

RISK STRUCTURE FOR PLANNING AND DESIGNING OF WASTEWATER TREATMENT PLANTS

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Summary: Wastewater treatment is imperative for development of Republic of Serbia on European integration way. Actual state in this area is not good as it has to be because the biggest cities in Serbia, like the capital city Belgrade and Novi Sad do not have their wastewater treatment plants. Also, existing plants are not in good conditions or do not work at all, so there is a small percent of treated wastewater in Serbia. Main interest of this study is to make a structure of risks for planning and designing of wastewater treatment plants. This structure is very important because it is a base for making of risk assessment model which can be part of prefeasibility and feasibility studies for wastewater treatment plants.

Keywords: risks, design and planning, wastewater treatment plant

1. INTRODUCTION

If there is no water – there is no settlement. If there is settlement, there is wastewater. Wastewater is permanent and certain follower for human settlements. [1] For Serbia there is a big step ahead and that is process of entering in European Union. There is norm for wastewater treatment plants that every settlement with more than 2000 inhabitants has to oblige [2]. That is a very big task for Serbia so this problem will be solved with connecting couple of small settlements to one big wastewater treatment plant.

These facilities are complex projects with a lot of engineers involved in process of planning, designing and construction. Also, these facilities are very expensive because of their complexity, equipment and a lot of people involved in all parts of project.

After doing of literature research which means review of journals, legal acts, books and also collecting of information for existing plants the main conclusion was that there is no unified methodology for identification and quantification of risks for these facilities. There are a lot of methods explaining the treatment processes and quality of effluent but those aspects are not the most important in terms of civil engineering. Because of that this research will present risk structure which incorporates spatial, constructional, economic

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and other risks which are not connected with technological aspects and wastewater treatment technology.

CASE OF RESEARCH

When there is a word about sewer infrastructure of Serbia, this country is in the group of medium developed countries. But in the wastewater treatment infrastructure this country is near the last place [3]. In [3] is mentioned that 55% of population in Serbia have a sewer infrastructure, but less than 10% have some kind of wastewater treatment.

These data are disappointing because of significance of wastewater treatment and also because the consequences resulting from untreated wastewater in land and effluent. Present state is bad with a tendency of deterioration [1].

After analysis of literature it can be concluded that in the last 20 years Republic of Serbia did not achieve planned activities in wastewater treatment field. Of course, there are wastewater treatment plants in Serbia, but a lot of them are not working, some of them are not in good condition and also some of them do not achieve designed capacities.

For resolving of problems during the life expectancy of plants and making plants work with designed capacities, there is need to analyze all possible problems which can be find at the beginning of planning process. For that analysis it is necessary to manage the risks.

2. RISK STRUCTURE

Risk Management is continued process and it has to cover all phases of civil engineering project. Risks analysis and their identification is part of Previous Feasibility Study, but for wastewater treatment plants there is no defined methodology or given instructions. Identification of risks which can be harmful for project, analysis of consequences and reactive measures for them has to be continuous during the all life expectancy [4]. The biggest responsibility for risk identification, analysis and risk answers is on investor and his team who manage the project.

While working on big and complex projects there is dynamic environment which frequently changes. So, there are no surprises with changing of risk factors during project life cycle [5]. Typical profile for project life cycle is shown in the Figure 1 [5].

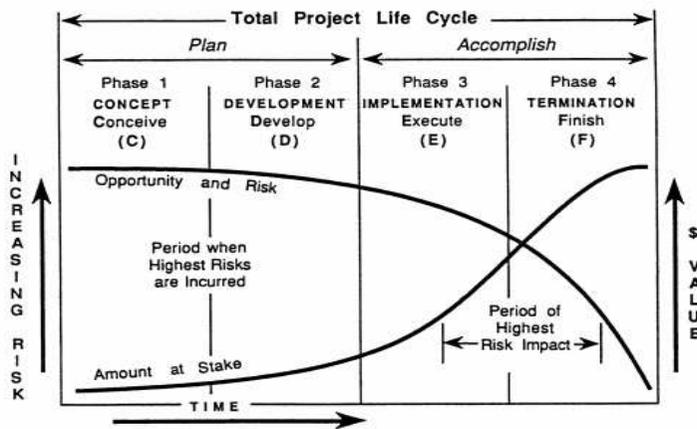


Figure 1. Typical profile of Project Life Cycle

There is importance of risk identification during the first phase of project (choosing the investor, finance issues, location conditions, agreement with public utility Companies, environmental organizations, etc.) and also in designing phase. That is the main objective of this work - to identify and investigate risks and make structure of risks which are part of planning and designing of wastewater treatment plants.

This risk structure will be very important for Serbia because detail analysis and predictions can reduce costs and make projects cheaper and easier for construction.

Process of risk identification starts with making of concept for risk management plan, and after that risk identification is made. Risk management plan is list of rules or steps for risk management within the project. Because of that the potential risk factors are investigated. Risk can have positive or negative issue. Negative issue is defined as risk, and positive is defined as opportunity. Something which is defined as risky is not always bad, likely uncertain [6]. When there is finished list of risks they are analyzed qualitatively and the risk register is made. After that every risk is explained and classified in categories. The next step is analysis of risks probability and impact on project.

First part of this research is making of chronological classification of risks in first and second phase of project, planning and designing phase respectively. According to [7] risks can be divided in two categories. First, risks in conception phase and second, risks in designing phase. This risk structure is shown in Figures 2, 3 and 4[8].

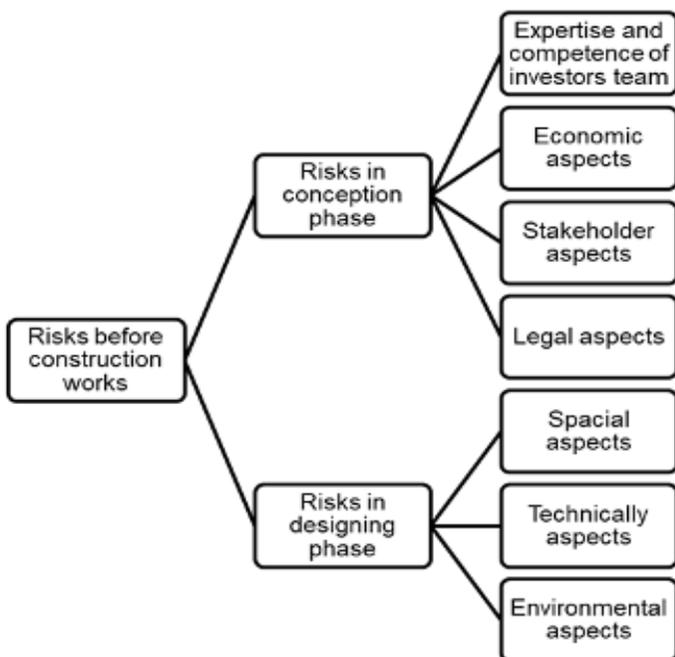


Figure 2. Risk structure in planning and designing phase

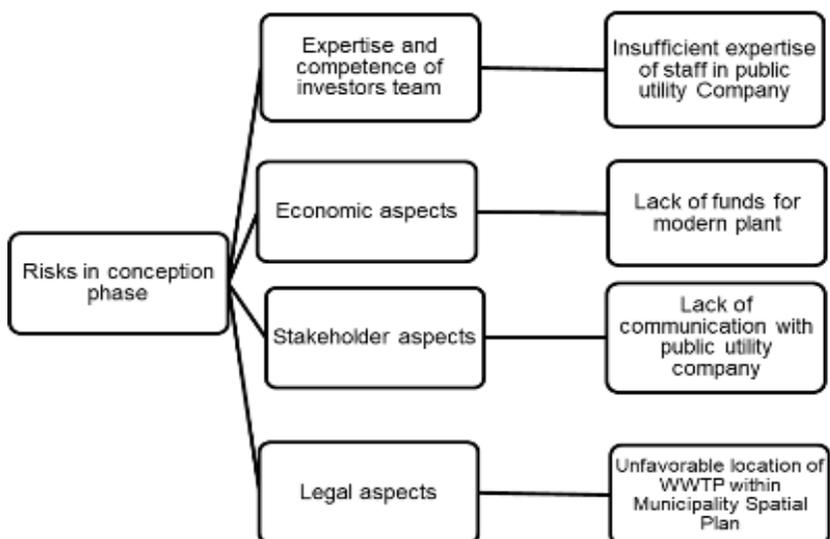


Figure 3. Risk structure in conception phase

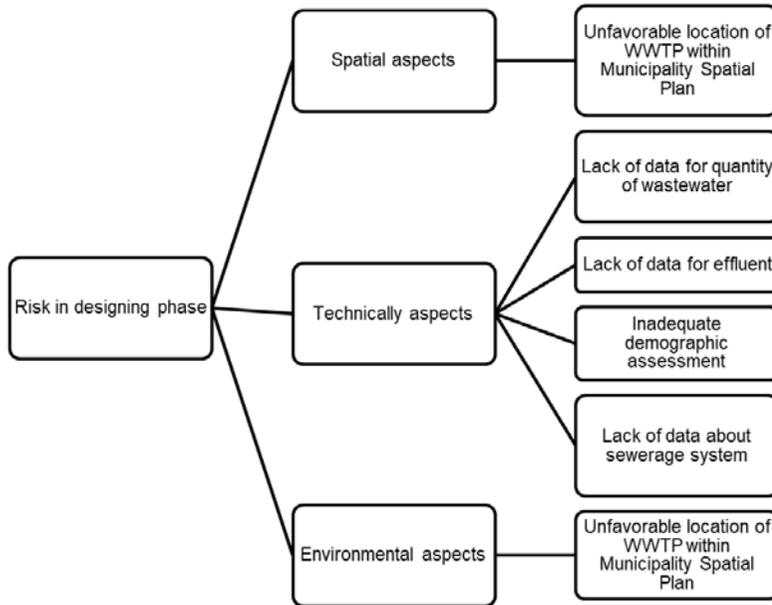


Figure 4. Risk structure in designing phase

For decisions which are made in wastewater treatment process without consideration of socio-economic and environmental parameters there will be consequences during the time [9].

3. RISK DEFINING

In further text all types of risks from Figures 3 and 4 will be explained:

Unfavorable location of WWTP³ within Municipality Spatial Plan: During the making of Spatial Plans, if there is insufficient information about wastewater quantity and size of facilities on site, calculated space can be inadequate. Sometimes, there is a problem because of technology issues and there is need for bigger site. When there is more settlements connected on plant dimensions of objects growth. There is also one big problem when there is no enough wastewater on plant site.

Lack of data for quantity of wastewater: Many public utility companies do not have installed flow meters for continuous measurement of wastewater quantity. Because of that estimation of wastewater quantity are usually partly accurate or approximate.

Lack of data for effluent: If there is no enough data about effluent state and quantities, choosing of treatment technology is difficult.

³ Wastewater treatment plant

Lack of communication with Public Utility Company: Besides the decision about integrated pollutant act, the Majority of Municipalities does not deliver their reports about pollutants.

Lack of funds for modern plant: WWTP are multimillionaires investments. This trend is hard to follow for Serbia. Because of that designers have to choose cheaper equipment or simpler wastewater treatment technology. This can result with inadequate quality of treated water. Sometimes, people who are responsible of making studies do not have enough knowledge about wastewater treatment facts so they do not justify resources.

Inadequate demographic assessment: If there is mistake with estimation of population and industry growth WWTP will be oversized or small.

Lack of data about sewerage system: With wrong estimation of sewerage system growth or not knowing type of sewerage there will be a lot of designing problems.

Identification and defining of risks for planning and designing WWTP is very important. Because these objects are so expensive and there is a lot people working on every phase of project. So, before construction phase there is need for risk identification and analysis and evaluation.

4. CONCLUSION

In this research is presented risk structure which incorporates spatial, constructional, economic and other risks which are not connected with technological aspects and technology of wastewater treatment. These risks are separated in two categories: risks in conception and designing phase. Risk structure which is explained in this work will be main part of further research and also base for making of risk assessment model. This model can be part of Prefeasibility and Feasibility studies. The main importance of presented model is better understanding of risk factors which can lead to reduction of financial costs and economical mistakes.

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СТРУКТУРА РИЗИКА ЗА ПРОЦЕСЕ ПЛАНИРАЊА И ПРОЈЕКТОВАЊА ПОСТРОЈЕЊА ЗА ПРЕЧИШЋАВАЊЕ ОТПАДНИХ ВОДА

Резиме: Пречишћавање отпадних вода је императив на путу Србије ка европским интеграцијама. Тренутно стање у овој области није добро као што би требало бити, јер иако постоје постројења, велики градови попут Београда, и Новог Сада немају постројења за пречишћавање отпадних вода. Такође, постојећа постројења нису у добрим условима или не раде, тако да се у Србији пречишћава мали проценат отпадних вода. Главни задатак овог рада је формирање структуре ризика за процесе планирања и пројектовања постројења за пречишћавање отпадних вода. Ова структура је јако битна зато што ће се користити за формирање модела процјене ризика који може бити саставни дио Претходних студија и Студија оправданости рађених за постројења за пречишћавање отпадних вода.

Кључне речи: ризици, планирање и пројектовање, постројење за пречишћавање отпадних вода