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On-line multi-criterion risk assessment model for construction joint ventures in China

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Abstract

Constructors are facing, constantly, complicated problems occasioned by culture, frequent policy changes, and other related factors when conducting Joint Ventures (JVs) in Mainland China. Hoping to decrease the risk of JVs in China for international constructors, this study applies Analytical Hierarchy Process (AHP) and Utility Theory to develop a multi-criterion risk assessment model for construction pre-JVs stage and to integrate World Wide Web (WWW) and company Databases. This model demonstrates the advantage of inspiring the evaluators to make more objective and systematic assessment; and more important, its on-line assessment function can demolish regional, spatial and time barriers, which will help the decision-making team use computers to participate in long-distance evaluations of users' ends at any time and any place. Moreover, each member of the team can fully participate in the process which lifts efficiency and improves decision-making assessments.

Keywords: Joint ventures; Analytical hierarchy process; Utility theory; Decision-making; World Wide Web

1. Introduction

The Chinese construction market is viewed as the most appealing one among the global construction markets for the coming 5 years [1]. It has been both a potential and incentive target for internationalized constructors and therefore contractors have rushed into this market. In China, foreign construction companies tendering for projects must have at least one suitable local partner and are required to obtain alliances on a project-by-project basis [2]. JVs, for most countries, have become one important means for attracting foreign investment [3]; but if foreign investors have to face on unfamiliar construction environment, there may be high risk involved when conducting JVs [4].

Former studies of the risks of Chinese JVs include cooperative strategies, the formation of IJVs, the dynamics of partner relationships, the role of information in JVs, and the evaluation of JV performance [5]. They mainly focus on discovering the important risk factors during the JV process and emphasize risk management at the construction stage; however, they lack any assessment model for the pre-JV stage. Therefore, in view of the great impact of risk evaluation beforehand to the later risk management, this study applies the traditional AHP and Utility Theory to develop a set of multi-criterion risk assessment models to manage both the visible and invisible unquantifiable multiple criteria affecting JVs, and also integrate organization Database and World Wide Web (WWW)

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functions, which supports the company decision-makers in conducting long-distance evaluations at various sites, which can upgrade the effect and efficiency of the decision-making process for internationalized constructors.

Utility Theory is able to handle multiple criteria, but the calculation of Expected Utility Value (EUV) becomes complex when the evaluation model is applied for various projects; therefore, this study uses IT together with WWW to improve the facilities of the traditional assessment model, and further to integrate promptly opinions from decision-makers at different locations, which can benefit the constructors in gaining predominance in the market and minimize the risk of construction JVs.

2. Model overview

The Model development and Model application as shown in Fig. 1 are categorized into 7 steps:

Step 1: Sort the influential Chinese JVs crucial risk factors out of the previous related literature.
Step 2: Sum up the suitable criteria and establish a systematic hierarchy as the source of questionnaire survey (questionnaire as Appendix B).
Step 3: Use AHP to get the weighting (w_i) of each criterion as the parameter for developing assessment model.
Step 4: Define the content and quantifiable risk range of each criterion and apply Utility Theory for building the utility function, then use Utility function to convert the quantified risk function into numerical relative ratings (u_{ri}).
Step 5: Apply AHP to get the rating (w_i) and use utility to gain the relative ratings (u_{ri}) so as to compute the Expected Utility Value (EUV) of each scenario; therefore EUV = S(w_i) * (u_{ri}).
Step 6: Employ EUV to deduce how cost impacts on the function of risk and take it as the source of quantitative comparisons among all scenarios
Step 7: Combine the functions of traditional evaluation model with company's database and World Wide Web (WWW).

This proposed model integrates the techniques of database and internet to set up an on-line decision-making assessment model, which helps decision-making members be able to participate in the evaluation process in spite of the limitations of domain, time and space.

3. Initial evaluation dimensions

The related literature regarding Chinese construction JVs and especially risk factors are as follows:

1. According to Bing [6], the risk factors are grouped into three main groups: (1) internal, (2) Project-specific, (3) External; and then final conclusion goes for 25 international JVs project risk factors.
2. Shen et al. [7], in his study of Chinese construction JVs risk factors, there are six dimensions of approved JVs risk factors including: technical risks, management risks, market risks, financial risks, and political risks; and to sum up there are 58 risk factors.
3. Gale, Luo [8] divided JVs life circle into three stage: (1) formation stage, (2) operation stage, and (3) termination or continuity.

The main purpose of the proposed assessment model is to offer an evaluation set for Chinese construction JVs for foreigner constructors at JV formation stage; as a result, consideration should cover all aspects including: Internal, project-specific and External. Therefore, the risk factors are grouped

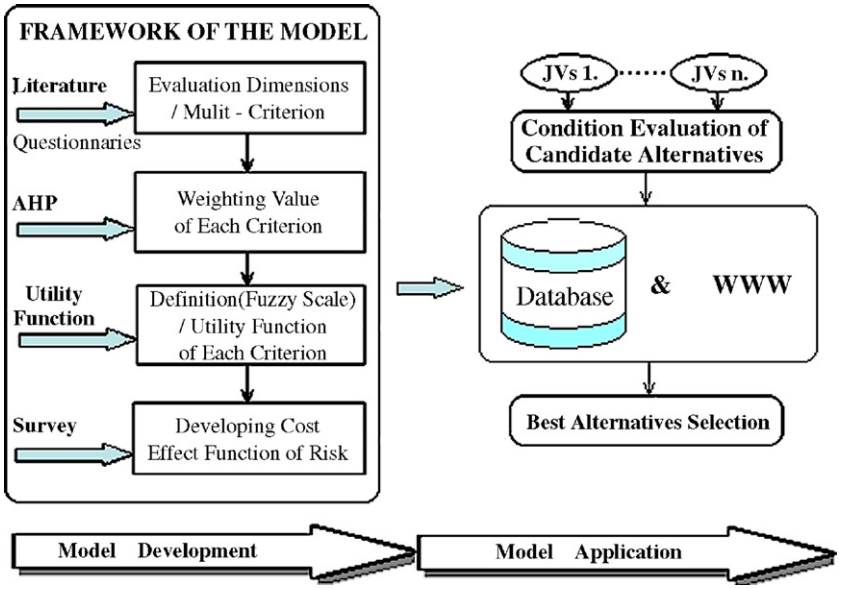

Fig. 1. The process development of proposed model.