



## Developing a Model for Forecasting the Success of Construction Projects Integration Taguchi (DOE) and TAXONOMY

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**ABSTRACT:** The construction industry is the largest industry in the world. It is more of a service than a manufacturing industry. The success of construction projects is a fundamental issue for most governments, users and communities. Multi criteria decision making is an approach that can be used to deal complex problems. In this paper, to treat multi criteria decision making problems in uncertain condition a model based on grey theory-including grey relational analysis and grey numbers is proposed. The scope of research about gray theory and multiple criteria decision making is relatively new field, so in this study we used the integration of Taguchi and Taxonomy with gray theory to forecasting the success of construction projects. Using Taguchi method and gray theory, weight of each criterion was determined. Finally, using Taxonomy and gray theory the success of thirteen construction projects was forecasted. Findings of this study provide clear understanding of construction project and could potentially enhance existing knowledge of construction project success.

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### 1- Introduction

The construction industry is vital for the development of any nation and the physical development of construction projects such as buildings, roads and bridges is the measure of their economic growth [1]. Growth in construction industry in fact is an indicator of the economic conditions of a country. The manufacturing industry exhibit high-quality products, timelines of service delivery, reasonable cost of service and low failure rates, the construction industry, on the other hand, is generally the opposite is widely accepted that a project is successful when it is finished on time, within budget, in accordance with specifications and to stakeholders' satisfaction. Unfortunately, due to many reasons, high project performance and project success are not commonplace in the construction industry, especially in developing countries [2]. Today's with the increasing expansion of construction industry and need for large construction projects, determining effective criteria in the success of these projects is very important. Project success can be defined as meeting goals and objectives as prescribed in the project plan. A successful project means that the project has accomplished its technical performance, maintained its schedule, and remained within budgetary costs [3]. Define the success or failure of a project without specifying the criteria for judging the performance holds no meaning [4]. Generally, preference information on

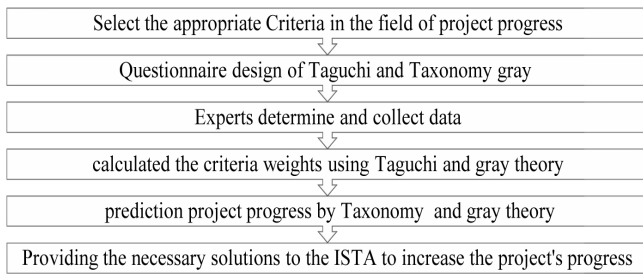
alternatives and on attributes belongs to the DMs' subjective judgments and Decision Makers (DMs) judgments are often uncertain and cannot be estimated by an exact numerical value. In this paper, to treat multi criteria decision making problems in uncertain condition a model based on grey theory-including grey relational analysis and grey numbers is proposed.

Thus, using taxonomy and gray theory, success of construction projects forecasted and solutions have been presented to company executives to increase the success of construction projects.

### 2- Methodology

In this study used one questionnaire to determine the contribution of each effective criterion on project progress and a taxonomy questionnaire was used to predict the progress of projects. In taxonomy questionnaire have been compared 13 project with 17 criteria. Questionnaires given to four experts in the company and after data collection the weight of each criterion identified using integration Taguchi and gray theory. Finally, using the taxonomy and gray theory the progress of 13 projects has been predicted. According to the results of taxonomy, guidelines in the field project progress on projects that is low is presented for managers. The implementation phases of this study are shown in Fig. 1.

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**Fig. 1. Implementation of study**

### 3- Conclusions

In this study, by review literature research, various criteria influencing the success of construction projects presented. Research conducted in the context of examining the success of construction projects typically used multiple criteria decision making and artificial neural networks to investigate the success rate of project progress. Taxonomy is the method of grading and classification based on of the desired properties of set that divided the set into subsets to more or less homogeneous. One of the methods used for uncertainty and incomplete data is gray theory. According to the capability of gray theory for study the uncertainty and incomplete data, this study combined Taguchi and taxonomy gray in order to predict progression of 13 construction projects.

The results of Taguchi gray method show that among the effective criteria of the progress of construction projects, factory production has greater share. Because a structure of LSF is important. Criteria in construction projects progress that used factory production. Also, the workforce criteria

has greater share, due the importance of human resources in projects. Payments made by the employer, types of overtime, transport and weather conditions criteria allocated the third rank to sixth. In this study using the taxonomy, the rate of progress of each project than each criterion is calculated. The results showed that the progress of projects Namayeshgah is 90%. The reason of this result is used factory production (Light Steel Framing (LSF)) in this project. Therefore we suggest that structure LSF considered in construction projects. This is due to the increased speed of the project, causing a rapid return of capital.

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