contractual constraints, risk stemming from changes in the macro-economic

environment, and risk concerning supervisory moral standards.

Thong Vu-Quoc et al. (2020) conducted a comprehensive study examining 31 factors contributing to cost overruns in construction projects managed by international contractors in Vietnam. These factors were systematically grouped into five categories, addressing issues concerning the owners, foreign contractors, subcontractors and suppliers, state management, and the projects themselves. The study highlighted five significant influencing factors, namely 1) prolonged project implementation schedules (Rank 1), sudden spikes in demand for site workers (Rank 2), Contract delay or arbitrary termination; (Rank 3), insufficient management and supervision of quantities (Rank 4), and postponed and incomplete handover of construction sites (Rank 5). This research provides valuable insights for both foreign and domestic contractors, offering them practical guidance to anticipate challenges and implement effective solutions to mitigate the risk of cost overruns in their construction endeavors.

An initial evaluation of 25 factors influencing the escalation of settlement values in public investment projects within the Central region has been conducted by Tai Le-Huu (2022) [4]. Among these factors, experts have identified a noteworthy impact from issues such as insufficient premises and the upward trend in material prices, attributed to price slippage in the construction sector. These factors are assessed as having the most pronounced influence on the substantial increase in the ultimate cost of public construction projects.

The table III shows the summary of this literature review about cost overrun.

TABLE III

SUMMARY OF FACTORS FROM LITERATURE REVIEW

ID	Reference	Country	Analyzed Factors	Top Critical Factors
[10]	S. M. Vidalis and F.T. Najafi (2002)	USA	8	<ul style="list-style-type: none"> - Change in construction conditions - Design modifications - Insufficient supervision and inspection
[11]	Garry Creedy (2005)	Australia	38	<ul style="list-style-type: none"> - Changes in project scale/design - Higher tender prices than estimated - Changes in drainage system design - Increased project activities/ scopes
[12]	Yehiel Rosenfeld (2013)	Israel	15	<ul style="list-style-type: none"> - Premature issuance of tender documents - Excessive alterations in owners' requirements or definitions - Tender-winning bids reflecting unrealistically low prices
[13]	Aljohani, A. et als. (2017)	<i>Many countries</i>	173	<ul style="list-style-type: none"> - Regular modifications in design, - Financial obstacles faced by contractors - Payment delays for completed work - Insufficient contractor experience - Inaccurate cost estimation - Inaccurate tendering documentation, - Inadequate management of materials
[14]	Sohu et al. (2018)	Pakistan	64	<ul style="list-style-type: none"> - Fluctuations in material costs - Change in project design - Delays in material supply - Inadequate contract management - Disputes among project stakeholders - Currency fluctuations - Inaccurate project timeline assessment - Delayed payments for completed works - The expertise of project manager and sub-contractors - Poor cost estimations, - Deficiencies in on-site management and supervision
[15]	Pranav K. Lende and Aradhana D. Rathod (2018)	India	17	<ul style="list-style-type: none"> - Changes in the cost of services - Delay in payment - Design modifications during construction - Change in quantity of work due to actual site conditions

				<ul style="list-style-type: none"> - Delays in design and approval procedures - Setbacks in relocating existing utilities in time - Insufficient communication between government entities
[16]	Herrera at al. (2020)	<i>Many countries</i>	38	<ul style="list-style-type: none"> - Failures in design - Fluctuations in material prices - Insufficient project planning - Changes in project scope - Modifications in design
[17]	Binh Ho-Anh (2011)	Vietnam	39	<ul style="list-style-type: none"> - Long project implementation time - Fluctuations in raw material prices - The impact of inflation and price slippage - Issues related to other technical infrastructure projects
[18]	Van Luu-Truong et al. (2013)	Vietnam	25	<ul style="list-style-type: none"> - Construction Management - Technology capabilities - Resources of contractor - Material and equipment availability - Financial resources - Design considerations
[19]	Vu Hong-Anh et al. (2016)	Vietnam	54	<ul style="list-style-type: none"> - Risk associated with infrastructure construction investment management systems - Risk related to survey and design schemes - Risk linked to land acquisition - Risk pertaining to the fiscal and management capabilities of construction units - Risk associated with capital and contractual constraints, - Risk stemming from changes in the macro-economic environment, - Risk concerning supervisory moral standards.
[20]	Tai Le-Huu et al. (2022)	Vietnam	25	<ul style="list-style-type: none"> - Insufficient premises - The upward trend in material prices

D. Summary of factors

The issue of cost overrun in construction projects is widely acknowledged as not being exclusive to Vietnam; rather, it affects numerous construction projects across various countries worldwide. Hence, it is imperative to thoroughly define and comprehend the primary causes contributing to this issue through a

comprehensive literature review and analysis of past researchers' studies. Subsequently, efforts can be made to mitigate and minimize the impact of such challenges on construction projects in Vietnam.

In this article, a thorough examination of various research publications has been conducted to appraise

their strengths and flaws compared with the context in factors that significantly influence cost management. Vietnam. In addition to assessing these aspects, the The consolidated list of these influential factors is analysis has resulted in the identification of ten (10) outlined in the table below.

TABLE IV

TOP FACTORS SIGNIFICANTLY INFLUENCE COST OVERRUN

N.O.	Cluster	Factors	Description
1	Preparation and Planning	Delay in site clearance certificates	Delays in the issuance of site certificates are causing extended waiting times, thereby resulting in increased costs.
2	Change Management	Change Management	The potential cause of this situation could be attributed to the client's decision to include additional specifications in the project.
3	Construction Management	Delay in Payment	The delay in processing payments for acceptance work contributes to project delays and exceeds the initially estimated costs.
4	Construction Management	Extension of the project implementation schedule	The potential cause for this issue may stem from the need for reworks and slow decision-making processes, potentially impacting cost management.
5	Change management	Construction Material Price Fluctuation	Throughout the project duration, variations in implementation prices may occur, potentially influencing the initially planned costs for materials.
6	Change management	Effects of inflation and price slippage	Insufficient measures to manage inflation pose a significant challenge, contributing to an escalation in project costs.
7	Construction Management	Poor construction site management	Inefficient site management may result in projects failing to meet established schedules, compromising quality assurance, and leading to escalated costs.
8	Construction Management	Poor project management capacity of the investor	Weak management capacity leads to lots of defects, leading to a prolonged construction process, and increasing project costs.
9	Finance Management	Poor financial capacity of the investor	Inadequate financial resources during investment and commercial activity might cause projects to go behind schedule.
10	Preparation and Planning	Geological complexity	The complexity of geological conditions can potentially impact cost management.

Source: Promoted by Authors

III. CONCLUSION AND RECOMMENDATION

Based on the literature review and the synthesis of the comprehensive above research articles, it is evident that the construction industry faces challenges in cost overrun management across various projects. The factors identified undoubtedly pose challenges to cost management in different countries worldwide. According to the above literature review, ten factors in Table IV are among of are among the very influential factors that should have a close look during the implementation of the projects in Vietnam.

However, it may be premature to definitively conclude the extent to which these factors impact highway road infrastructure projects in Vietnam. In addition to the findings from the literature survey reported in this research, a thorough literature review is required to discover a larger range of variables. Despite the fact that most elements impacting cost management are common across nations, there is a large study deficit in Vietnam. Few researchers have addressed the elements that influence cost management in the building business, particularly in the context of highway roads. Furthermore, beyond an enlarged literature analysis, there is an urgent need for additional empirical study in this area, particularly in Vietnam.

The scarcity of studies outlining industry difficulties and presenting potential solutions highlights the need for extensive real-world research programs. The forthcoming studies should adopt diverse perspectives from the various stakeholders involved in the project and evaluate quantitative factors influencing cost overruns. By doing so, the synthesis of research findings will enable managers to obtain a comprehensive understanding of project costs within the construction industry overall, and specifically within road infrastructure projects. This inclusive approach will facilitate better decision-making and more effective cost-management strategies.

IV. REFERENCES

- [1] Vietnamnet Global Magazine, 2023. <https://vietnamnet.vn/en/vietnam-takes-action-to-build-3-000km-of-highway-by-2025-2157189.html>
- [2] Vneconomy Magazine, 2022. <https://vneconomy.vn/chon-duoc-nha-thau-manh-cao-toc-bac-nam-giai-doan-2-ky-vong-can-dich.htm>
- [3] Long Le-Hoai, Young Dai Lee, and Jun Yong Lee. Delay and cost overruns in Vietnam large construction projects: a comparison with other selected countries. *KSCE Journal of Civil Engineering*, 2008, vol. 12, no.6, 367 – 377.
- [4] Tai Le-Huu, Thong Tran-Van, and Thuat Dang-Cong. Investigating factors affecting Construction Cost and Schedule Overruns of public investment projects. *The Builder Magazine*, 2022, no.3-4, 54-60.
- [5] Van, L. T., Nghia, N. H., & Khuong, L. T. (2012). Identifying Key Factors influencing cost variation of construction projects in Ho Chi Minh City. *Ho Chi Minh city open University Journal of Science-Engineering and Technology*, 2(1), 3-10.
- [6] Flyvbjerg, B.; Holm, M.S.; Buhl, S. Underestimating costs in public works projects: Error or lie? *J. Am. Plan. Assoc.* 2002, 68, 279–295.
- [7] Al-Hazim, N.; Salem, Z.A.; Ahmad, H. Delay and Cost Overrun in Infrastructure Projects in Jordan. In *Proceedings of the 7th International Conference on Engineering, Project, and Production Management, EPPM 2016*, Białystok, Poland, 21–23 September 2016; Halicka, K., Nazarko, L., Wasiak, A., Eds.; Elsevier Ltd.: Amsterdam, The Netherlands, 2017; Volume 182, pp. 18–24.
- [8] Odeck, J. Cost overruns in road construction - What are their sizes and determinants? *Transp. Policy* 2004, 11, 43–53.
- [9] Vietnamnet Global Magazine, 2023. <https://vietnamnet.vn/en/five-metro-line->

- projects-report-a-cost-overflow-of-347-billion-540435.html
- [10] Vidalis, S. M., & Najafi, F. T. (2002). Cost and time overruns in highway construction. In CSCE 30th Annual Conference Proceedings: 2002 Challenges Ahead - 4th Structural Specialty Conference, 4th Transportation Specialty Conference and 2nd material Specialty Conference (Vol. 2002, pp. 2799-2808)
- [11] Garry D. Creedy, 2005. Risk factors leading to cost overrun in highway projects. The Queensland University of Technology Research Week International Conference, 4-8 July 2005, Brisbane, Australia
- [12] Y. Rosenfeld, "Root-cause analysis of construction-cost overruns," *Journal of Construction Engineering and Management*, vol. 140, no. 1, pp. 04013039, 2013
- [13] Aljohani, A., Ahiaga-Dagbui, D., & Moore, D. (2017). Construction Projects Cost Overrun: What Does the Literature Tell Us? *International Journal of Innovation, Management and Technology*, 8 (2), 137-143.
- [14] Sohu, Samiullah & Abdullah, Abd Halid & Nagapan, Sasitharan & Jhatial, Ashfaque & Lakhiar, Muhammad. (2018). Contributing Cost Variation Factors in Highway Projects. *Civil Engineering Journal*. 4. 1793. 10.28991/cej-03091115.
- [15] Lende, P.K.; Rathod, A.D. Study of factors affecting cost overrun in road construction project. *Int. J. Res. Eng. Sci. Manag.* 2018, 1, 115–119
- [16] Herrera, Rodrigo F., Omar Sánchez, Karen Castañeda, and Hernán Porras. 2020. "Cost Overrun Causative Factors in Road Infrastructure Projects: A Frequency and Importance Analysis" *Applied Sciences* 10, no. 16: 5506. <https://doi.org/10.3390/app10165506>
- [17] Binh Ho-Anh. Important factors affecting the increase in investment during the construction phase of traffic projects in Vietnam. Master thesis, Ho Chi Minh City University of Technology (HCMUT), (2011)
- [18] Van, L.T., Nghiem, D.T., Nghia, N.H., Hai, D.H. Key factors influencing on Vietnamese construction performance. *Ho Chi Minh City Open University Journal of Science - No. 3(1) 2013*, 39-49.
- [19] Vu, H.A.; Wang, J.; Min, L.; Mai, S.H.; Nguyen, H.P. Research on cost overrun risk of construction phase of Vietnam highway international contracting project. *Engineering* 2016, 8, 86–98.
- [20] Quoc Vu, Thong et al. (2020): Factors Influencing Cost Overruns in Construction Projects of International Contractors in Vietnam. Published in: *Journal of Asian Finance, Economics and Business*, Vol. 07, No. 09 (10 August 2020): pp. 389-400.

Cite this article as :

Hung Huu Nguyen, Tuan Anh Nguyen, Thien Chi Nguyen, "Significant factors affecting the Vietnam Roads Infrastructure Construction Cost Overrun - A Review", *International Journal of Scientific Research in Science, Engineering and Technology (IJSRSET)*, Online ISSN : 2394-4099, Print ISSN : 2395-1990, Volume 11 Issue 1, pp. 214-224, January-February 2024. Available at doi : <https://doi.org/10.32628/IJSRSET2411118>
Journal URL : <https://ijsrset.com/IJSRSET2411118>