STUDY ON RISK MANAGEMENT IN PREPARATION STAGE FOR EXPRESSWAY CONSTRUCTION PROJECTS IN VIETNAM

NGHIÊN CỨU QUẢN LÝ RỦI RO TRONG GIAI ĐOẠN CHUẨN BỊ ĐỐI VỚI CÁC DỰ ÁN XÂY DỰNG ĐƯỜNG CAO TỐC TẠI VIỆT NAM

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Abstract: *The expressway projects in Vietnam are being in thriving because these projects play an important role in the national economy. However, in the project preparation phase, many risk factors have emerged. These risk factors directly and seriously affect the performance of the entire project. Many expressway projects have been delayed and costly exceeded over the recent years. This article focuses on the current situation of the risks of expressway projects in Vietnam, thereby analyzing and studying the risk factors affecting the project, considering the level of impact of these risk factors on expressway projects. This analysis will clarify the main risk elements for expressway projects when the implementation of these projects involves complex policy issues, socioeconomic status, technical issues, and the conflict between the parties involved in the project.*

Keywords: *Risk management, expressway, project quality, project management.*

Classification code: *11.3*

Tóm tắt: *Các dự án đường cao tốc ở Việt Nam đang được đầu tư phát triển mạnh, bởi vì những dự án này đóng vai trò quan trọng trong nền kinh tế quốc dân. Tuy nhiên, trong giai đoạn chuẩn bị dự án, nhiều yếu tố rủi ro đã xuất hiện. Các yếu tố rủi ro này ảnh hưởng trực tiếp và nghiêm trọng đến hiệu quả hoạt động của toàn bộ dự án. Nhiều dự án đường cao tốc đã bị chậm tiến độ và vượt chi phí trong những năm gần đây. Bài báo này tập trung vào thực trạng rủi ro của các dự án đường cao tốc ở Việt Nam, từ đó phân tích, nghiên cứu các yếu tố rủi ro ảnh hưởng đến dự án, xem xét mức độ ảnh hưởng của các yếu tố rủi ro này đến các dự án đường cao tốc. Những phân tích này sẽ làm rõ các yếu tố rủi ro chính đối với các dự án đường cao tốc là gì khi mà việc thực hiện các dự án này liên quan đến các vấn đề phức tạp về chính sách, tình trạng kinh tế xã hội, các vấn đề kỹ thuật và mối quan hệ giữa các bên tham gia dự án.*

Từ khóa: *Quản lý rủi ro, đường cao tốc, chất lượng dự án, quản lý dự án.*

Mã phân loại: *11.3*

1. Introduction

The plan for Vietnam's expressway network consists of 21 routes with a total length of 6,411 km [8]. Up till now, around 1,139 km of the expressway has been completed and put into use.

During the process of implementing expressway projects in Viet Nam, there have been several risk elements causing the project to be delayed, cost over-run and low quality. For instance, The Ben Luc - Long Thanh expressway was delayed; crack and potholes were seen at Da Nang - Quang Ngai expressway just after the traffic clearance ceremony.

Figure 1. *Crack and potholes were seen at Da Nang - Quang Ngai expressway [13].*

It illustrates that the project management in general and risk management in particular of expressway projects were ineffective. This is an urgent issue requiring solutions so that projects implemented in the future will achieve efficiency in terms of progress, cost and quality.

The construction industry and its clients are widely associated with a high degree of risk due to the nature of construction business activities, processes, environment and organization. In fact, in Viet Nam, the project management boards, investors and contractors are still coping with risks mainly based on their experience, without clear management tools.

By qualitative research method, this article focuses on statistics, synthesizing main risk factors, causes and proposing solutions to limit risks in the preparation stage of expressway projects in Vietnam. Its practical value is applied to expressway projects in Vietnam and contributes to the completion of the risk management system.

2. Objects and research methods

Construction projects are generally divided into three main phases: the preparation phase, the implementation phase and the final phase, during which changes and decisions in the project preparation phase are assessed as having the greatest impact on the entire project. On that basis, the authors selected research objects as Risk management in the preparation phase of expressway projects, the research's scope is Expressway projects in Viet Nam from 2010 to the present.

The author chose qualitative research methods: Expert interviews. The experts questioned have at least 10 years of experience directly involved in expressway projects in the following positions: Investor, Project Management Board, Main Contractor. The number of experts interviewed was 15 experts. From 2010 to the present, the Vietnam Expressway Corporation (VEC) was the owner of almost all large expressway projects. Besides, there are only a few project management boards, main contractors with extensive experience in expressways. In order to avoid inaccurate results, all interviewed experts are those who satisfy the above conditions and have an extremely high reputation in the expressway construction industry in Vietnam. Details are shown in the chart below. (Some experts who have held positions in two or all three roles above will be classified in the group of positions where the expert has the longest working experience).

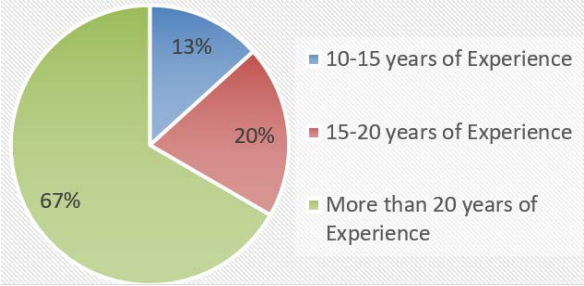

Figure 2. *Structure of years of expert experience.*

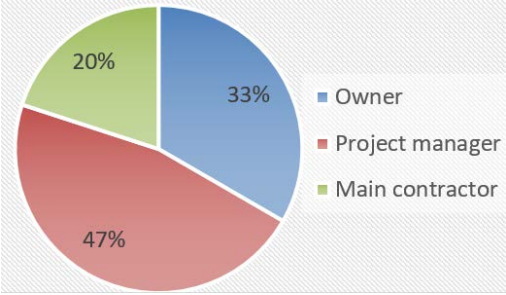

Figure 3. *Structure of positions.*

The author organizes questions for experts, the question focuses on risk management of Vietnam's expressway projects from 2010 to the present:

- Project risk management perspective;
- Project's risk factors;
- The cause of the risk factors of the project;
- The degree of impact of the project's risk factors;
- The project management tool has been applied and its efficiency;

The research process is organized in steps:

- Step 1: Design the question;
- Step 2: Interview the expert;
- Step 3: Statistics synthesized expert opinion;
- Step 4: Analyze the data using the “Potential - Impact matrix” tool for risk assessment;
- Step 5: Conclusion and proposed solutions.

3. Results

3.1. Risk identifying

Based on the interview results, the author statistics the risks in the project preparation phase in the table below:

Table 1. *Risk Elements and its influence level.*

Risk Code	Risk Element	Influence level	Possibility
R1	The conflict between the parties involved in the project	1.21	1.52
R2	Errors in cost estimation	2.65	3.25
R3	The low management ability of the Owner and Project management board.	4.25	4.32
R4	The low ability of consultant Company	2.75	3.35
R5	Design changes many times	3.32	3.20
R6	Design approval delay	3.25	3.65
R7	The flaws in Design	2.63	3.12
R8	The flaws in the experiment	3.25	2.58
R9	The difficulty in Funding	2.23	3.12
R10	The change of law and policies in the construction field	3.52	3.50
R11	Administrative procedures are complicated and cumbersome	3.63	4.23
R12	Changes in tax and policies	2.45	1.65
R13	The lack of knowledge in legal documents in the construction field	2.98	2.64
R14	Difficulties in accessing project finance sources	4.24	4.68
R15	Difficulties due to political institutions	2.21	1.95

Table 1. *Corresponding score.*

Score	0-1	1-2	2-3	3-4	4-5
Influence level	Trivial Impact	Little Impact	Normal Impact	Great Impact	Serious Impact
Possibility	Rarely	Seldom	Occasionally	Often	Usually

3.2 Risk Evaluating

With 15 risk elements were explored in the questionnaire, the author proceeded the data and transferred the risks to the "Potential – Impact matrix". Risks are assessed according to two criteria: Influence level and possibility on a scale from 1 to 5 (table 2).

The results of the distribution of risks on the matrix are shown in the figure below.

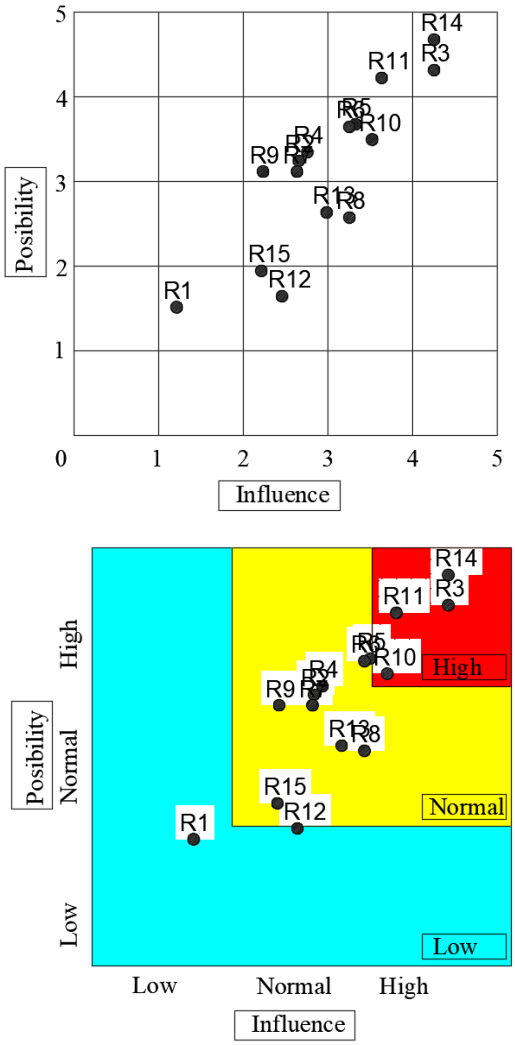

Figure 4. *Potential – Impact matrix.*

Based on the matrix it can be seen that risks are divided into three groups:

• Group 1: Low risk (R1);

• Group 2: Medium risk; (R2, R4, R5, R6, R7, R8, R9, R12, R13, R15);

• Group 3: High risk (R3, R10, R11, R14).

3.3. Current risk management method

In the current situation in Vietnam's expressway projects, risk management has not been paid attention to. Specifically, the risk reduction method that these projects are the insurance method. In addition, when risk factors appear to have risks affecting the project, the risk management method mainly comes from the manager's personal experience, without a strong and proactive method. Through experts working in three positions as an investor, project management board, and main contractor, the authors summarize that: Risk management tools are passive, personal, and the practice efficiency is not high as expected.

4. Discussion

Faced with the fact that the project's risk management still has drawbacks, questions are sent to experts and find out the risk factors and their impact level. In detail, in the project preparation stage, the authors have found out 15 risk factors.

There are many studies on construction risk in Vietnam that have been carried out by reputable authors such as Prof.Dr. Nguyen The Quan [15] Dr. Pham Thi Trang [11], Dr. Le Dang Thuc [9], Dr. Tan Thanh Son [12], Dr. Nguyen Van Chau [10]. Besides, this is also a problem that many scientists around the world research:

Dale Cooper, Stephe Grey, Geofffrey Raymond and Phil Walker [7], Nerija Banaitiene [14], Alfredo Federico Serpellaa Ximena Ferradaa, Rodolfo Howarda, Larissa Rubioa [2], Akintola Akintoye, Audrius Banaitis and Nerija Banaitiene [1], Ang S-AH, Leon De D [3], Batson, R. [5], Bruce. R. E [6] and other authors Ren. H; Hariharan Subramanyan, Priyadarshi H. Sawant, Vandana Bhatt; D F Cooper, D H MacDonald and C B Chapman; Patrick .X.W Zou, Guomin Zhang, Jiayuan Wang; Perry .J .G & Hayes; Sameh Monir EL Sayegh,… Compared with the results of previous studies, there are new risk factors found by the authors: "The change of law and policies in the construction field" and "The lack of knowledge in legal documents in the

construction field". These new findings are due to the author's research into a specific phase of the project (the preparation phase) and the specific characteristics of expressway projects in Vietnam. Moreover, the author has classified the level of danger and the impact ability of the risk factors, which has not been clarified in previous studies.

Expressway projects already have many inherent risks, in which the risk codes R3, R10, R11, R14 have the strongest impact. Responding to the question are experts with a lot of experience in the position of investors, project managers and main contractors, most experts say that nowadays, dealing with risks is still not proactive, based on individual management experience. Therefore, it is necessary to have solutions to improve the efficiency of risk management of expressway projects. This is an urgent issue as there are still many expressway projects to be built in the future in Vietnam.

5. Solutions and Conclusions

5.1. Solution

Through research, the authors propose the following solutions to improve the efficiency of risk management for expressway projects in Vietnam.

- **Improving the ability of the Investor and Project management board**

Reality has shown that investors often do not have a piece of profound knowledge about the expertise. Meanwhile, the project management unit is still operating under the traditional model and has not responded to changes in the construction field. A project will achieve high efficiency if it is organized scientifically in sequence. The Project Management Board is responsible for subjective decisions and improper project organization. To improve the capacity of the Investor, project management board, the short-term solution is to organize short training courses on expertise, helping individuals to raise awareness about the project. Lack of information is one of the main reasons pointed out by experts to investors and project management, so it is necessary to build a clear information system between project management and project owners from members to the project. Besides, the internal information system should also be built to ensure information access to members. Currently, many countries around the world have applied Building Information Modeling (BIM) to projects. In Vietnam, the application of the BIM project information modeling is only used at certain stages and has not been successfully applied to the entire project.

The application of the BIM building information modeling will be a sustainable and effective solution for future projects.

- **Completing the policy system and adapting to changes**

In Vietnam, there are many legal documents applicable to construction projects. These legal documents still have several shortcomings, making it difficult for the project implementation process. Expressway projects usually last 2 to 5 years; changes in legislation as projects are in progress will cause projects to need more adjustments. These adjustments delay the project due to the additional time and resources needed to adapt to the current regulations. Experts all consider it as one of the main risk factors that project managers face. Therefore, the first solution is to improve the legal system. When there is a change, it is necessary to have detailed instructions for the parties involved in the project to have a timely solution, avoiding conflicts between old legal documents and new ones.

Besides, the initiative of the parties involved in the project is essential. Organizations need to create research groups on construction law and policy, the group will organize contingency plans to timely organize risk response. Proactively researching and developing contingency plans is the key for organizations to respond quickly and effectively to changes in policies and laws.

- **Building the processing records system**

The State management agency's delay in approving licensing procedures is a common problem in urban development investment projects. These are the objective risks that the Investor, management board and contractor can minimize.

The authors propose to build visual diagrams of administrative procedure steps, creating favorable conditions for all parties to grasp. Besides the process diagram, there should be more specific and detailed instruction documents. Currently, with the development of technology, this process can be built in an online form. Parties can easily apply and track the status of their application through a single website. This will remove barriers to the complexity and cumbersome administrative procedures, and shorten project time. This is not only a solution to reduce risk but also increases clarity. For example, in the bidding process, the investor will choose the best-qualified contractor.

- **Budget for projects**

In Vietnam, since 2004, the government has officially started the expressway development investment program by establishing a professional investment unit, "Vietnam Expressway Corporation" (VEC). This is a state-owned enterprise, state capital accounts for only about one percent, mainly borrowed from international credit institutions and a small part is raised from the domestic private sector.

Although 20 years have passed, since the start of the expressway development program, up to now, our country's expressway development speed is still slow. Expressway projects in Vietnam are invested in 3 forms:

- The State will spend on investment for the whole project;
- Public-Private - Partnership (PPP);
- Build – Operate - Transfer (BOT).

Experts all agree that access to capital is a big difficulty encountered in all projects. To overcome this risk, the authors say that it is necessary to mobilize non-budget capital, encourage all economic sectors, both domestic and international, to invest. The form of investment under Public-Private - Partnerships (PPP) is the spearhead. To do so, the state must show a clear commitment, issue legal documents and policies to support investments in expressway projects.

5.2. Conclusion

Expressway projects are the driving force for national development, between now and 2030, many new projects will be implemented. For projects to achieve quality efficiency, completion on schedule, and not exceeding the investment budget, risk management needs to be more drastic.

In practical terms, the article has pointed out the risk factors in the preparation of highway projects in Vietnam from 2010 to the present. The article has further pointed out 4 main risk factors: The low management ability of the Owner and Project management board, the change of law and policies in the construction field, administrative procedures are complicated and cumbersome, having difficulty in accessing project finance sources. Through analysis of the cause, consulting experts, and the situation in Vietnam, the author has proposed corresponding solutions to cope with these risks.

Finally, the author has evaluated the project preparation phase only, he has emphasized the risk factors in this phase, contributing to building the theoretical risk management system. This study could constitute a reference for the development of future research❑

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