MINISTRY OF EDUCATION AND TRAINING MINISTRY OF CONSTRUCTION

HANOI ARCHITECTURAL UNIVERSITY

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RISK MANAGEMENT OF HOSPITAL CONSTRUCTION INVESTMENT PROJECTS - MINISTRY OF HEALTH

SPECIALIZED IN URBAN AND CONSTRUCTION MANAGEMENT
CODE: 9580106

ABSTRACT OF DOCTORAL THESIS

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The doctoral thesis was completed at Hanoi University of Architecture

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The thesis could be found at:

- National Library of Vietnam
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INTRODUCTION

The urgency of the subject

Currently, the Ministry of Health is directly managing 14 general hospitals and 20 specialized hospitals. The Ministry of Health has over 20 large-scale projects under construction investment with a total capital of 31,972,844 million VND. A number of hospital projects have been implemented such as: CS2 Central Geriatric Hospital in Ha Nam; Ho Chi Minh Central Endocrine Hospital; Can Tho Central Trauma and Orthopedics Hospital; Central Obstetrics Hospital facility 2; National Children's Hospital facility 2; Oncology Center Project - Hospital E; Project to renovate and upgrade Hospital K facilities 1, 2;....

In fact, when implementing a medical construction project in general, or a hospital project in particular, there are always many potential risks. Typically, two investment projects to build new facilities of 2 Viet Duc hospitals and Bach Mai hospital (Liem Tuyen commune, Phu Ly city, Ha Nam) are among the 05 hospital projects approved by the Prime Minister in the project. Project "Investment in new construction of 05 central and terminal hospitals located in Ho Chi Minh City" according to Decision No. 125/QD-TTg dated January 16, 2014. However, the implementation of these two key projects is facing a series of risks in project management, related to the responsibilities of the Key Health Project Management Board - Ministry of Health, especially in the field of cost management and construction contract management... This has caused most projects - the Ministry of Health to be behind schedule and not achieve the desired investment efficiency.

For the above reasons, the researcher chose the research topic ***"Risk management of hospital construction investment projects - Ministry of Health"*** . The results obtained will be helpful in developing risk management solutions to improve the quality and efficiency of investment in hospital projects - Ministry of Health today.

Research purposes

Research Purpose: Thesis research proposes solutions to improve the risk management of construction investment projects Hospital projects - Ministry of Health, contributing to ensuring investment efficiency in hospital projects - Ministry of Health, minimizing damage to the project. At the same time, create a harmonious relationship of benefits between project participants.

Item pepper research rescue: To obtain Okay item destination research rescue, essay judgment put go out the item pepper need obtain Okay according to too submit research rescue as follows:

(1) Analysis and evaluation of research projects on risk management in construction investment in general and medical projects in particular domestically and abroad

(2) Systematize and clarify the scientific basis for risk management of construction investment projects in general and hospital construction investment projects in particular

(3) Survey to clarify the issue of risk management of hospital construction investment projects - Ministry of Health

(4) Propose scientific and feasible solutions to improve risk management of hospital construction investment projects - Ministry of Health.

Object and scope of the study

- Research object: Risk management of hospital construction investment projects - Ministry of Health

- Research scope:

+ Spatial scope: Public hospital projects use state budget capital, however, the focus will be on hospital projects directly invested and decided by the Ministry of Health.

+ Time range: From 2015 to 2022

+ Scope of content: Within the research scope of the thesis, the PhD student will focus on researching risk management during the implementation phase of investment projects to build public hospitals using state budget capital, going deeper into Hospital projects are directly invested and decided by the Ministry of Health. From there, propose solutions to manage risks to improve project investment efficiency. At the same time, minimize losses for project participants.

Research Methods

In addition to research methods such as synthesis, analysis, comparison, the thesis has mainly used two methods of qualitative research and quantitative research to determine research results.

Scientific and practical significance of the topic

Scientific significance:

- Supplementing and perfecting scientific issues on risk management of hospital construction investment projects - Ministry of Health: Concepts and risk characteristics associated with hospital construction investment projects institute,....

- The results obtained from the project can become useful knowledge for scientists and managers when researching risks in the construction field in general and hospital construction projects. Institute - Ministry of Health in particular.

Practical significance:

- Data on the current status of risk management for hospital construction projects - Ministry of Health are collected from reliable sources of the Ministry of Construction, Ministry of Health,.... This data provides Reliable information, accurately reflecting the actual implementation of hospital projects - Ministry of Health today.

- Based on the assessment of the current situation, the researcher develops solutions to manage risks and improve investment efficiency for hospital construction projects - Ministry of Health.

- Research results help project subjects take measures to identify, prevent and minimize risks during the investment and construction process of hospital projects - Ministry of Health.

Newness of the thesis

1. The thesis has researched an overview of risk and risk management in the field of construction in general and in hospital construction in particular in the world and in Vietnam. This content has contributed to enriching knowledge about risk and risk management of hospital construction investment projects in Vietnam. This content can also be a reference for training on risk management in construction project management, for engineers, experts and agencies and organizations interested in researching risk and risk management in construction projects. hospital construction projects.

2. The thesis has comprehensively analyzed the risks affecting the entire project, including: technical, economic, environmental, social and political risks. This list of risks is compiled from previous studies and from hospital projects that have been and are being developed in Vietnam. These risks are discussed by experienced experts in the field, so they have theoretical and practical significance, helping risk managers to quickly identify risks that may appear in projects.

3. The thesis has combined qualitative and quantitative methods along with appropriate approaches and tools, taking into account the interactions and interactions between risk groups and between project goals. From there, propose management solutions to respond to highly dangerous risks for hospital construction investment projects - Ministry of Health. At the same time, apply some solutions experimentally to evaluate the appropriateness of the solution in practice.

Thesis structure

Includes introduction, content (Chapter 1: 30 pages, Chapter 2: 32 pages; Chapter 3: 45 pages, Chapter 4: 36 pages), conclusion, recommendations and published scientific works, References and appendices.

Some terminology

Hospital project : is an independent public building, a complex of buildings used for medical examination and treatment purposes . Hospital construction is the process of building buildings, structures and facilities to serve the provision of medical services to patients. Hospitals are often built on a large area and must comply with standards, regulations, and laws related to health and construction to ensure safety and quality of medical services.

Risk management : Risk management is a process of identifying, evaluating and ranking possible risks through which effective measures and necessary resources are selected and applied. practice to limit, monitor and control the likelihood of occurrence and/or impacts of unforeseen events.

CONTENT

characteristics similar to other construction projects. In addition, hospital construction projects - Ministry of Health are also characterized by 10 unique characteristics such as: Complexity of the project; Project implementation time is long; Projects have strict and clear traffic planning; Challenges in structure (design); technological challenges; consumes large resources; are related to public organizations and public financial resources; project specificity; has a great impact on society and community; There are many parties involved in the project.

Because of some of the unique characteristics presented above, hospital projects often encounter many problems such as cost overruns, longer implementation times than expected, and not fully meeting the requirements of the parties. related to the project. Therefore, researching to identify risks, evaluate the priority of risks and propose measures to minimize the negative impacts of risks on the cost, schedule and quality of this project is important. Urgent issue that needs attention and research.

1.3. Identify gaps and issues that need in-depth research

1.3.1. Conclusions drawn from an overview of research works related to the topic

Many studies on risk management in construction have been carried out. Especially the methods and techniques used by researchers to analyze and assess risks . These are the values the thesis will inherit.

1.3.2. Identify research gaps

- Some types of projects that have been researched have been mentioned in the above sections, and there are many types of projects that have not been researched, including investment projects using state budget capital.

- Hospital construction investment projects are complex due to the participation of many parties with different expertise. The aspects of quality, schedule, and cost are three separate aspects but have an impact on each other in the project. With research conducted in Vietnam, there are very few studies on risk management for hospital projects, which have many potential risks. Meanwhile, the division of risks according to aspects of the project as reported in previous studies is often confused. Therefore, it is necessary to determine criteria when dividing risks according to aspects of the project.

1.3.3. Identify issues that need in-depth research

- Task (1): Overview of risks and risk management in construction investment projects in general and hospital projects - Ministry of Health in particular

- Task (2): Synthesize and systematize the scientific basis for risk management of construction investment projects in general and hospital

construction investment projects - Ministry of Health in particular.

- Task (3): Investigate the current situation and evaluate risk management for hospital construction investment projects - Ministry of Health.

- Task (4): Propose risk management solutions in hospital construction investment projects - Ministry of Health using state budget capital.

- Task (5): Apply some solutions to actual hospital construction investment projects - Ministry of Health.

1.4. Research sequence of the thesis

The research framework of the thesis is implemented as shown above. The research steps are as follows:

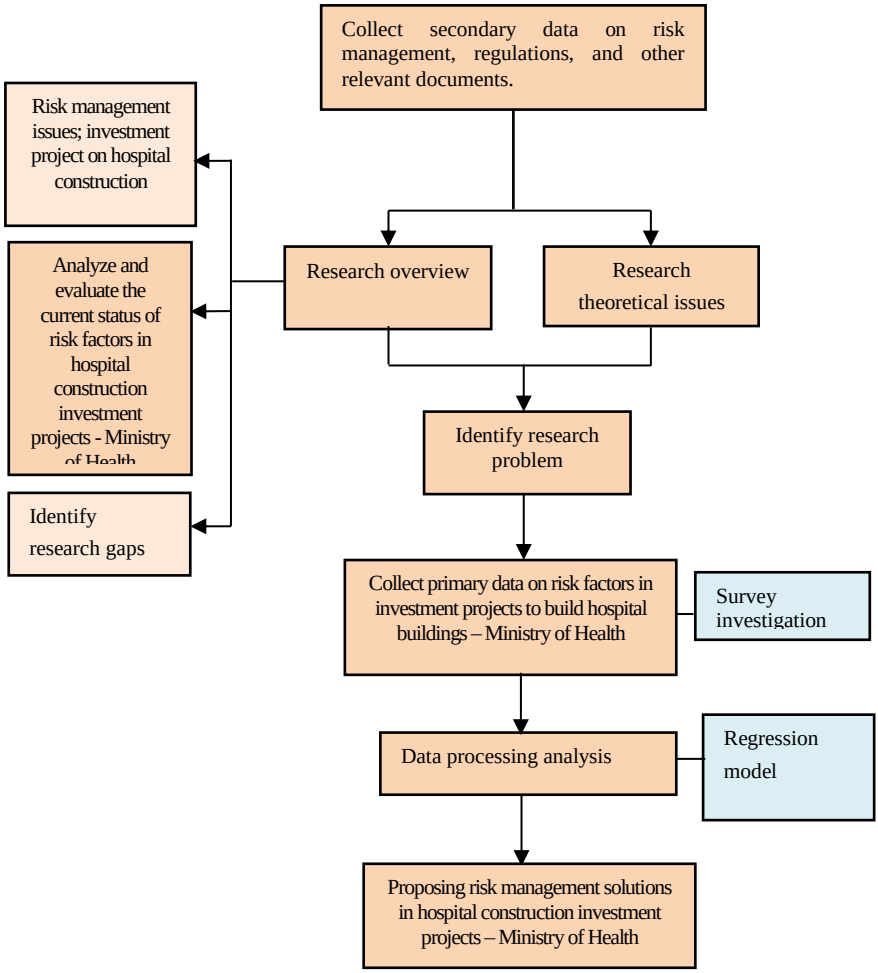

Figure 1. Research framework of the thesis

CHAPTER 2: SCIENTIFIC AND PRACTICAL BASIS OF RISK MANAGEMENT OF CONSTRUCTION INVESTMENT PROJECTS

2.1. Scientific basis for risk management of construction projects

2.1.1. Risk concept and risk management

(1) Concept of risk

There are currently quite a few concepts of risk given by researchers. Within the limits of the thesis, the author considers project risk as factors that may occur (foreseeable or unforeseeable). during project implementation and impact on project goals, causing project results to differ from initial expectations. In other words, RR can be uncertain events, conditions, and consequences if those events or conditions occur in relation to project goals. Although, there can be both damage and opportunity exist in risks [14], however, building a risk assessment model considering both factors is extremely difficult and is currently nearly But very few studies in the world can consider both of these aspects in the same model, at the same time.

Within the scope of the thesis, risks will be considered based on their negative impact on the project, while the positive side will be viewed as an opportunity for stakeholders.

(2) Risk management concept

Risk management is a process of performing tasks from identifying risks, analyzing, evaluating the level of impact, selecting policies as well as how to implement policies to minimize the negative influence of risks. They come from the project implementation process as well as finding profit opportunities from these risks. Risk management is a difficult process, requiring a suitable management framework in both theory and practice to maximize possible opportunities and eliminate and minimize damages and losses caused by RR causes. Within the limits of the thesis, the PhD student will conduct an in-depth study of the project's risk identification and assessment process instead of understanding all activities in the risk management process.

2.1.2. Risk classification

Within the scope of the thesis, the researcher will group risks into 5 main groups, which are social, technical, economic, political and environmental risks.

(1) Risks related to social factors Social risks can be identified when the surrounding community and project stakeholders are concerned about issues such as labor regulations, human rights, and legal regulations. power for investors.

(2) Technical risks Technical risks (RRK) are common and well-researched risks in construction projects in general and medical projects in particular, so they are subjects that are closely monitored.

(3) Economic risks Economic risks (RRKT) are mainly risks related to project finance during implementation.

(4) Environmental risks According to Chen Z, Li H et al., environmental risks (RRMTs) are risks to the natural environment, ecosystems and risks to human health that originate from changes or degradation of the ecosystem. environmental system.

(5) Political risks Political risk (RRCT) arises from the interaction between the government, the environment and surrounding social factors.

2.1.3. Risk management content (risk management process

2.1.3.1. Risk identification

Risk identification (NDRR) is the process of systematically and continuously identifying, classifying and evaluating the initial significance of risks related to a construction project [38]. NDRR is the identification of risks that can affect the project and recording their characteristics.

2.1.3.2. Risk analysis

The risk analysis process is an important link between risk management and risk management. The risk analysis process aims to evaluate the consequences associated with risk and evaluate the impact of risk using risk analysis and measurement techniques [66]. The process of risk analysis means calculating the weights for the identified risks to serve the next actions.

2.1.3.3. Respond to risks

This process aims to identify effective response actions that are consistent with the priorities of individual risks and the overall project risk.

Response to risk can be one or a combination of the following solutions [75][74]: Mitigation; avoid; transfer and acceptance

2.1.3.4. Risk allocation

Risk will be divided among the parties that can best control the consequences of the risk and the parties that can bear the risk at the lowest

cost. However, implementing this principle in practice is very difficult.

2.2. Legal basis

2.2.1. Legal documents

- Construction Law No. 50/2014/QH13 , has some content related to risk management in Article 66.

- Decree 20/2022/ND-CP regulates compulsory insurance in construction investment activities to prevent objective risks.

2.2.2. Legal documents issued by the Ministry of Health

(1) Decision No. 6226/QD – BYT of the Ministry of Health promulgating regulations on management of investment projects to construct medical works and equipment under the authority of the Minister of Health for approval.

(2) Decision No. 1895/1995/QD-BYT promulgating hospital regulations.

2.3. Practical basis

2.3.1. Experience in risk management of hospital construction projects around the world

- ***Australia*** Managing investment in construction projects in the form of PPP in Australia is an effective capital risk management solution. This form is widely applied to different types of construction works, especially for medical works.

- ***China*** In China, risks at construction projects in general and hospital projects in particular are managed very well. This is demonstrated through quality management. Quality management of hospital projects is regulated in China's Construction Law.

2.3.2. Lessons for Vietnam

- Completing the system of legal documents: From legal documents and by-law documents, there needs to be synchronization and unity, avoiding overlaps and conflicts. Regulations and standards need to be specific and clear. Improve institutions to create a safe, solid legal corridor, improve effectiveness and efficiency of enforcement. Proactively and continuously review to promptly amend and supplement to meet practical needs.

- Tighten the ability to adjust progress, estimates and financial plans to force investors to make fundamental calculations right before project implementation. Clearly state responsibility for organizations and individuals that cause project adjustments

CHAPTER 3. DETERMINATION AND ASSESSMENT OF RISK FOR

HOSPITAL CONSTRUCTION INVESTMENT PROJECTS - MINISTRY OF HEALTH

3.1. Current status of risk management in hospital construction investment projects - Ministry of Health.

3.1.1. Current status of risks recorded from records of hospital construction investment projects - Ministry of Health

Reviewing records and diaries from projects at 34 hospital projects under the Ministry of Health in recent times, the researcher recorded 27 risks that often appear during project implementation. These risks focus on Issues: Quality, progress, design, capital source, fluctuations in raw material prices on the market, etc. These risks are easily detected and are of particular concern to project parties. For example: Capital planning, disbursement, and annual capital settlement are not appropriate; complex administrative procedures; changes in State policies and regulations; Unclear definition of project goals; Delay in handing over construction site; many design changes; …

However, these risks have only just been recognized as occurring and discussed by the project parties to resolve, the risk outcomes as well as the impacts of the risks are not clearly recorded.

3.1.2. Current status of risk management for hospital construction investment projects - Ministry of Health

(1) Current status of risk identification and identification

Organize weekly briefings between the Investor and Contractors in project implementation, and regularly organize meetings to exchange information between experts and Contractors and contractors. The design unit and contractors have captured information and have solutions to overcome difficulties in a timely manner.

(2) Current status of risk measurement activities

The assessment of each risk is based on a detailed description of the uncertainties, their impacts and possible risk mitigation methods. All this information is recorded in the Risk Register. For each risk, it is necessary to determine the frequency and level of impact of the risk on the costs incurred by the parties, the environment and people in production and business activities.

(3) Current status of risk control activities

Through studying project documents, it is shown that the risk owner (mainly the contractor) and the person in charge of risk management discuss and propose appropriate plans to mitigate the impact of risks on efficiency project results

Periodically, the risk management coordinator is responsible for submitting Assessment Reports risk assessment to the risk management officer and the

company's Board of Directors in a reporting manner prescribed report

3.1.3. Assessing the achievements and limitations in risk management for hospital construction investment projects - Ministry of Health

(1) Things that can be done

- Systematize a list of risks through experience and actual project implementation.

- Risk measurement is done through internal assessment of the project team and the score is approved and finally agreed by the project manager such as project manager, project director... evaluated from a subjective point of view.

- Develop risk control processes associated with goals such as: controlling progress, costs, quality, to serve risk management.

(2) Limitations

- Have not identified any risks in previous projects that often occurred and greatly affected contract performance so we can focus on risk management and mitigation.

- The assessment of the impact of risks on the project is mainly based on the experience and subjective factors of the direct management team, and has not been able to gather or survey all experts and experiences from previous projects. because there is no library to store risks.

(3) Cause of limited existence

- The risk management organization system is not given importance.

- The awareness of risk management of project participants is not adequate compared to actual requirements, the implementation of data collection, analysis and assessment of risk factors is still far away from formality. In fact, it is not timely.

- Weak risk management capacity of managers

3.2. Identify risk factors

3.2.1. Identifying risk factors in hospital construction investment projects - Ministry of Health

Based on previously conducted risk research from domestic and foreign experts learned in Chapter 1 as well as the implementation status of hospital construction investment projects - Ministry of Health In fact, PhD has compiled 40 NTRRs

3.1.2. Expert group discussion

The results of the expert group discussion all agreed with 40 NTRRs, because experts believe that those NTRRs are all likely to occur. Besides, the expert group also added 5 other risk factors from practical experience and accumulated knowledge.

3.2.3. Build a test board

BCH is an effective data collection tool for research that requires input from the experiences of many people. The content of the trial Executive Board is shown in Appendix No. 02

3.2.4 Experimental survey results

Regarding the score, NTRR is evaluated through two indicators: Frequency and Impact. These two indexes are synthesized into a common index called **RS Risk Score (Risk score)** , calculated based on the formula:

$$RS_j^i = \sqrt{Fr_j^i \; x \; Im_j^i} \qquad (3.1)$$

By calculating the average score from n respondents to have an average score for each RR, this average score is called the **RIS risk-index score** and is used to rank the NTRRs.

$$RIS_j^i = \frac{\left(\sum_{j=1}^{n} R_j^i\right)}{n} \qquad (3.2)$$

3.3. Collect and select research samples

3.3.1. Determine sample size

Given the nature and objectives of the research, this study preliminarily determined the sample size to be 5 times the number of factors according to [47][31], which means about 5 x 45= 225 valid responses are needed.

3.3.2. Select sampling technique

There are two sampling techniques: probability sampling and non-probability sampling

3.3.3. How to collect data

Surveyors were asked about their level of agreement with each factor in the BCH on a scale of 1 to 5. The author used 3 methods to send the BCH to respondents, specifically: (1 *) Method of sending BCH directly; (2) Online survey method; and (3) Method of sending BCH via email* .

3.3.4. Develop an official questionnaire

From the results of the fourth discussion, the experimental Executive Committee was adjusted and completed to conduct a mass survey.

3.3.5. Experimental survey (official survey)

The official Executive Committee has been completely built and a mass survey has been conducted. BCH is expressed in two forms, which are live BCH and sent via email . BCH online is designed as a website with Google Form tool application. The total amount of BCH distributed is 300 pounds

3.4. Analyze data from the official survey

3.4.1. Select data

The data collection process collected a total of 300 BCH, of which 200 BCH were obtained by live broadcast method (including sending BCH via email) and 100 responses from the online survey. But to ensure the quality of the information collected, the received BCH number needs to go through a further elimination process.

Result: after performing the above removal steps, the remaining amount of BCH is 250 pounds. These are the Executive Boards used to analyze data in the next steps

3.4.2. Characteristics of respondents

Characteristics of respondents from a total of 280 responses selected after screening: According to years of experience; according to job position ; by role in the project and by educational level

3.4.3. Official survey results

The results show the influence of the risk factor groups as follows: (1) Technical risk group (RRK); 2) Social risk group (Social risk); (3) Economic Risk Group (RRKT); (4) Political RR Group (RRCT); (5) Environmental risk group (RRMT)

Risk management = 0.307*RRK + 0.209*XH + 0.182*RRKT + 0.175*RRCT + 0.162*RRMT + □

The calculated results of Cronbach Alpha coefficient are 0.953 and 0.954 corresponding to the two items Level of influence and Level of occurrence, respectively. This result proves that the survey committee completely satisfies the reliability requirements of the scale.

Table 3. 4 . Results of testing Cronbach 's Alpha coefficient

	Cronbach's Alpha	Total number of factors
Infulence level	0.953	45
Degree of occurrence	0.954	45

3.4.4. Ranking of risk factors

The basis for ranking the main RIS risk factors is in formula (3.2). As introduced, the higher the RIS value of any NTRR, the more important that factor proves to be. The NTRR with the highest overall RIS value will be ranked 1st and in turn the NTRRs with lower average values. All results are presented specifically in the following table:

Table 3.8 . Results of ranking risk factors

Risk factor	**overall**	
	RIS index	**Rating**
Compensation and site clearance work is slow and inconsistent	4.35	1
Construction errors, redo	4.04	2

Risk factor	overall	
	RIS index	Rating
Capital planning, disbursement, and annual capital settlement are not appropriate	3.92	3
The design has many flaws	3.9	4
The professional capacity of the construction contractor is weak	3.88	5
Fuel and raw material costs change	3.85	6
Many design changes	3.83	7
The appraisal and approval of designs and estimates still have many errors	3.81	8
Limited qualifications and experience of project managers	3.8	9
The generated volume is not included in the design documents	3.79	10
Construction does not comply with standards and technical procedures	3.78	11
Damage to construction machinery and equipment	3.76	12
The contractor's financial capacity is not guaranteed	3.74	13
Project cost forecast is inaccurate	3.73	14
Delays in appraisal and approval (legal procedures)	3.72	15
The bidding price (winning bid) is too low	3.71	16
Complicated administrative procedures	3.70	17
Defining the project scope is unclear or the project investment scale changes	3.69	18
Forecasting project implementation time is not accurate	3.68	19
The supply process is interrupted	3.65	20
Construction organization methods are not guaranteed	3.64	21
Errors in appraisal and approval of related documents	3.62	22
Errors in quality supervision of construction contractors	3.61	23
Topographic and hydrogeological survey records have many errors and are incomplete	3.60	24
Changes in state policies and regulations	3.58	25
Supplement or change design requirements of the Investor or state management agency	3.57	26
Choosing inappropriate technical solutions and construction technology	3.56	27
High bank interest rates	3.54	28
Project participants disagree and lack cooperation	3.52	29
Pressure to adjust project scope from stakeholders	3.51	30
Raw materials are scarce	3.50	31
Unusual natural disaster conditions (storms, floods, earthquakes...)	3.48	32
Responsibilities and powers between departments and positions are overlapping and unclear	3.47	33
Changes in government and donor funding policies	3.45	34
The project was delayed	3.44	35

Risk factor	overall	
	RIS index	Rating
Risks related to contracts	3.43	36
Completion documents are erroneous	3.42	37
Inflationary	3.40	38
Change the conditions for calculating total investment	3.39	39
Environmental pollution (air, water, noise, waste...)	3.38	40
Lack of Government support	3.36	41
Complaints and disputes arise during project implementation between related parties	3.35	42
Negative social impacts (traffic, resettlement, lifestyle...)	3.34	43
Opposition from public opinion and the community	3.33	44
Threat to human safety and property	3.31	45

3.4.5. Classification of risk groups

From the remaining 45 NTRRs with RIS > 3.0, experts once again consulted to group and name the groups. Finally, the results were also consistent with the groups named as follows: (1) Social risk group (social risk); (2) Technical RR Group (RRK); (3) Economic Risk Group (RRKT); (4) Environmental risk group (RRMT); (5) Political RR Group (RRCT). The results are presented specifically in Table 3.9.

Table 3.9 . Grouping of risk factors

RR group	Encryption	Variable RR
Social risk (social risk)	XH1	Compensation and site clearance work is slow and inconsistent
	XH2	Complicated administrative procedures
	XH3	Project participants disagree and lack cooperation
	XH4	Pressure to adjust project scope from stakeholders
	XH5	Responsibilities and powers between departments and positions are overlapping and unclear
	XH6	Complaints and disputes arise during project implementation between related parties
	XH7	Negative social impacts (traffic, resettlement, lifestyle...)
	XH8	Opposition from public opinion and the community
	XH9	Threat to human safety and property
Technical risks (RRK)	K1	The professional capacity of the construction contractor is weak
	K2	Defining the project scope is unclear or the project investment scale changes
	K3	Forecasting project implementation time is not accurate
	K4	Limited qualifications and experience of project managers

RR group	Encryption	Variable RR
	K5	The supply process is interrupted
	K6	Construction does not comply with standards and technical procedures
	K7	Errors in quality supervision of construction contractors
	K8	Topographic and hydrogeological survey records have many errors and are incomplete
	K9	The design documents have many errors and must be corrected
	K10	The appraisal and approval of designs and estimates still have many errors
	K11	The generated volume is not included in the design documents
	K12	Supplement or change the design requirements of the Investor or state management agency
	K13	Damage to construction machinery and equipment
	K14	Choosing inappropriate technical solutions and construction technology
	K15	Completion documents are erroneous
	K16	Errors in quality monitoring
	K17	Project cost forecast is inaccurate
	K18	The contractor's professional capacity is weak
	K19	The design documents have many shortcomings
Economic risk (RRKT)	KT1	High bank interest rates
	KT2	The project is behind schedule
	KT3	Risks related to contracts
	KT4	Change the conditions for calculating total investment
	KT5	Fuel and raw material costs change
	KT6	Raw materials are scarce
	KT7	The contractor's financial capacity is not guaranteed
	KT8	Capital planning, disbursement, and annual capital settlement are not appropriate
	KT9	The bidding price (winning bid) is too low
Environmental risk (RRMT)	MT1	Unusual natural disaster conditions (storms, floods, earthquakes...)
	MT2	Environmental pollution (air, water, noise, waste...)
Political RR (RRCT)	CT1	Lack of Government support
	CT2	Changes in state policies and regulations
	CT3	The project was delayed
	CT4	Changes in government and donor funding policies
	CT5	Delays in appraisal and approval (legal procedures)
	CT6	Errors in appraisal and approval of related documents

From the table above, it shows that technical risk factor groups (RRK)

account for 42% of the total risk factors considered ; The Economic Risk Management Group (RRKT) and the Social Risk Management Group (Social Risk) both account for 20%; Political Risk Management Group (RRCT) accounts for 14% and Environmental Risk Management Group (RRMT) accounts for 4%

Thus, it can be seen that in current hospital construction projects in Vietnam, RRK factors have become a major issue in the entire project management issue. Therefore, researching effective solutions to risks will have a significant effect in finding solutions to the problem of risk management in hospital projects in our country.

CHAPTER 4: RISK MANAGEMENT SOLUTIONS FOR HOSPITAL CONSTRUCTION INVESTMENT PROJECTS – MINISTRY OF HEALTH

4.1. Proposed direction

The need to determine risk is obvious during the implementation of construction investment projects. Therefore, instead of ignoring risk, it is necessary to define risk management as controlling risk, not missing any risk. If you want to not miss RR, the first thing is to determine RR completely and accurately.

Taking the project as the center, any risk occurring to any party will affect the project and involve other parties participating in the project. Therefore, there needs to be a reasonable division of risks among the parties in the project.

4.2. Develop a risk management manual

The handbook contains the following contents:

- Part 1. Related terms
- Part 2: Implementation content
- Part 3. Risks during the implementation of hospital construction investment projects - Ministry of Health
- Part 4. Issues in risk management of hospital construction projects - Ministry of Health

4.3. Some risk management solutions in hospital construction investment projects - Ministry of Health

4.3.1. Improve risk understanding for project participants

- For Investors.
- For groups of consulting contractors
- For construction and installation contractors.

- For state management agencies
- For the community

4.3.2. Solution to complete the risk allocation process

A survey of implemented projects shows that: Currently, the Ministry of Health plays a decisive role in allocating risks and selecting risk management subjects. In order to reduce the burden on the State as well as competent project management agencies, the author has researched, supplemented and perfected the risk allocation process according to Figure 4. 1

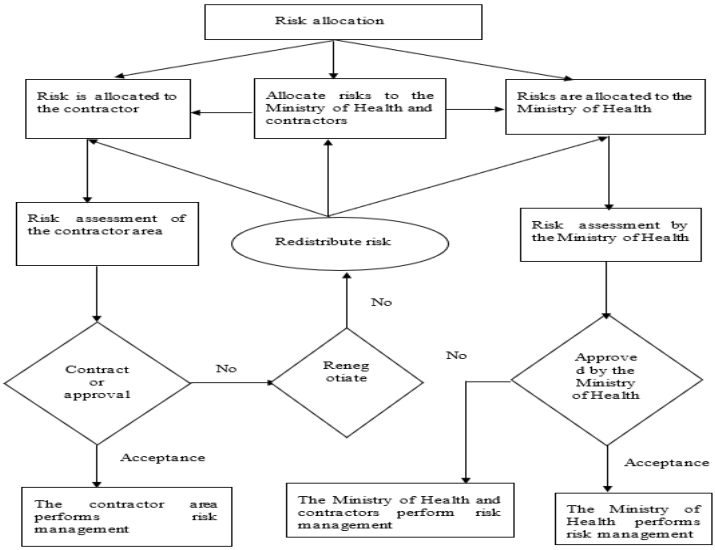

Figure 4.1. Risk allocation process for hospital construction projects - Ministry of Health

[Source: Suggested by author]

4.3.3. Complete solution for risk management process

Based on the risk management process and the specific content of the process steps, combined with the completed risk allocation process in Figure 4.1, the author supplements and proposes a risk management process expressed through through Figure 4.2.

The risk management process in Figure 4.2 clearly shows the content of the steps of risk management and shows the specific work content in each step of the process, helping the State to proactively control and manage risks. and efficiency

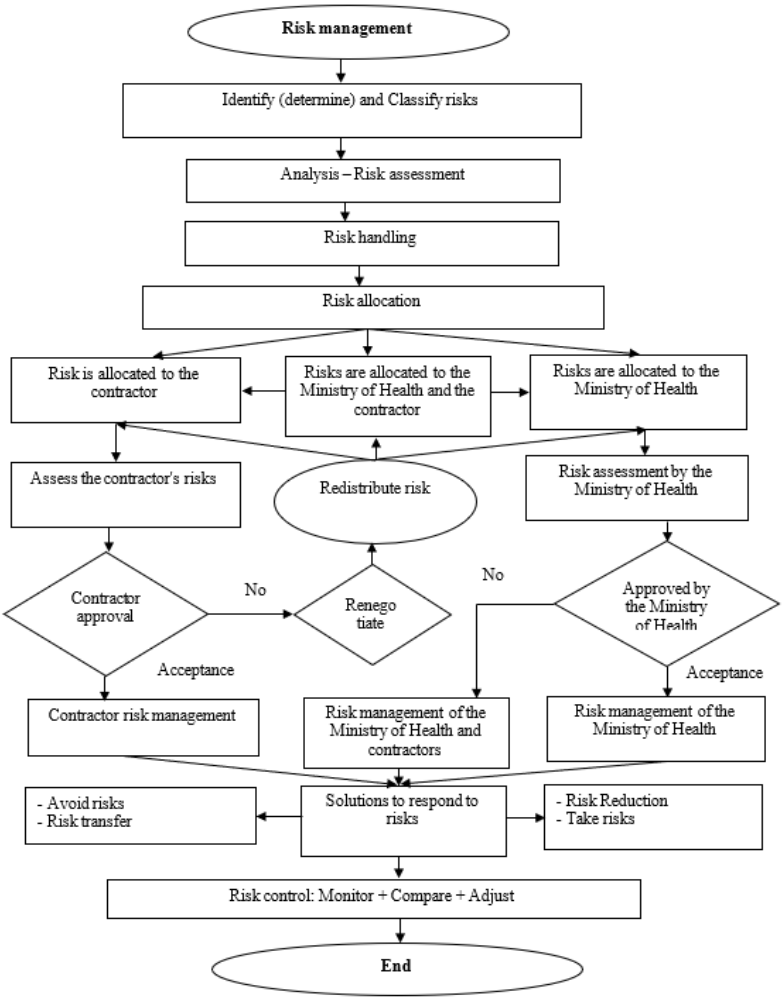

Figure 4.2. Risk management process for hospital construction projects – Ministry of Health

[Source: Suggested by author]

4.3.3. Risk response solutions for relevant parties

For effective risk management for hospital construction investment projects - Ministry of Health. The State (Ministry of Health) needs to propose solutions to relevant parties to cope with risks for hospital projects. As follows:

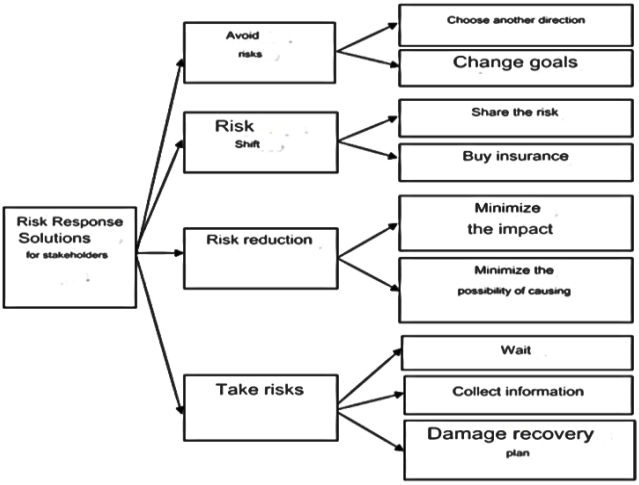

Figure 4.3. Risk response solutions for relevant parties in hospital projects - Ministry of Health

4.4. Response solutions for each risk factor

From the results of the survey and ranking of risk factors, the researcher proposed a number of solutions to deal with some dangerous risk factors according to expert opinions, specifically as follows:

- Compensation and site clearance work is slow and inconsistent (XH1)
- Construction errors, rework (K16)
- Capital planning, disbursement, and annual capital settlement are not appropriate (KT8)
- The design has many errors (K19)
- Weak professional capacity of construction contractors (K1)
- Fuel and raw material costs change (KT5)
- Many design changes (K9)
- The appraisal and approval of designs and estimates still have many errors (K10)
- Limited qualifications and experience of project managers (K4)
- Arising volume not included in design documents (K11)
- Construction does not comply with standards and technical procedures (K6)
- Damage to construction machinery and equipment (K13)

4.5. Other solutions

- Apply science and technology in risk management

+ Mobile integration technology

+ Build a digital information standard framework network in the project

- Issue regulations and guidelines on risk management

Attach risks to relevant current regulations such as regulations on construction insurance, regulations on labor safety, regulations on quality, costs, etc. This can create a reference system in risk management to help managers easily find measures to respond to risks.

- Labor safety management in construction

+ Comply with regulations on labor safety in construction.

+ Enhance the responsibility of construction safety management of investors and contractors in labor safety management in construction.

4.6. Experimental application of some risk management solutions for hospital construction investment projects - Ministry of Health.

- **General assessment of the project**

Due to some sensitive characteristics, some project information is not included in the thesis

- Project name: General Hospital A renovation project.

- Location: Hanoi

- Scale: 06 floors; Total project progress is 520 days.

- Scope of project work: New construction of patient emergency area, renovation of laboratory, administrative room, and auxiliary area.

- **Evaluation of project status**

**Safe:* The project has not had any serious accidents that endanger the lives of workers.

* *Progress* The project started on January 1 and is expected to be completed after 520 days of construction, excluding holidays. However, during the project implementation process, many events occurred that caused the progress to be prolonged, such as:

- Temporarily suspend the project from May 23, 2019 to November 1, 2020.

- Restarting construction, schedule November 1, 2020 - April 29, 2021.

- Paused for 1 month due to technical errors

- The investor intervenes in acceptance, causing project delay

- Changed the design of the elevator core width, causing a delay of 14 days

- Tower cranes are often damaged, causing delays

* *Cost:* The project is in the final stage of completion, reaching about 80% of the project's workload. Up to now, the main contractor's costs are exceeding the estimated costs. The main reason is due to inaccurate volume estimates, rework errors, and slow progress.

* *Quality:* According to the assessment of the consulting unit here, the contractor's construction quality is quite good. Some items had to be redone

due to design changes from the investor

Conclusion: the project is behind schedule and has cost overruns

- **Evaluation of project participants**

***** *Investor* **:** Ministry of Health

* *Design unit:* Is a company hired by the investor but has a close relationship, so the design unit partly receives favor from the investor.

* *Consulting unit:* As a unit established by the investor to manage projects in the investor's area, the consulting unit has great authority.

* *Construction contractor:* The main contractor only performs construction work. Since its inception, the project has changed through two contractors. After the project is re-constructed, the investor is replaced by the current contractor. According to available information, the project had to suspend construction for 1 month due to the repair of serious technical errors by the previous contractor. Currently, the contractor's progress is slow and costs are being exceeded. One reason from the contractor's side is that the cost estimate and unit price are not reasonable given the difficulty level of the project.

***** *Subcontractors and suppliers* **:** Construction subcontractors are mostly teams introduced by familiar supervisors. In many cases, subcontractors arbitrarily cancel contracts because they do not make a profit

***** *Other objective factors* **:** The project was conducted during a period of financial market crisis and industry crisis. Interest rates for project loans have increased continuously and high inflation has greatly impacted the progress and costs of the project.

- **Apply research results to projects**

Applying the research to project A, gives us the following results :

8/14 research risks have a management process in project A, of which 8 risks are managed but still occur. 3 Risks are managed and do not occur and 3 risks do not have a management process but do occur 2 risks

Thus, project A has 10/14 risks occurring during project implementation, although 8 of them have a management process. That proves that Project A's Risk Management Process is not an effective risk management process.

CONCLUSIONS AND RECOMMENDATIONS

1. Conclusion

Risk identification and risk management are two core issues that need to be researched in hospital construction investment projects - Ministry of Health. The thesis " *Risk management of hospital construction investment projects - Ministry of Health* " is really necessary and has practical significance.

The thesis has achieved the following results :

(1) Systematize and clarify the theoretical and practical basis of management risks of construction investment projects in general and medical hospital projects in particular.

(2) Analyze the current risk situation as well as risk management of hospital construction investment projects - Ministry of Health through qualitative methods such as statistics, analysis, evaluation Data reported in Vietnam and some countries around the world and through quantitative survey methods.

(3) Propose scientific and feasible solutions to improve risk management of hospital construction investment projects - Ministry of Health through risk identification, risk classification, and classification. risk analysis and risk control.

(4) Using SPSS tool to identify risk factors in hospital construction investment projects - Ministry of Health through Cronbach alpha reliability coefficient, exploratory factor (Exploratory Factor Analysis - EFA), rotation matrix and testing of risk classification, risk ranking, risk distribution according to the Cronbach alpha reliability coefficient.

Limitations of the Thesis.

(1) The problem with the survey sample is reflected in the number of survey projects: due to difficulties in collection, the number of survey projects is not high.

(2) Issues with risks: risks are ranked based on the survey project sample. Due to limited data and sample size, these risks may not be representative of the entire population.

(3) Due to limited data, the thesis only analyzes the risks of hospital projects in which the Ministry of Health is the investor. As for hospital projects in which the Ministry of Health is not the investor, the researcher has not yet analysis.

2. Recommendations

(1) For managers, officers, and engineers working in hospital construction projects - the Ministry of Health must always identify, evaluate risks and monitor risks according to their responsibilities. responsible for their professional work.

(2) The Ministry of Health organizes the development and promulgation of detailed regulations and instructions for investors and the Management Board to clearly implement investment projects and risk management for the project.

(3) The Ministry of Construction needs to consider and add risk management content to legal documents so that the implementation of risk management is convenient and effective.

THE AUTHOR'S PUBLISHED SCIENTIFIC WORKS RELATED TO THE THESIS TOPIC

1. **Le Xuan Hai, Pham Xuan Anh** (2021). Overview of risks and risk management in the field of construction investment. Vietnam Construction Association , Builders Magazine . No. 1&2/2021, Pages 66-71 – **ISSN 0866 8531.**

2. **Le Xuan Hai**, **Vu Anh** (2021). Some risk management issues in hospital construction investment projects - Ministry of Health . Institute of Construction Economics – Ministry of Construction , Construction Economics Magazine , No. 01/2021, Pages 43-51 – **ISSN 0866 8531.**

3 . **Le Xuan Hai** (2023). Proposing some risk management solutions for hospital construction projects of the Ministry of Health. Vietnam Construction Association, Builders Magazine. No. 373, May 2023, Pages 32-40 – **ISSN 0866 8531.**