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Risk Assessment in Project Supply Chains in Maldives Hospitality Sector

Introduction

The article evaluates the enabling factors of risks in the project management supply chain process within the Maldives hospitality sector within identification of needs in procurement process. The tourist arrivals in the Maldives have been increased rapidly. This trend is found as 64% from 2017 to 2021. The identified trend encourages investments in the hospitality sector in Maldives. Therefore, more accommodations are built to cater upcoming trend of tourist arrivals in Maldives. Statistics show 1.4 million tourist arrivals to Maldives in 2018, setting a new record. The Minister of Tourism, Ali Waheed, reported that the number of tourists who visited Maldives in 2018 was 1,484,276, which is 6.8% (or 94,734 tourists) which is higher than in 2017[1]. Tourism contributes 60% of foreign exchange receipts, making it a crucial part of the Maldives' economy [2].

According to the extensive search at Scopus, only two studies focused on Maldives sector under project supply chain management in Maldives sector. Yamin & Sim, (2016) have conducted their study on critical success factors for international development projects in Maldives. Adil et al have focused on selecting suitable e-procurement decision models for the Maldivian public sector. These studies have not focused on the project sup-

ply chain management in the hospitality industry in Maldives. Further, it is really critical to understand each flow inside the supply chains [5].

Identifying the risks to avoid delays in project supply chains is really critical for the development of the industry [6]. Therefore, the main aim of the research is to pinpoint potential risks that can occur within the supply chains of hotel projects in the Maldives while identifying the requirements of suppliers. First, we introduce the fuzzy inference system that is used in the analysis of the study. The identified risk factors are revealed through expert interviews and are introduced in the analysis. The findings of the study are presented as an evaluation and assessment.

Methodology

Five steps can be identified in fuzzy logic; 1. fuzzification of inputs, 2. apply fuzzy operator, 3. apply implication method, 4. aggregate all outputs, 5. defuzzification. In the first step, it is needed to recognize inputs and those are fuzzified. Identifying the most relevant membership function is important to proceed with the process of fuzzy logic. The tool that is used to apply in the process should be identified at the beginning of the process. Matlab has been employed as the tool to develop the fuzzy logic model.

In the second step, applying the fuzzy operator to perform logic operations is the core of the entire fuzzy logic process. Fuzzy operators are used to determine the degree of membership of an element in a particular set. This degree of membership reflects the degree of similarity between the element and the set. One commonly used fuzzy operator is the min-max operator, which computes the minimum or maximum value between two fuzzy sets.

Overall, fuzzy logic provides an elegant and flexible way to model systems that are subject to imprecise data or varying conditions. With the ability to handle uncertainty and imprecision, fuzzy logic has been increasingly applied in many areas that require decision-making in the presence of incomplete or vague information. By following the five steps outlined above, one can successfully develop a basic fuzzy logic model that can be refined further for more complex decision-making.

Results

Data collection based on two phases; 1. Initial interviews with project supply chain management experts in Maldives sector, 2. Survey on identifying the consequence of factors that influence project management supply chains Maldives sector. The analysis based on the collected data.

The first phase of the data collection conducted using direct interviews with the stakeholders in Project Supply Chain Management in Maldives sector. According to the insights that were collected from the group of experts, six factors were listed in Table 1. The participants of the survey are asked to evaluate each factor on a linear scale.

Table 1: Considered factors for the survey (based on the expert interviews)

Factor ID	Factor - Identification of the need
F1.1	CSRF / BOQs must be completed with full spec
F1.2	Lack of interest of consultants in the procurement process
F1.3	Nonstandard specifications
F1.4	Incomplete drawings
F1.5	No specific delivery timeline for materials
F1.6	Poor communication with the wrong attitude

A rule-based system proposed that is developed using fuzzy-logic techniques. Table 3 explains the fuzzy rules that are developed in the first stage of the fuzzy model. The weight each considered as equally distributed. In this stage, 18 rules have been developed.

Table 2: Fuzzy rules

Factor	Weight on factor	Weight on rule	Consequences from factor (if)	Consequences into overall category (then)
F1.1	17.670%	5.890%	Low	Low
		5.890%	Moderate	Moderate
		5.890%	High	High
F1.2	15.795%	5.265%	Low	Low
		5.265%	Moderate	Moderate
		5.265%	High	High
F1.3	16.683%	5.561%	Low	Low
		5.561%	Moderate	Moderate
		5.561%	High	High
F1.4	16.782%	5.594%	Low	Low
		5.594%	Moderate	Moderate
		5.594%	High	High
F1.5	16.288%	5.429%	Low	Low
		5.429%	Moderate	Moderate
		5.429%	High	High
F1.6	16.782%	5.594%	Low	Low
		5.594%	Moderate	Moderate
		5.594%	High	High

Discussion

Table 3: Identified consequence through factors, (based on the analysis on the interview)

Factor		Consequence
F1.1	CSRF / BOQ's must be completed with full spec	4.475
F1.4	Incomplete drawings	4.25
F1.6	Poor communication with the wrong attitude	4.25
F1.3	Nonstandard specifications	4.225
F1.5	No specific delivery timeline for materials	4.125
F1.2	Lack of interest of consultants in the procurement process	4

In the analysis of the study, how each identified factor influences the overall consequences of occurrences are evaluated.

The research findings indicate that delays in project completion can be attributed to incomplete BOQs and CSRFs. Participants reported that they often have to redo work when specifications are not provided in these documents. In addition, unfinished drawings that are subject to change also contribute to delays. Experts suggested that the frequent visits from clients who do not have a comprehensive understanding of the final product lead to changes in drawings. As a result, consultants must revise plans and make changes to the drawings, causing further delays in project completion.

The research revealed that miscommunication is the third most significant contributor to project failure, leading to delays and incorrect results. Obtaining quotes during the procurement process is time-consuming when dealing with non-standard specifications. These specifications are also responsible for delaying the project completion. The exact timeline for product delivery is crucial, as early delivery leads to increased storage costs, a problem given the limited storage space available at project sites. Therefore, project management prefers timely deliveries to avoid excessive holding costs.

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