RETHINKING CONSTRUCTION MANAGEMENT PRACTICES TO ATTAIN SUSTAINABLE DEVELOPMENT GOALS

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CONTENTS

CHAPTER 5

A STUDY ON IMPACT OF RISK MANAGEMENT PRACTICES ON SUCCESS OF CONSTRUCTION PROJECT

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Abstract

There is no way to avoid discussing risk in the era of raging globalisation because it has become a necessary component of daily living. Everywhere, in every aspect of life, there is a risk. One such field is the construction sector, where risk is a constant piece of a complex puzzle. Although it would appear like the cheapest course of action, effective risk management does not apply to risk resignation. The fundamental issue with this choice is its nonsensical economics, since anything that has the potential to be profitable is by definition dangerous, and anything that does not pose a risk is attractive from an economic standpoint but does not result in any real advantages. The "golden mean" in risk management will therefore be determined in connection to the project that is being undertaken. On the one hand, it will include safeguarding against the danger of the negative side through meticulous risk identification and classification, which produced a thorough analysis. In contrast, management should be centred on determining the decisions' maximum advantages while utilising all available mathematical and analytical techniques. We will be able to properly manage risk by doing a thorough

analysis that considers all important factors, including stakeholder analysis, and which will result in immediate advantages for our project. Identification of project risks is essentially based on identifying the different categories of hazards that might have an impact on the project, giving a description of their characteristics, and calculating the likelihood that they will occur. The three sorts of investors—risk preference, risk neutrality, and pure risk aversion—as well as their measurement—are preserved under these three categories of conditions: assurance, uncertainty, and risk. A list of occurrences with their causes, probabilities, and final assessments of their environmental impact will be the output of the project's risk identification and analysis.

Introduction

Risk is difficult to avoid in the era of progressive globalisation since it has become an essential component of daily living. Risk can be found everywhere and in all facets of our lives. One of these facets is the construction sector, where risk is a fundamental component. The elimination of risk, which would appear to be the simplest solution, is not the same thing as effective risk management. This choice is useless economically since anything that has the potential to be profitable by definition involves risk, and anything that does not involve risk is not interesting economically and does not, therefore, result in any concrete rewards.

1. Identification and risk assessment

Every project involves taking risks. Institutions and businesses should be ready for potential hazards to occur. Companies frequently have a high propensity to take risks at the start of their operations, and as a result, many of them go bankrupt within the first two years of their founding. Banks and other financial institutions, however, have relatively little taste for risk. They manage the assets of their depositaries; therefore, they conduct their firm in a risk-resistant manner. They decide to implement the initiatives in their portfolio whose variance (uncertainty) is acceptable. Therefore, each project should undergo a risk analysis along with the identification of potential risks prior to implementation. In order to identify risks in construction projects, it is important to first define the types of risks that might have an impact on the project, as well as their characteristics and likelihood of occurrence. The decision-making circumstances that an investor is now in lead to the necessity for risk identification.

The project's risk identification and analysis produced a list of incidents with descriptions of their causes, probabilities, and ultimate environmental impact. Frank Knight outlined the distinction between risk and uncertainty in

1921: The well-known concept of risk, from which uncertainty has never really been separated, must be seen in a way that is decidedly different from that concept. The essential point is that, depending on the kind we must deal with, there are significant and fundamental changes in our understanding of this phenomenon. In some circumstances, the danger has a quantifiable scale, while in others it has a completely different nature.It appears that the risk or measureable uncertainty, which is a term we'll employ, is enough distinct from the immeasurable uncertainty to not qualify as uncertainty.

1.1. Examples and categories of risk

The most typical risk division is categorised according to the frequency of occurrence and the extent of harm. The division is generally as follows:

Risk in terms of frequency

- Specific risk relating to specific projects, along with all variants,
- Specific risk relating to specific projects, along with all variants.

Risk in terms of impact scope:

- Fixed risk, affecting the entire economy,
- Variable risk or non-fixed risk in respect to a specific enterprise.

Additionally, we categorise risks into the following groups:

- Financial risk,
- Risks associated with the passage of time, the failure to carry out the project, or specific activities,
- Technical risk associated with inability to deliver project quality,
- Risks associated with the market's response to the project's progress and results,
- Risks associated with nature and the environment, which are factors that man cannot predict,
- Risks from the socio-economic context, external risk,
- Risks associated with the human factor, workplace safety, and executive team risks.

The five primary groups of a construction project's risk division are:

- Preliminary design.
- Detailed design.
- Tender.

- Construction works.
- Financing the investment.

Preliminary design- If the project is rejected, the costs paid for implementation could be lost.

This is the outcome of the firm having to assume the following kinds of risks:

- risk of unrecognised competition,
- risk of poorly recognized preferences of the investors,
- risk of poor self-esteem,
- Risk of overestimating project costs (too expensive given the investor's resources).

Tender- The tender is a must before the project can start. This fact establishes the requirement for a certain strategy at this point in the construction process. The following are burdensome aspects of this time.

- risk of tender cancellation,
- Risk of receiving a poor quote for the project (determining the profitability criteria),
- the possibility of competitors utilising predatory pricing,
- risk of spending too much (or too little) on marketing and lobbying,
- Client's reliability risk.

Detailed design- - a phase that serves as the foundation for the finished product. We face the following dangers at this point:

- risk of selecting the wrong design team,
- risk of forecasting project costs too high,
- Risks include inappropriate technology selection and a decline in aesthetic quality (which requires understanding of investor preferences).

Construction- moulds the finished result. Risks connected to the execution of building projects include

- Protest potential (locals, ecologists, etc.),
- risk of a poorly understood soil structure, such as quicksand,
- risk of equipment failure,
- risk of bad work schedule,

- risk of worker absences (strike, illness),
- danger of ineffective management of human resources, suppliers, and materials,
- Risk associated with employee qualifications (performance),
- risk associated with timely building material supply,
- risk of maintaining standards,
- risk of insufficient control,
- risk of expanding the scope of the project,
- Risk of poor work organization.

Financing the investment- is the region that is most at risk. It contains:

- risk of the nation's political unrest,
- risk of the nation's economic unrest,
- risk of inflation,
- Industry recession risk,
- The risk of contract precision (objectives changing mid-project, lack of exact initial objectives, poorly defined scope of work and commissions subject),
- risk of law compliance and enforcement,
- Risk of client credibility.

2. Risk planning and reacting

Planning how to manage risk is a very challenging process that must be started during the project planning phase. In most instances, the degree of involvement during the first phase affects the entire process of managing risk. You must start at the same place in order to correctly complete the contract's risk management process, specifically with the creation of a risk management plan. This strategy will be used frequently in numerous studies and research techniques, as we shall see in the future. The core project assumptions, which describe the nature and course of the project, serve as its fundamental building blocks. To assign and specify the duties and responsibilities of project people, you must first decide the company's or entity's risk management policy. In order to remove any negative thoughts towards the project as soon as feasible, we immediately independently analyse the participants' attitudes. Evidently, it may be a very challenging chore at times because, as we all know, the risk is often associated with the potential for losing advantages.

2.1. Stakeholder analysis's effects on the project

Stakeholder analysis, despite appearing to be the next step in risk identification, is one of many tools used in planning techniques and risk management. The identification of risks in this analysis is merely one of the components that serve as the foundation for more study. It is mostly based on an accurate description of each party involved in the project's implementation. Both people and legal entities fall under this category; the range of people who qualify as individuals can, and in fact, should, be vast. The scope of our involvement in this subject is entirely up to us. It's important to keep in mind that stakeholder analysis also applies to groups who could be negatively impacted by the project. We can employ a variety of techniques, including questionnaires, surveys, and community interviews, to develop this analysis. The equality with regard to race or origin is one of the severe principles that define this style of study. It ensures that the project will be carried out in accordance with the highest moral and ethical standards. Several factors impacting our business require the use of stakeholder analysis:

- socio-economic characteristics;
- Sensitivity to matters related to the project's activity;
- potential, information, and experience;
- Objectives, interests, expectations, etc.;
- Consequences and project conclusions.

The shape and design of the stakeholder matrix are optional. However, it is crucial that the major elements, notably the positive and negative influence on the project, are shown clearly. Built on the foundation of community interviews, risk matrices can, for instance, be based on two metrics: the degree of parties' interest in the project and the influence of stakeholders on the project. The scale of evaluation may be stated as in Figure 1, where the assigned symbols denote generated groups that share the following characteristics, depending on the scheme used.

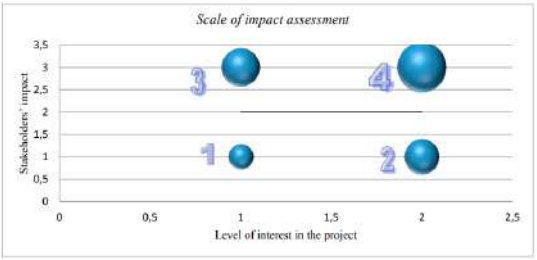

Fig 1: Example Construction of a risk matrix employs an assessment scale.

1) The parties' lack of interest in the project and its minimal impact on the project itself;
2) Significant interest in the project with negligible effects on the project
3) Little interest in the project but significant influence of stakeholders;
4) A lot of people are interested in the project, and stakeholders have a lot of influence.

We can develop a risk matrix using this type of evaluation scale, assigning each person to one of the groups (1–4) mentioned above. We can obtain a prioritised group of stakeholders in this simple and transparent way, both in terms of their positive and negative influence on the project.

2.2. Qualitative and quantitative risk analysis

The accuracy of the projection's risk likelihood and the scope of its accompanying impacts will serve as the foundation for qualitative risk analysis. It will also assist in deciding which potential risks should be examined and verified first and which ones can be "put away" ahead of time due to a little likelihood of occurrence. Making important decisions about which risk factors to consider will be based on the findings of qualitative analysis.

- demand constant observation, with intervals for halting planning and decision-making pertaining to the classified risk;
- will end due to a change in the project's profile or a total withdrawal;
- shall be handed to another project participant who is capable of managing all consequences that arise;
- a requirement for compensated actions under the carried-out project;

Numerous tools are used in qualitative analysis to evaluate and categorise risk. The most crucial of these are as follows:

- indicative evaluation of risk factor impact and likelihood of occurrence;
- analysis of the stability of the project's assumptions and the project's susceptibility to changes in those assumptions;
- risk index assessment matrix;
- data ranking methods according to their suitability for risk analysis;

- Determining the risk index, which is the product of the chance that a certain risk factor will develop and the magnitude of that risk to the project in the event that it does.

We may also build the risk impact scale based on the results of that investigation. A quantitative approach of analysis that describes the topic under consideration must be used in addition to a thorough risk analysis. It is required to have data like the probability of risk in a project under consideration, which is best established on the basis of a sufficiently big, uniform, and accurate data sample, and the valuation of risk effects in order to determine risk based on quantitative analysis. We will establish a weighted arithmetic value based on the data gathered and use it as a measure of risk calculated using the equation below.

WV = probability x consequences

On the same output data, both qualitative and quantitative analysis may be based. The latter requires slightly different methods than the former, although both deal with the likelihood that a danger will materialise. The quantitative analysis also aids in making very accurate predictions about the likelihood that project deadlines or costs will be met and establishes trends in risky future events. In conclusion, it is clear that the estimation of risk and its effects are at the centre of both qualitative and quantitative investigations. However, while quantitative analysis provides visible benefits of these analyses in the form of numbers and statistical data that serve as the foundation for additional study, qualitative analysis specifies the framework for operation. Unfortunately, it frequently occurs in practise to just use one of these techniques while conducting testing, which results in an incomplete picture of the situation.

Therefore, these analyses should be performed simultaneously in order to ensure their safety while being performed and to ensure the best possible study outcome.

2.3. Different ways of responding to risks

After the classification of all project-related hazards, suitable remedies must be proposed for each risk that was found. These actions may take two forms. First, they may seek to fully mitigate any negative impact on the project or concentrate on lessening the negative influence. Four categories can be used to classify these reactions:

- Risk acceptance (active, passive) involves an amount of risk acceptance for the project. We acknowledge that there will be

consequences due to a shortage of time and money.

- Transfer of risk- involving the transfer of risk to another organisation displaying the capacity to reduce risk. A direct transfer of the effects of a loss to another entity is one type of transfer. The primary way that such activity takes place is insurance, which enables the transfer of occurring effects in a legal manner. To commission a "uncertain" assignment to the contractor or transportation services to the shipping firm is an example of risk transfer.
- Reduction, risk mitigation - are acts that lessen the likelihood of an occurrence and mitigate the effects of risk. Examples include building resource inventories or balancing one risk with another to lower overall risk. At every level of the project, beginning with the planning phase and organisation activities, the notion of risk minimization may be introduced.
- Avoiding risk - involves either preventing danger from happening or removing risk from the entire research process. In this instance, we don't take on any danger that is greater than what we consider to be acceptable.

3. Risk management and control

3.1. Management process

The management process can be carried out in four different ways, according to study by Brown and Chong. However, a lot of study and situations went into determining the best method to respond to danger. As a result, the responses shown below may only be used to show how in a certain case, investors, contractors, and interested parties can move forward with their decisions on rising risks because the management techniques outlined and described below are only applicable in certain situations:

1. Avoiding risk - It is an effort to switch the project's present partner in an effort to reduce the projected risk. Avoidance can also take the form of giving up on investments in processes that are in danger.
2. Risk mitigation - reduction of risk by reducing exposure to it or just by lowering the expected damages
3. Dispersion of risk - essentially, the development of a setting for the investment in which the possible risk can disperse, minimising the adverse impacts. The formation of a group of companies to carry out the project is one example of such action.
4. Absorbing risk - that is, taking steps to improve one's position so that

one can absorb the shock brought on by the occurrence of particular events, hazards, etc. This can be accomplished by adding employees, moving the project, adjusting the time frame for important actions, or setting aside additional funds.

Basically, there are six phases to the management process.

Table 1. Phases of risk management process

Process phases	Proposed actions
Risk identification and early warning system	- determining the causes of risk; - determining possible consequences; - identifying entities affected by risks.
Risk analysis	- estimating the possibility of an event; - figuring out the effects of the incident.
Formulating variants	- discovering potential alternatives; - evaluating the costs and expenses of various alternatives
Risk assessment	-announcing readiness and assessing the entity's capacity to decisions; -determining the actual level of risk; - defining the usage of potential substitutes for risk management
Risk-related decisions and actions (risk management)	- choosing tools; - setting priorities; - using optimal combination.
Control, observation, and assessment of the actions undertaken	- verifying and assessing the effects of the action after the fact. - the creation of a new risk management process in the event of a poor choice; - usage of additional technologies that guaranteed success in risk management.

3.2. Risk management cycle

The main goal of thoughtful and deliberate risk management is to maximise positive outcomes and reduce negative ones, increasing the likelihood that a project will succeed. If we have established a suitable project management cycle, then we may take effective activities. A properly implemented scheme not only aids in making contentious and difficult decisions, but also gives investors crucial information on what course of action to take and in accordance with which plan to obtain the best outcomes with the least amount of "negative" risk. An illustration of a risk management cycle with four key stages is provided below:

Fig 2: Risk management frame work

3.3. Methods and tools in risk management

Without the aid of widely used marketable approaches, the management process would not be conceivable. The most important step in risk management is selecting the right approach. Be aware, however, that in order to succeed, we will frequently be compelled to employ a few of them to support our steadfast belief that our hypothesis is true and supported. The most typical techniques include:

- Brain storming
- Delphi method
- Ichikawa method
- SWOT analysis
- Modelling and computer simulations
- Sensitivity method
- Risk matrix.

It should be noted that there are a number of mathematical strategies that concentrate on calculating the magnitude of risk likelihood in order to

completely understand the issue of tools and techniques in risk management. They principally allow for formalising partial knowledge and for risk analysis related to the incapacity to predict the future. However, these are the primary techniques:

- PERT method
- Fuzzy sets
- Artificial neural networks
- Probabilistic methods and probability theory
- Decision trees

Conclusion

Numerous investigations, both scientific and solely based on common life, have demonstrated that risk is a measurable thing and can thus be predicted. With the help of newer, better programmes and systems that determine the scope and size of risk occurrence, modern science gives us a wide range of instruments and techniques for identifying and measuring risk. Our understanding of this topic has also evolved over the past few years. Investors and construction businesses began to value the tools for efficient investment planning in the form of schedules or computer analysis. It was understood that a properly implemented project plan and risk identified at the beginning may subsequently result in the project's success. Such actions have become required, at the very least, in light of the implementation delays for several significant expenditures. In conclusion, managing risk in a project involves more than just listing all the advantages and disadvantages or labelling every incident that is upsetting or exhilarating as a "negative risk." The management process is complicated, protracted, and wide-ranging; it starts well before the investment and occasionally continues even after it is finished. To manage risk properly, one must accurately identify it and ascertain all associated opportunities and risks, rather than trying to completely avoid it.

References

1. Bizon-Górecka J., Zastosowanie innowacyjne na przykładzie branży budowlanej, materiały konferencyjne Technologia i zarządzanie w budownictwie, Wrocław 2006, s. 175–182, Prace Naukowe Instytutu Budownictwa Politechniki Wrocławskiej nr 87
2. Chong Y.Y., Brown E.M., Zarządzanie ryzykiem projektu, Oficyna Ekonomiczna, Kraków 2001
3. Dokumenty formalne, przygotowane na potrzeby realizacji Kontrakt nr

5/FS2 - Aglomeracja Kórnik: Rozbudowa i modernizacja oczyszczalni ścieków w Borówcu, autorstwa "ECM GROUP POLSKA" SP. Z O.O., 2010
4. Połoński M., Pruszyński K.: Problematyka ryzyka w projektowaniu realizacji budowlanych (cz.1), Przegląd budowlany, 2006
5. Radkowski S.: Podstawy bezpiecznej techniki, Wyd. PW, Warszawa 2003
6. Skorupka D.: Zarządzanie ryzykiem w przedsięwzięciach budowlanych, Zeszyty Naukowe WSWOL, ISSN 1731-8157, 2008
7. Wróblewski P.: Zarządzanie projektami informatycznymi dla praktyków, Wydawnictwo Helion. Zarządzanie Ryzykiem w przedsięwzięciu, Narzędzia i techniki wspomagające ZPRP, Krajowy System Zarządzania BPI, Wydanie 1, 2007
8. Kapliński O.: Risk Management of Construction Works by Means of the Utility Theory: a Case Study. Procedia Engineering. - 2013, 57, 533- 539.
9. Kapliński O. :The Utility Theory in Maintenance and Repair Strategy. Procedia Engineering. - 2013, 54, 604-614.
10. Kapliński O.: Komentarze do badań własnych: retrospekcja, Archiwum Instytutu Inżynierii Lądowej, 13, 2012, 171-185