

**MINISTRY OF EDUCATION
AND TRAINING**

**MINISTRY OF
CONSTRUCTION**

HANOI ARCHITECTURAL UNIVERSITY

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**RISK MANAGEMENT FOR URBAN DEVELOPMENT
INVESTMENT PROJECTS IN HANOI**

SPECIALTY: URBAN MANAGEMENT

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**THESIS SUMMARY
URBAN MANAGEMENT**

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The thesis can be found at:

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A. INTRODUCTION

- **The urgency of the thesis**

Risk management (RM) is considered to be the most important and complex matter in the project management. If there pay attention to risks, then difficult problems will be discovered, opportunities will be created, and also improve the quality and efficiency of the work, shorten working schedule.

There are many managers who have gained new perspectives and views on risk management, are from Australia, USA, Sweden, etc. Instead of dealing with risks when they occur, risk management is considered in terms of forecasts and precautions.

Risk management is paid more attention when integrating into the world economy in Vietnam. There are some regulations which related to risk management such as Construction Law 2014 [31], Decree 119/2015 / ND-CP [11] November 13, 2015. Ministry of natural resources and environment promulgates regulations on environmental impact assessments for construction projects. However, these regulations are merely administrative procedures or focus on handling incidents when it has occurred of quality. These don't cover and review all risks during the project progres.

Nowaday, the speed of construction is increasing rapidly in big cities such as Hochiminh, Hanoi, Danang. 100% of urban development investment projects contain risks and serious risks. There are many quality risks, safety risks, etc which have caused serious consequences for project participants and also affected urban activities.

The construction boom of the urban development investment projects makes a heavy environmental pollution in Hanoi. Urban road transport projects are the most concerned in the urban development investment projects. The explanation for this:

(1) The urban road transport projects directly affect to transportation in city. It happens traffic jams, slow movement on construction site of the urban road transport projects. It wastes travel time in city.

(2) Implementing the urban road transport projects makes unsafety for labors and people.

(3) Implementing the urban road transport projects also makes the environmental pollution such as: Smog, dust, waste, rampant materials, etc. From the above statement, the thesis focuses on researching of "Risk management for urban development investment projects in Hanoi" and case study of urban road traffic projects.

- **Purposes**

Researching of risk management for urban development investment projects, case study of urban road transport projects in Hanoi. It improves the risk management for urban road transport projects and investment development projects in Hanoi; Contribute to complete the urban road transport projects with the least loss to the project, the project participants, as well as urban residents.

- **Object and scope of the study**

- Research object: Risk management for urban development investment projects, focusing on urban road transport projects in Hanoi.

- Research scope:

- + Scope of content: The thesis will research of urban development investment projects, case study of the construction phase of the urban road traffic project in Hanoi.

Comparing the view of risks management between Owner/ Project management board, consultant and contractors / subcontractors. The thesis only researches of the main activities in risk management to

identify risks, evaluate risks and develop a response solution with risks.

+ Scope of space: The process of survey is be conducted in Hanoi. Projects managers and engineers who participated in the urban development investment projects and the urban road transport projects, are interviewed.

The proposed risk management solutions are feasible to apply for for the urban road transport projects in Hanoi, and also provinces in Vietnam.

- **Research Methods**

There are 06 research methods following: (1) Methods of analysis, theoretical synthesis; (2) Method of experts; (3) Methods of survey; (4) Method of fish bone diagrams; (5) Matrix method of impact ability - degree of influence; (6) Methods of statistical probability.

- **Scientific and practical significance of the thesis**

- Scientific significance: : The thesis implements the theoretical issues about risks, risk management for the urban development investment projects and the urban road traffic projects.

- Practical significance: The assement of risk management for the urban development investment projects in general, the urban road traffic projects in particular in Hanoi, can be used as a reference of state management agencies, project managers. They understand risks, risk management more clearly.

The thesis proposes the general risk management solutions and the specific risk management solutions. The solutions are practically apply to the urban road transport projects, the development investment projects in Hanoi, and can be expanded to other cities in Vietnam.

- **Novelty of the thesis**

- Identify 73 risks for the urban road transport projects in Hanoi,

of which: 53 risks have the apparent impact, 20 risks have the unclear impact or without impact.

- Analysis and assessment of risk affecting for the urban road traffic project in Hanoi show that: (1) Risks have the high serious level accounted for 70.24.53%; (2) Risks have the average serious level accounted for 66.04%; (3) Risks have the low serious level accounted for 9.43%.

- Orientations of the risk management solutions for the urban road transport projects in Hanoi bases on the perspective of risk management of three main participants (Owner / Project Management Board, Consultants, Main contractors / Subcontractors).

- Proposing two general solutions for risk management for the urban road traffic project in Hanoi: (1) Developing a risk forecast work plan; (2) Apply science and technology to risk management.

- Proposing twelve risk management solutions to deal risks with its high serious level for the urban transport projects in Hanoi: (1) Solution of Contractor's human resource; (2) Solutions of improving the capacity of the Owner / Project Management Board; (3) Solution of Design; (4) Solutions of the construction process; (5) Solutions of payment; (6) Solutions of construction ground; (7) Solutions of coordination of progress management; (8) Solution of Labor safety; (9) Solutions to deal with changes in legal policies; (10) Solutions of administrative procedures; (11) Solutions of responding to price and market fluctuations; (12) Solutions of residential communities.

- **Definition or terminology**

The thesis mentions some definition or terminology about risks, risk management, the urban transport projects, the urban development investment projects, risk management for the urban transport projects.

- **The structure of the thesis**

Introduction

The content includes 4 chapters.

Chapter 1: Overview of risk management for the urban development investment projects in Hanoi

Chapter 2: Theoretical and practical basis of risk management for the urban development investment projects

Chapter 3: Identifying, analyzing and assessing risks for the urban road traffic projects in Hanoi

Chapter 4: Risk management solutions for the urban road transport projects in Hanoi

Conclusions and recommendations.

List of references

Appendix

B. CONTENT**CHAPTER 1: OVERVIEW OF RISK MANAGEMENT FOR THE URBAN DEVELOPMENT INVESTMENT PROJECTS IN HANOI****1.1. General introduction of risks, risk management in construction***1.1.1. Risks in the construction*

There are many risks happened in the construction in the world. The speed of construction is increasing more and more massively in Vietnam. Thus risks are becoming a serious problem. It make the projects managers who have to pay more attention on them.

1.1.2. Risk management in construction

Professional risk management is a trend of research and application in the world. Project Management Institute (PMI) which was born in 1969 in the US, be a new step in project management in general and risk management in particular. The construction industry is

under pressure from the rapid and massive development of construction investment projects in Vietnam. Risks occur with frequency and serious impact level.

1.2. General situation of risk management for the urban development investment projects in Hanoi

1.2.1. The situation of implementation of the urban development investment projects in Hanoi

There are more 350 new urban plans, housing projects which are being designed and more 500 construction projects the corresponding planning area of 2.000ha. 71 super projects with a total capital 400,000 billion vnd. By 2050, 393 transport projects will be completed, including: Roads, railways, waterways and airways. In particular, the urban road traffic projects is the highest proportion (81%, 317 projects).

1.2.2. Risks for the urban development investment projects: A lot of risks occur for the urban development investment projects. Risks occur during construction activities, construction progress. It is easy to find out risks of labor safety, environmental sanitation, construction quality, ... which are seriously affecting the lives of urban people.

1.2.3. Causes of risks for the urban development investment projects: Objective and subjective causes.

1.3. Situation of risk management for the urban road transport projects in Hanoi

1.3.1. Characteristics of the urban road transport projects in Hanoi:

(1) Linear construction works; (2) Transport projects are closely related to the system of urban technical infrastructure; (3) Going through the residential area; (4) Using different sources of capital; (5) Many transport projects have big capital.

1.3.2. Implementation of the urban road transport projects in Hanoi

- Progress of implementing the urban transport projects in Hanoi: The urban road transport project in Hanoi is planned to implement from 2016 to 2050. Up to now 29.6% of completed projects, 55.8% of on-going projects and 14.6% of projects are about to be implemented.

- Difficulties and challenges for the urban road traffic projects in Hanoi: The system of legal documents is not completed; Project progress is delayed, clearance land is delayed; The capacity of the project participates has not met the requirements of the project; Contractual issues; Impact of market price fluctuations; Ability to provide project funding.

1.3.3. Risks for the urban road traffic projects in Hanoi: 100% of the urban road traffic projects in Hanoi are at risks. The risks are of a chain nature. There is a strong interaction between risks for the urban road transport projects in Hanoi. The risks impact significantly on the results of the urban road transport projects in Hanoi.

1.4. The published researches related to the thesis

1.5.1. The published researches in the world: There are many researches on risk and risk management in the world. the *researches* are comprehensive and use a variety of methods and techniques to analyze and assess risks.

1.5.2. The published researches in Vietnam: The researches on risk and risk management in Vietnam is being concerned. More and more topics and theses which are being implemented on this matter. Although there are some researches on risk management, the effective application of risk management is not high in projects.

1.5. Research content

- Overview of risks and risk management for the urban development investment projects and the urban road transport projects in Hanoi.

- Summarize and complete the scientific basis on risk, risk management for the urban development investment projects in general and the urban road traffic projects in particular.

- Surveying the situation of risk management for the urban road traffic projects in Hanoi. It gets more actual data, 3 project participates are considered for surveying.

- Identify and analyze the situation of risk management for the urban road transport projects in Hanoi with the support of the selected analytical methods.

- Proposing risk management solutions for the urban road traffic projects in Hanoi.

CHAPTER 2: THEORETICAL AND PRACTICAL BASIS ON RISK MANAGEMENT FOR THE URBAN DEVELOPMENT INVESTMENT PROJECTS

2.1. Issues on the urban development investment projects

2.1.1. Definition, classification

Urban development investment project means an construction investment project of a building or a building complex which are implemented in an urban development area approved by local government. Urban construction investment projects includes urban construction investment projects and construction investment projects.

- Classification of the urban development investment projects: Houses; Public works; Industrial buildings; Urban infrastructure (water supply and drainage, electricity supply, lighting, petrol and gas supply facilities, communications, solid waste collection and treatment systems, meaning pages, urban transport works).

2.1.2. Phase of the urban development investment project: (1) The phase of project preparation; (2) The phase of project implementation; (3) The phase of finishing and handing over for use.

2.1.3. Project participants: (1) Owner/Project management board; (2) Main contractor/subcontractor; (3) Consultant (design, project management and supervision)

2.1.4. Urban road transport project

- The role of the urban road traffic system: The urban road traffic system is base for developing the process of economic and social and ensuring the common technical corridor.

- Relationship between risks and characteristics of the urban road transport projects:

+ Urban road traffic project is implemented in parallel with activities of urban residential community. This problem may have serious risks.

+ Unlike normal construction investment projects, the urban road traffic projects not only need to achieve economic efficiency but also achieve social and environmental efficiency. Therefore, risks of the urban road transport projects will increase compared to the normal construction investment projects.

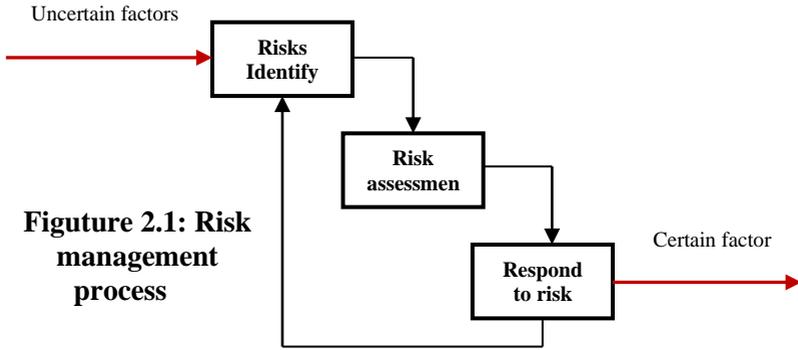
2.2. Risk management for the urban development investment projects

2.2.1. Risk classification: (1) According to the objectivity of risk; (2) According to the consequence of human activities; (3) According to the origin of risks; (4) According to the ability of human control; (5) According to the scope of occurrence of risks; (7) According to the project participants; (8) According to the impact object.

2.2.2. Purpose of risk management: Reducing of resources and costs; Minimize damage to project participants, as well as disadvantage for project participants; Promote the outcome of the project or the relationship of the parties in the project.

2.2.3. Risk management process

- Risk management process for the the urban development investment project



- The thesis proposes risk management process following 3 steps. Risk management is a systematic process of identifying risks, assessing the impact level and the probability of occurrence of risks and responding to risks.

- Identifying risks: Identifying risks for the urban road transport project is according to expert interview method and fishbone chart technique.

- Risk assessment: In the thesis, using the survey method, an ability-impact matrix analysis, a statistical probability test to evaluate risks for the urban road transport project.

- Respond to risks: Preventing risks; Risk reduction; Risk transfer; Take risks.

2.3. Regulations relates to risk management for the urban development investment projects

- Construction Law No. 50/2014/QH13.

- Decree No. 59/2015/ND-CP; Decree No. 42/2017/ND-CP, Decree 119/2015/ND-CP

- Decision No. 79/QD/BXD, Circular No. 26/2016/TT-BXD.

- Design standards: TCVN 3990: 1985, TCVN 9362: 2012, TCVN 356: 2005, TCVN 338: 2005,

- Standards of materials and construction components: TCVN 2682-1999, TCVN 1771: 1987, TCVN 5440: 1991, TCVN 5709: 1993,

2.4. Experience of risk management from some countries in the World and Vietnam

2.4.1. Experience of managing risk in the road transport projects in the UK

A large proportion of the road transport projects in the UK are implemented in the form of PPP. The capital is divided into different sources to reduce project risks. Managers focus on allocating risks to project stakeholders. Risks analyzes are performed according to Monte Carlo simulations.

2.4.2. Experience of managing costs of the road traffic projects in Vietnam

Project management board requires strickly for project cost management. It make the projects completed on schedule and reduce waste during project implementation. The project cost risk analysis is required when managers evaluate the financial performance of the project. The financial effective of the project is selected according to the criteria: calculating the present value of the project's net income - NPV. Content of cost management includes: (1) Management of capital sources; (2) Payment management; (3) Requirements on capital use.

CHAPTER 3: IDENTIFYING, ANALYSIS, ASSESSMENT OF RISKS FOR THE URBAN ROAD TRAFFIC PROJECTS IN HANOI

3.1. Results of interviewing experts and surveying

- Interview experts: It only focuses on interviewing experts with over 10 years of experience to ensure that the interviewed experts who have a lot of experience and practical knowledge to identify the necessary risks.

- Survey result: It only focuses on surveying experts who have over 5 years of experience to ensure that the surveyed officials and managers who have information and understanding about project risks.

3.2. Identify risks for the urban transport projects in Hanoi

3.2.1. *Summary of potential risks from the published researches:* There are 63 risks from foreign studies and 79 risks from national studies.

3.2.2. *Identify risks by fishbone chart method*

With each content of construction management (X1 to X7), the thesis shows the fishbone chart to find the main causes which affect the results of the management content.

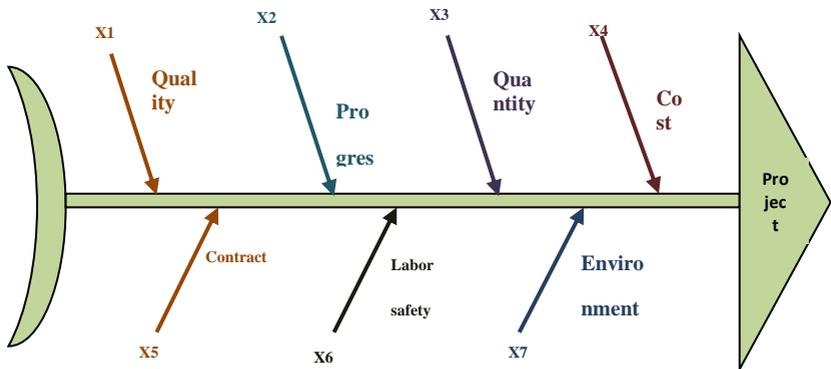


Figure 3.5: Fishbone chart of matter of project management

- Risks due to quality requirements: 19 risks. Risks due to progress requirements: 9 risks. Risk due to quantity requirements: 8 risks. Risks due to cost requirements: 11 risks. Risks due to environmental assurance requirements: 9 risks. Risks due to labor safety: 10 risks. Risk due to contract: 6 risks.

3.2.3. Analyze the data to identify risks

According to the published reserches and result of fishbone chart method, the thesis showses 73 risks for the the road transport projects. 73 risks are classified and used as a basis for designing questionnaire. The result showses 53/73 risks (73%) occured from the probable level to the probability of occurrence and 20/73 risks (27%) are less likely to occur, none of risk has never happened.

3.2.4. Conclusion about risks for the urban road transport project in Hanoi

There are 53 risks collected through the process of risk identification, for the urban road transport project in Hanoi. The risks appear during project management progress. In which 36 subjective risks and 17 risks objective.

3.3. Risk analysis and assessment for the urban road transport projects in Hanoi

3.3.1. Group of risks by matrix of ability - impact

With 53 identified risks, the thesis processed the data and attaches risks to the ability-impact matrix. 9% (5 risks) is showed the low serious risk. allmost of Risk (66%, 35 risks) is showed the medium serious risk, and 25% (13 risks) is the high serious risk.



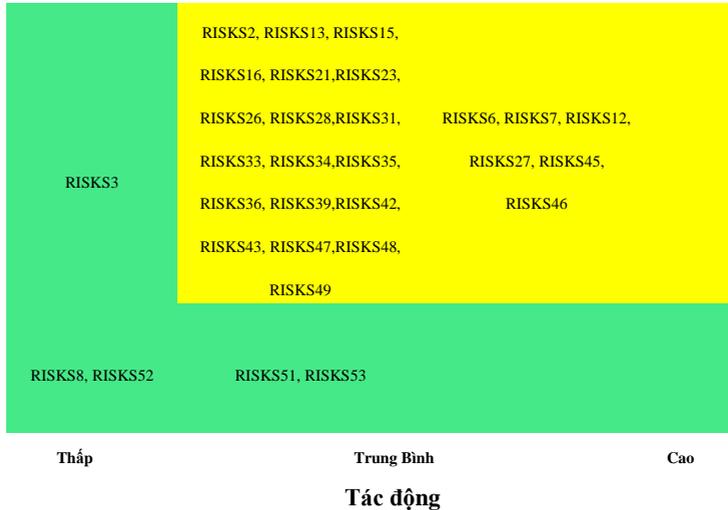


Figure 3.16: Matrix of ability - impact

- Low serious risks: 02 of risks related to coordination project participants; 02 of social risks and 01 of political risk.

- Medium serious risks: 03 of quantity risks, 03 of environment risks, 03 of risks with third parties, 02 risks of natural conditions and 03 of contract risks, 04 of risks in coordination project participants; 03 of design risks; 04 of quality risks; 02 of cost risk; 02 of schedule risks; 02 safety risks; 02 of risks related to law; 02 of risks on markets, economy and finance.

- High serious risks: 02 risks related to the capacity of the parties in the project; 01 of design risk; 01 of quality risk; 01 of risk for delayed payment, 02 of risks related to progress; 01 of safety risk; 02 of risks related to the law; 02 risks about market, finance and 01 society risk. Thus, the serious risks are evenly distributed, not focusing on any one issue.

3.3.2. Risk analysis and assessment

(1) Probability of occurrence of risk: 100% of the projects get risks.

(2) Who causes risks the most in the project: Contractor/ subcontractor.

(3) Who are affected the most by risks: Consultant is affected at least, owner/Project management board and contractor/ subcontractor are affected equally.

(4) Matter of project is affected by risk: Cost and work progress.

Owner/Project management board, consultant, contractor/subcontractor assess 13 of high serious risks comparing with general result.

- Risk assessment from Owner/Project management board: Owner/Project management board assess 13 of high serious risks the similarities general result. 12/13 risks are similarities, only 1 risk RR5 is different.

- Risk assessment from Consultant: The viewpoint of the consultant is the most different with general result. 9/13 risks are similarities, 4/13 risks are not similarities. Especially, there is one risk that is completely different, RR17 "The process of construction has many errors".

- Risk assessment from contractor/ subcontractor: 11/13 risks are similarities with general result. 2/13 risks are different with general result, RR41 and RR 50.

3.3.3. Assess the correlate between project participants

3.3.3.1. Introduction of statistical probability testing method

The thesis uses the "one-way ANOVA" technique to test for the hypothesis that "three project participants (Owner/Project management board, consultant, contractor/subcontractor) are similar to risk management.

3.3.3.2. Analysis of correlation between project participants with actual survey data: The thesis examines the correlation between project participants based on 29 variables. 29 variables will show the logic of

the level of risk interest, whether or not the project has risks and project participants willing to respond to risks. This logic will be reflected by 13 high serious risks for the urban transport projects in Hanoi. Results 16/29 correlated comments and 13/29 comments not correlated.

Results are as follows:

(1) Regarding the risks interest, there is agreement between the Owner/Project management board and consultant but differen with contractor. Risks of the urban road traffic project in Hanoi are inevitable, so contractor is accustomed to the fact that risks must happen. That why contractor don't consider about risks. Meanwhile, Owner/Project management board and consultant who achieve the project objectives, the interest in risks has been pushed up.

(2) Assessment risks: all project participants agree many risks for the urban road transport project in Hanoi. This is a true reflection of the urban road transport project that the risks occurs outside the interest of the project stakeholders.

(3) RR5 "The weak management capacity of Owner/Project Management Board" is assessed similar the possibility of occurrence and the level of impact dynamic by Owner/Project Management Board and Consultant. They consider that RR5 does not really dangerous. Meanwhile, Contractor considers that this risks make a very high serious level to the project. Owner/Project management board and the consultant assume that the Owner only makes decisions on a timely basis, the other impact of the Investor/Project management board on the project is only indirect, so the impact of RR5 is low on the project. Contractor always carry out thier tasks based on the Owner's decisions. Thus, RR5 is one of the main factors affecting the project.

(4) RR19 "Payment delay as committed" is considered the same

by all project participants. Capital is considered as a key factor to maintain the operation of the project. It causes why RR19 which has the high agreement of the serious level.

(5) The risk management needs are considered the same by all project participants. Question is: Contractor does not care about risk but due to the impact of risk is very large, contractor is very eager to manage risk. Contractor's wishes are in conflict with their own management activities. This is considered a problem to be solved in the current projects.

CHAPTER 4: RISK MANAGEMENT SOLUTIONS FOR THE URBAN ROAD TRAFFIC PROJECTS IN HANOI

4.1. General introduction

For each specific risk, the management solutions always relate to 4 directions of handling preventing, minimizing, transferring or accepting risks. However, it does not mean that each risk needs a single solution. Sometimes it is necessary to combine many solutions in different directions to bring an efficiency in management.

4.2. Proposed viewpoints

4.2.1. Comprehensive risk management

4.2.2. Risks are controled by the party with the best risk management capabilities

Table 4.1: Risk management subjects for 13 Risks with the high serious level.

No	Risk	Risk management subjects
RR4	Contractor shortages of human resources on site	Contractor/ Subcontractor

RR 5	The weak management capacity of the Investor / Project Management Board	Owner/Project Management Board
RR 11	Many mistakes of design	Consultant
RR 17	Problems during the construction progress.	Contractor/ Subcontractor
RR 19	Payment delay as committed	Owner/Project Management Board
RR 22	Delayed handover land for implementing	Owner/Project Management Board
RR 24	Coordinate and control the schedule unreasonably	Consultant
RR 29	Accident on the construction site	Contractor/ Subcontractor
RR 37	Change of legal regulations and policy in construction	Owner/Project Management Board, Contractor/ Subcontractor, Consultant
RR 38	Administrative procedures are complicated	Owner/Project Management Board, Contractor/ Subcontractor, Consultant
RR 41	Fluctuations in market prices	Owner/Project Management Board, Contractor/ Subcontractor, Consultant
RR 44	It is difficult to access financial sources to support the project	Owner/Project Management Board, Contractor/ Subcontractor
RR 50	The objections and disagreements of the community	Owner/Project Management Board, Contractor/ Subcontractor, ĐVTV

4.2.3. Solution-oriented response to risks

Providing solutions to respond to risks briefly before specific response measures in four directions: Prevent, minimize, transfer or accept risks.

4.2.4. Minimize the impact of risks on the project and the community

4.3. General solution

4.3.1. Making the working plan with the risk forecast

The working plan with the risk forecast which can be understood as a work plan with the possibility of a risk, understood as a work plan that takes into account the possibility of a risk. An outstanding feature of the urban road transport projects in Hanoi is the length of time for land clearance, sometimes up to several years. Therefore, the site clearance plan must be reviewed in detail before construction progress.

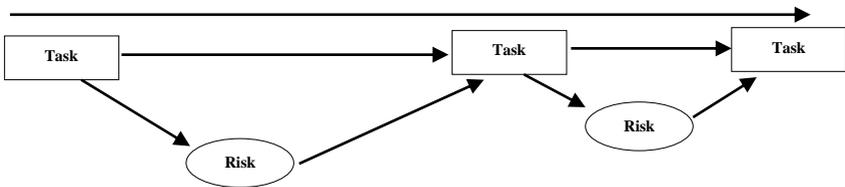


Figure 4.1: Working plan

4.3.2. Application of science and technology in risk management

Applying science and technology in risk management which limit the occurrisence of risks and control risks more easily (3D BIM detailed model, cost management and progress with 5D Macro-BIM, ...).

4.4. Solutions for the serious risks

4.4.1. Solution of Contractors' human resource

- Improve the contractor's focus on human resources.
- Penalty contract if contractors does not meet or cheat in arrangement technical staff to implement the project.

- Regulations on reward, punishment and appropriate regime for employees.

- Organization a friendly working environment so that employees have comfortable thoughts.

4.4.2. *Solution of improving the management capacity of Owner/Project management board*

(1) Improve capacity of Owner/Project management board

- Training, practicing.

- Selecting Project manager who is qualified and capable of project management.

(2) Getting more experience for Owner/Project management board

4.4.3. *Solutions of design*

(1) Create a detailed and complete drawing list.

(2) Check drawings before publishing.

(3) During the project process, contractor collaborated with the design staff to review all the drawings to timely add and adjust missing details, etc. .

The contract between the Owner/Project management board and Consultant should retain a sufficiently large sum of money to fulfill the responsibility of author supervision.

4.4.4. *Solution of construction process*

The engineers and managers in the project must be the risks's management and monitoring engineers at the same time. Tasks when monitoring risks:

- Prepare risks tables of professional fields, update new risks that appear during the project implementation.

- Arranging risks according to 3 serious levels of risk (low, medium and high serious risk). The risk arrangement done through

discussions and assessments of the project team and decided by the project leader.

- Make backup plans, risks handling scenarios in case of risks occurs.

- Daily monitoring and supervision of risks, notify project members when discovering potential risks.

The supervision of the construction process must be done by Owner/ Project management board, consultant everyday. Owner /Project management board, Consultant need to have a warning system during construction. These alerts include work alerts to follow progress and errors alerts. The consequences of errors should also be listed and assessed on the level of danger, affecting payment issues at the request of the Investor/Project management board.

- Contractor needs to develop regulations on safe construction and promote job responsibilities with officials and workers on the site. In other words, contractor need to issue a regulation in their work and follow it strictly.

4.4.5. Solution of payment

- Making the payment process convenient and transparent within the internal of Owner/Project management board.

- Finding financial sources to support the project convenient.

4.4.6. Solution of construction plan

(1) Determine the time of handing over the construction site according to the actual situation:

Determining the time of handing over the construction ground needs to be exact. An agreement should be established on the time of site handover between Owner/Project management board and contractor.

Contractor can assist the Owner/Project management board to

complete the conditions to start the work.

Contractor must clearly identify that it will receive partial ground handover and must have a phased construction plan.

(2) Construction preparation tasks:

Contractor can be prepared some tasks in advance to begin the construction process such as: Preparing human resources; Preparing for supplies and materials; Prepare construction ground.

(3) Ground clearance work:

- Owner/Project management board builds the process of organizing project clearance, the process of enforcement of land acquisition, organizing training for forces before land clearance to ensure compliance with the provisions of law, limiting error.

- Establishing a propaganda and advocacy working group to enhance deep mobilization to each subject of land acquisition; public and transparent policies on land clearance.

4.4.7. Solution of coordination and progress of the schedule

- Monitoring the project progress.

- Adjusting the plan to provide materials, human resources, machineries and equipment suitable for the project.

- + Create a transparent information channel between the field staff, the order department and the supplier.

- + Supervision strictly on construction site.

4.4.8. Solution for labor safety

(1) Establishing a labor safety fund

Safety cost = $(G_{xd} + G_{tb}) * 0.12\%$; G_{xd} : Construction cost;

G_{tb} : Equipment cost.

(2) Table of labor safety regulations; (3) Training on labor safety

4.4.9. Solution of changing in legal regulations and policies

construction

Owner/Project management board should not force constructor to reduce prices strongly to keep constructor 's profits to ensure to cope with changes in policies, laws and risks.

In case of changes in policies and laws, there are major changes that make the constructor uncontrolled, Investor/Project management board needs the corisksesponding support. The cost source can be taken from the contingency fee calculated for the project. Constructor needs preventive calculations in the bidding process.

4.4.10. Solution of administrative procedures

Making a national information system to link the use of ministries and branches. Simultaneously apply online submission form. Minimize the regulations on administrative procedures, strengthen the guiding documents and disseminate widely on the mass media.

4.4.11. Solution to cope with price and market fluctuations

Establish a contingency cost to respond to fluctuations in market prices.

4.4.12. Solution of the residential communities

Making the detailed labor safety measures and environmental sanitation to reduce the impact on the community. Constructor must strictly follow the regulations on labor safety and environmental sanitation.

4.5. Discussion some research issues

4.5.1. Risks for the urban road transport projects in Hanoi: The thesis has found 73 risks for the urban road traffic project in Hanoi, include 53 clearer impact risks. The risks illustrate that they reflect quite well the characteristics of urban road transport projects in Hanoi.

4.5.2. Risk management process for the urban road transport projects in Hanoi: Risk management is a continuous process and requires a

high level of concentration associated with the project implementation stages.

4.5.3. Risk management solution for the urban road transport project in Hanoi: Select risk management solution is an important step for the urban road traffic project in Hanoi. It relates to the cost and concentration of project stakeholders.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

Nowadays, risk management for the urban road transport projects in Hanoi becomes more important. There was 73 risks occurred for the urban road transport project in Hanoi, while 53 out of 73 risks have obviously impact. 53 risks include 5 risks are less dangerous, 35 risks are medium and 13 risks are at a high level of danger.

Owner/Project management board and consultant have a similar concern about risks, different from main contractor/subcontractor. The paradox is contractors caused many risk than others and affected by risk mostly but they concerned with risk at least.

The proposed solutions including: General solutions and specific solutions for 13 risks with a high serious level.

Recommendations

- (1) For managers, engineers who work for the urban investment development projects and the urban road transport projects in Hanoi, focusing on monitoring and managing risk.
- (2) For specialized state management agencies construction, it is necessary to consider and supplement risk management contents into legal documents so that the implementation of risk management is convenient and effective.
- (3) Open training, retraining and disseminating about risk management knowledge to project stakeholders.

THE PUBLISHED SCIENTIFIC PUBLICATIONS RELATED TO THE THESIS

1. **Nguyen Thi Thuy & Dinh Tuan Hai** (2015), *Overview of risks during the implementation of the urban development investment projects*, Journal of The Builder, No 7&8/2015, Page 20-24.
2. **Nguyen Thi Thuy & Dinh Tuan Hai** (2016), *Some risk management solutions for the construction phase of the urban development investment projects*, Journal of structural Engineering and Construction Technologi , No 21/II-2016, Page 89-95.
3. **Nguyen Thi Thuy & Dinh Tuan Hai** (2017), *Overview of reseaches on risk management for the urban development investment projects*, Journal of Construction Economic, No 02/2017, Page 21-27.
4. **Nguyen Thi Thuy & Dinh Tuan Hai** (2018), *Identify risks for the urban development projects*, Journal of The Builder, No 3&4/2018, Page 7-10.
5. **Nguyen Thi Thuy & Dinh Tuan Hai** (2019), *Scientific basis for risk management for urban development investment projects*, Science Journal of Architectural and Construction, No 34, 5/2019.
6. **Nguyen Thi Thuy & Dinh Tuan Hai** (2019), *Risk management solutions for the urban development investment projects*, Vietnam Journal No 5/2019.
7. **Nguyen Thi Thuy (2020)**, *Risk management solutions for the urban road traffic in Hanoi*, It is approved to publised by Journal of Construction Economic.