Risk identification and risk response of tourism real estate development projects—— Nanxun ancient town

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Abstract. In the 1980s, an ancient town took the lead in developing tourism, which led to a boom in the growth of tourism in ancient towns in China. Due to the in-depth development of ecological tourism in China and the promotion of social media, more customers recognize the attraction of the ancient town. Applying and updating project information and finding major risk factors can impact the Chinese ancient town projects. The main aim of this research is to utilize risk identification and risk response to manage major risks. In this research, the FMEA method was considered and then all information was inputted into the formula, finally, the RPN with eight risks of information was ready for risk identification and response. It creates a risk identification with three major risks and reduces the probability, which positively affects risk response at the right time. Discussing the major risks of the project and improving the ability of risk identification with some risk responses.

Keywords: risk identification; risk response; tourism projects; excessive commercialization; FMEA.

1. Introduction

Chinese ancient towns as a sort of ecological tourism, are the tourism outcome of the combination of the new situation of rapid development of tourism and the new requirements of small town construction [1]. In China, there are 220 ancient towns with a history of more than 100 years, however, not every ancient town applies risk identification to manage its tourism projects [2]. Ancient town projects have brought significant economic, social and cultural benefits to the ancient town, forming a unique development model for the ancient town [3, 4]. Tourism projects still face a problem with risk management in different phases of a project. The research value is to improve the risk identification of ancient towns and enhance the need for risk identification to improve its efficiency. This paper will also define eight broad risks of Xidi ancient town and identify threats with some solutions. The research method is FMEA to examine the level of RPN of eight risks.

2. Literature review

2.1 Risk factors

Risks are a vital component impacting whether the principal objectives of projects can be successful, and objectives referring work period, cost, work performance, quality, and safety [5, 6]. Risks and uncertainty may bring more challenges to work performance in ancient town projects [2]. Risks provide probability and impact level about unpredictable events or accidents causing negative consequences on expected outcomes [7]. According to the Project Management Institute, project risks can be determined as uncertain events or incidents that, if it happens, will bring consequences to the principal objectives such as project scope, budget, time, quality, and performance [8]. Thus, effective risk management is greatly successfully correlated with project outcomes.

To accomplish ancient town project objectives concerning the work period, budget, quality, safety, and tourism sustainability [8]. Risk factors have been defined in table 1. The risk factors affect on normal project perforce of ancient town projects which can be distinguished into five types: equipment and labour risk, design risk, financial risk, material risk, and management risk [6].

Table 1. The category of risk factors

Number	Name	Definition
1	Labour risk [6]	Different departments of employee are responsible for assigned work that need to complete on time in ancient town projects. A project success mainly relays on cooperation among tourists, designers, supervision consultants, contractors, sub-contractors, and material suppliers as they are significant parts of projects [9].
2	Design Risk [6]	Deficient, inadequate, and changing designs lead to time overruns in ancient town projects. Dilatory response time and unfinished project design drafts cause a delay in projects [10].
3	Financial Risk [6]	The project may have an inadequate budget and lose some key stakeholders when their expectations are unmet.
4	Material Risk [6]	Delay and shortage lead to material risks that will affect project performance and final success [11] There are several reasons for the occurrence of material risks, such as building material accessibility or source, varying demand, poor quality detection, labour efficiency, and inadequate planning [12].
5	Administrative or Management Risk [6]	A shortage of human resources and executive skills largely affects construction delays in ancient town projects as it negatively influences the project [12]
6	Inflation risk [11]	When inflation increase, the cost of construction or labour cost also increases, which will impact procurement and project cost.
7	Supply-demand risk [11]	The market is constantly changing, and changes in supply and demand will inevitably cause price fluctuations, resulting in the actual return of investment not reaching the expected return [11]
8	Environmental risk [6]	During the construction process, the environment will be seriously polluted and damaged, and the ecology of the scenic area will be destroyed, which may lead to the risk of increased project costs and even shutdown [11].

2.2 Risk identification

Risk identification is identified as the identification of uncertainties [13]. Most tourism projects utilize risk identification in the initial phase, the tourism project may have some technical problems with communication issues affecting effectiveness and work performance. Risk identification conducts in all periods of the project using updating information through different departments[14]. Risks are easily recognized in the initial phase of a project, taking into consideration changed factors in external conditions. Risk identification as part of project management helps to analyze the effect of the influencing aspects on the project [15]. Assessing the different risk factors is essential for every project manager to identify some changed risks. Some risks are unpredicted in nature which may be difficult to manage [16]. Identification involves the level of probability, impact level, occurrence, stakeholder involvement, risk sources, and reason [17]. When project managers begin to define risks, they have to examine all risk factors from team performance, the availability of resources, the involvement of other stakeholders, and contractual relations [15]. The risk of activities with corrected identification can provide realistic information for an effective reaction [17]. Risk identification can make a specific decision to avoid adverse effects on different phases of a project [18]. When identifying, it is vitally significant that find reliable information sources used, selected suitable persons involved in the identification, and required additional information [19, 21]. Successful risk identification can form conductive risk awareness about hidden risks [22].

2.3 Failure Mode and Effects Analysis

Failure Mode and Effects Analysis (FMEA) is a preventive risk tool and involves several parts, such as occurrence, severity, defection, and RPN [19]. FMEA formula equals multiplying severity, the likelihood of occurrence, and detection. FMEA can sort out the troubles, potential negative effects and failures that may be encountered during the cycle of a project [23]. The application of FMEA aims to reduce costs, reduce changes, and avoid the loss of personnel and capital [19]. FMEA can comprehensively identify potential risks to analyze the causes of risks and propose preventive measures for risks. FMEA reduces the probability of risk by improving the safety and reliability of a project [23]. FMEA is applied to all phases of a project, meanwhile, it can provide effective measures for redeveloped projects in advance [24].

Accordingly, FMEA is an effective way to control risk during the operation of tourism projects [23]. FMEA can promote the flow of personnel in various positions, meanwhile, it improves the ability of departmental cooperation [19]. FMEA helps to detect the negative impact of the project at an early stage and continuously improves its competitiveness [24]. FMEA can provide reference information for problems that may be encountered in similar projects in the future. FMEA is a dynamic maintenance measure that plays an important role in project management [25, 26]. Project risk management tends to utilise the FMEA method due to its accessibility, familiar calculation format, and comprehensive structure [27]. The study utilizes the FMEA method with risk identification to analyze eight major (broad) risks to calculate and evaluate project risks.

2.4 Research gap

According to the above literature review, existing research argued for risk management in tourism projects, however, there is still a lack of research on qualitative methods with FMEA in tourism projects to evaluate risk from a risk management perspective in the ecology tourism industry in China. therefore, this paper sets Nanxun ancient town as a research subject and discusses its major risks. This paper will research risk identification and risk response to the problem of Nanxun ancient town.

3. Methodology

In this paper, the author will apply FMEA to analyse the risk of the Nanxun ancient project. FMEA is a planning tool for predicting failures and avoiding their occurrence or recurrence. It can help us identify potential process failures and estimate the relative risk of failure occurring. FMEA can help us identify potential process failures, estimate the relative risk of failures, evaluate current control plans, and identify priority process areas for improvement. Meanwhile, FMEA can evaluate the current control plan and identify prioritized process areas for improvement. The final risk priority number (RPN) is obtained by multiplying these values (Equation 2).

RPN = Occurrence * Severity * Detection

In the RPN formula, the severity normally represents by the capital letter S and means the danger level of failure affecting the project or customers. The occurrence generally stands for the frequency of risk and writes in the capital letter O. The detection means the degree of detecting the cause of the problem, and represents by the capital letter D. To indicate the hazard of risk events, a score table has been developed, which occurrence, severity and detection can be evaluated effectively by 10 grades and corresponding 1 to 10 scores.

The FMEA interview form has several steps for seven interviewees. Step one is for the group to confirm the definition of eight major risks. Step two is for the group to indicate the influence of the risk occurring. The negative consequence may be severe work delay, an increase in budgets, and low work performance. Step three needs to identify the event for each process, some risks may happen once or several times in the project lifecycle. Step four requires interviewees to fill in all key values of SEV, OCC and DET. Step five is for multiplying all values to find all RPN. Finally, step six needs to figure out if some RPN is bigger than 120 and highlight the column.

4. Results

4.1 Data analysis

The paper combines an interview with the FMEA method at the two departments of Nanxun tourism management and the operational office. There are seven valid forms with one invalid form from eight interviewees. This interview is only aimed at project managers and project assistant managers who worked on Nanxun ancient project before. Five project managers with two project assistant managers are interviewed. The invalid form was not filled in because the interviewee said: “I lack professional knowledge of risk management or management skills”. In the interview form, the proportion of high risk with low risk is 3:8, and the questions take 15 minutes to 20 minutes to fill in.

4.2 FMEA process

As part of this research, a total of 7 interviewees were conducted through the FMEA process., There are generally 5 steps in FMEA implementation to define what is the object to be analyzed, see Diagram 1.

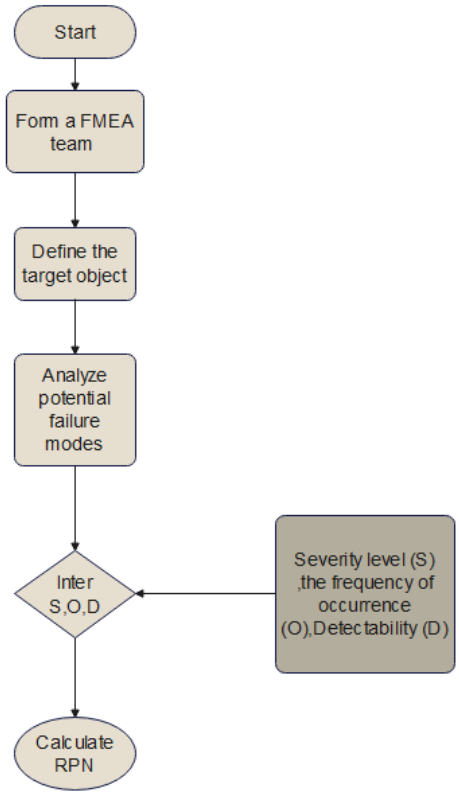

Figure 1. FMEA process

Step 1 is to from a FMEA team to interview eight risks. Every FMEA team member may have a different understanding of the probability and severity. FMEA team must comprehend or participate in Nanxun ancient town project. Step 2 is to define the target object which is to define the influence order of eight risks. FMEA team needs to arrange the order of each risk, which request some professional knowledge. The order of risk means the most important taking precedence over other risks. Step 2 identified financial risk (risk 3) as the most important risk listing on the top. Step 3 is to analyze potential failure modes and aims to analyze when the failure will happen during the project lifecycle. Step 3 examined some risks that may happen several times during the project lifecycle. Step 4 is to inter the severity level (S), the frequency of occurrence (O), and detectability (D). This is the most time-consuming step that the FMEA team needs to compare the S, O, and D of each risk. Then

FMEA team needs to input the correct value in each column. Step 5 is to calculate RPN by multiplying the severity level × the frequency of occurrence × detectability.

4.3 Comparison of total RPN

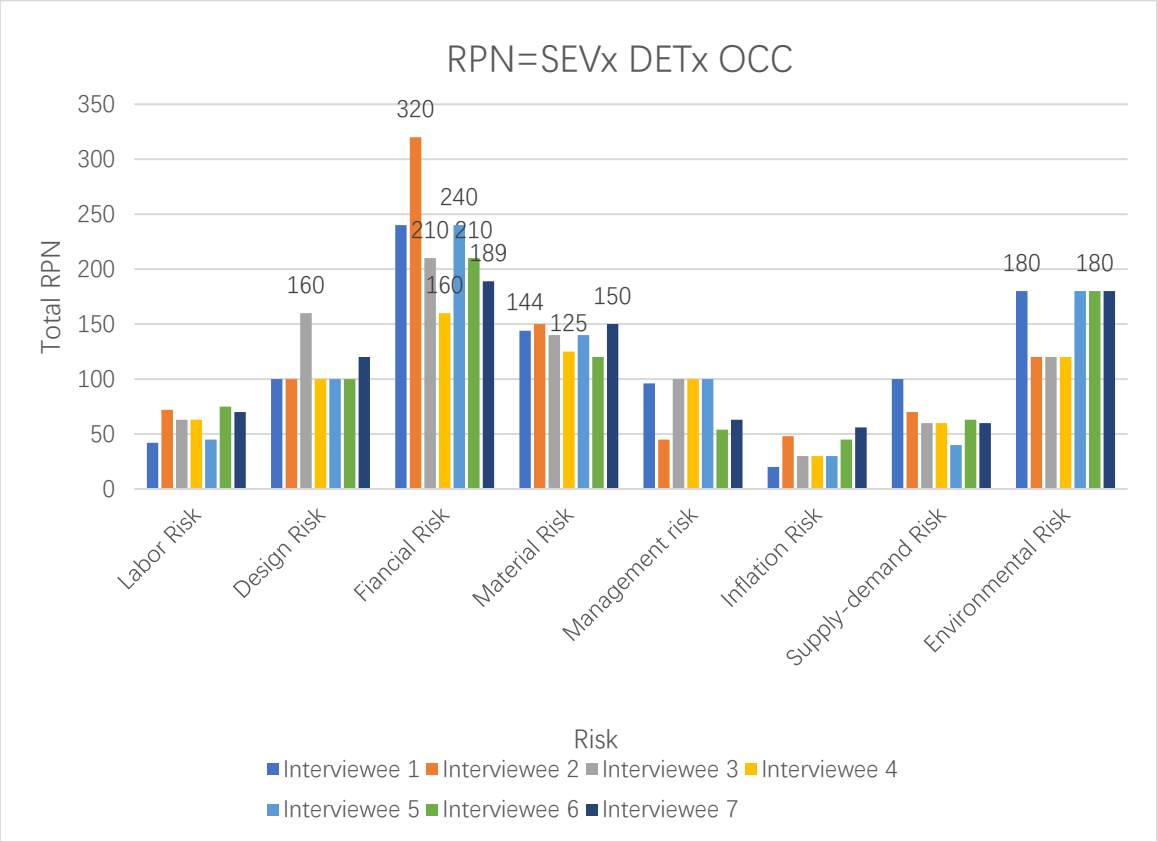

Figure 2. FMEA result of eight risks

Figure 2 provides a visualization of eight different risks examined by seven project managers who from the Nanxun ancient town tourism management department. Some risks have a higher score, which is above the total RPN of 120. Financial, material, and environmental risks are above the RPN of 120. In FMEA, a risk above RPN of 120 means a medium or high risk. However, total RPN cannot redefine whether is a medium risk or high risk. Therefore, the average RPN will evaluate each risk. Design risk only has one time above RPN of 120, this means it rarely happens. Those risks will into step 4 to compare each RPN.

4.4 Average RPN of each risk

Table 1. Average RPN result of each risk

	High Risk (Average RPN≥120)	Medium Risk (90<Average RPN <120)	Low Risk (Average RPN<90)
Labour Risk			61.4
Design Risk		111.4	
Financial Risk	224.1		
Material Risk	138.4		
Management risk			79.7
Inflation Risk			37.0
Supply-demand risk			64.7
Environmental Risk	154.3		

According to the RPN table 2 result, there are four RPN above 120, which are financial risk, material risk, and environmental risk. They are referred to high risk with serious negative effects on achieving project objectives. This means that financial risk may bring seriously effects on the Nanxun ancient town project. The material risk may lead to work delays in Nanxun ancient town project constantly, however, it does not cause a project shutdown. The environmental risk may increase project costs to solve the environmental problem which may lead to project failure or rectification. There is only a medium risk, which is design risk. At Nanxun ancient town project, it has a fragile ecological environment, especially in the river circulation system and the protection of ancient buildings. Therefore, project designers need to be very careful to draw a sustainable draft, and any mistake may lead to huge damage to the local environment. Accordingly, table 1 shows four low risks with negative impacts on the project itself, which are labour risk, management risk, inflation risk, and supply-demand risk.

5. Conclusion

FMEA is a sophisticated risk tool that is uncomplicated and insightful. FMEA analyses eight major risks with different RPN in Nanxun ancient town project. The research compared eight major risks and identify low risks, medium risks, and high risks. The research has also shown that three major risks with high RPN mainly impact the success of the project. The major limitation of this study is the number of interviewees in the specific department in Nanxun ancient town. The innovation of research is to combine FMEA with risk response and risk identification. The value of the research is to examine eight major risks in Nanxun ancient town project by applying the FMEA method. The paper proposed some risk response strategies in three areas to avoid work performance, increase cost, and work delay.

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