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developing adaptive multi dimension road construction management using EDAS technique

Ayat Nazar Jabbar1, Sepanta Naimi

[1] Altinbas University, Civil Engineering Department Istanbul Turkey
[2] Altinbas University, Civil Engineering Department Istanbul Turkey

ABSTRACT

Adaptive road construction project Management is considered a major challenge in economic development issues. This research looks into the many variables that can have an impact on building projects. Unfortunately, infrastructure projects in Iraq have slowed the country's progress, so effective methods of project management using actual databases are urgently needed. This research established a centralized data bank with a collection of specialized maps depicting the status of infrastructure projects in Iraq, and it also produced an advanced administrative system via effective success and failure elements that allow administration of projects. Implementing adaptive features during road construction projects is the primary problem of this study. There are three stages to the study methodology; the first is the Delphi technique, which is used to determine the first set of influential elements. The EDAS method is employed in the second approach, and it provides the most useful information regarding the aspects that can effect road construction projects positively or negatively. According to the findings, there are a number of effective factors that can lead to the failure of road construction projects. These include insufficient site security, poor site management and supervision, ineffective field management, inexperienced equipment operators, and insufficient consultant experience. The expert thinks this is a really important finding.

Keywords: EDAS, success factors, fail factors

1. INTRODUCTION

An infrastructure with high-quality roads enables markets to trade goods and services in a secure and timely manner. Indeed, road infrastructure projects provide better condition. Hence, for developing countries to improve their living standards, national road infrastructure programs and projects are critical. Building, highway, public, roadway, water-related constructions, road tunnel, railway, hydropower, power plant, and power projects are all interested application areas for project cost assessment. However, unfamiliar approaches, a lack of prior knowledge, more testing and inspection in road building, a lack of manufacturer and supplier assistance, and a lack of performance information are all linked to more efficient cost management in road construction. Additional goals may be set in relation to particular needs or issues discovered during the planning stage [1]. Effective management prediction is a critical procedure for any firm since it serves as a precursor to budget prices and resource allocation during the project life cycle. Actually, obtaining input data for an efficient management estimating process is difficult, especially when the extent of work is unknown, which can lead to inaccurate and rash estimations. The more the project scope is known, the more likely it is to provide more accurate estimates since more project requirements are established. Because of its characteristics and the vast quantities of cash required to launch and sustain a project, the railway construction sector is one of the project kinds that requires greater attention because of its high-effective management[2]. Future budget vs. actual cost variations will result from either overestimating or underestimating the cost of these initiatives. As a result, interest in the methodologies utilized in this field, their correctness, and even their shortcomings is rising [3]. Effective management is a systematic technique for determining the likelihood of any event occurring and detecting factors on that event using a substitution scheme to keep the project on track. Effective management may be described as a process for identifying, analyzing, and responding to project effective managements in order to boost chances and decrease dangers to the project's objectives. Effective management is one of the most critical aspects of the project decision-making process. A project's performance, productivity, budget, and quality may all be influenced by effective management[4]. A slight activity that is presumed to include effort, resources, and a goal. Construction of physical infrastructure, such as a roadway, a bridge, a building, or other types of infrastructure, as well as significant and minor maintenance tasks relating to such physical infrastructure, could be considered such an activity[5]. It is crucial that the entire activity be undertaken in a professional manner and that it be done within the allotted time and budget in order to achieve the intended outcome. Additionally, it is crucial that the entire process and the final product have little to no social and ecological impact and that the investors who will be influenced by it are consulted [6]. This entire action can roughly be classified as a plan. According to one definition, a project is a mix of organizational resources brought together to create something that did not previously exist and that will provide a presentation capability in the project and implementation of structural plans. Project management refers to the proper management of a project from its inception to completion[7]. Deliverables are a part of every project. Often taking the shape of a strategy, report, rule procedure, product, or service, deliverables is something of value produced by a scheme management team as planned, to be accessible to an authorizing group, a reviewing group, client constituent, or other concerned gathering [8]. Since the

bulk of earths have been moved by mechanical forces of nature, it is plausible to say that these forces are the main method by which they were naturally brought to or placed in their current locations[9]. The kind of residual soil that was created was mostly governed by climate conditions, including temperature and rainfall. While chemical endurance predominated in tropical areas with year-round high fevers and heavy rains, mechanical weathering, or disintegration, predominated in northern cold temperatures and desert regions. Because they have been transported by other glacier soils or are buried beneath them, remaining soils are rarely discovered in glaciated areas[10]. On the contrary hand, hot, humid regions are thought to have the least amount of in-situ lateritic soils[11]. Soils are composed of stone debris, talus, or talus that has broken off from the buildings below and has been lowered by gravity down slopes. The upper and lower surfaces of the deposits are rarely flat, and these resources usually consist of course, badly sorted angular particles[12].

2. effective road projects criteria

A comprehensive list of factors to be used in marketing a set of road standards is included in design standards. These include goals for resource management, environmental restrictions, care, actual environmental problems (including terrain, climate, and soils), traffic supplies, and traffic facility levels. For each road, objectives must be determined[1]. Boundaries of property ownership, the health of the neighborhood economy, and public sentiment toward a particular project are some examples of the latter [13]. Regular daily traffic should be forecast for various user collections, according to traffic supplies. For instance, a road may be used by record or cattle trucks, followed by local traffic. It is important to analyze an estimate of traffic supply in proportion to usage as well as changes over time [14]. With the fewest infrastructures per unit area, the ideal road design is one that retains the lowest haulage coldness. When compared to the area of land removed from production, the density of infrastructures offers short-term cost savings and long-term savings on road maintenance costs[15]. Road placement and design should be compared to the overall forest resource, which includes patterns of short- and long-term harvesting, reforestation, fire prevention, fish and nature reproduction, rural agricultural development, and rangeland management [16][17]. In addition, the following elements must be taken into consideration: the number of lanes, turnout spacing, path widths, the type of heavy surface, sight distances, project speed, clearance; horizontal then vertical alignment, curve flaring, and turn-around [18]. Many additional factors can be concern such as car design which represents a vehicle that typically travels on public roads, such as dump trucks in the case of mining activities. The term "critical vehicle" refers to a vehicle that is necessary for the operation being considered but only sometimes utilizes the road (for example, a livestock truck when transporting range livestock) [19]. Also, multiple user kinds will be using the same road, circulation safety is a crucial necessity[20]. The chosen road standards can be determined by the other design standards in combination with safety considerations like as stopping distance, sight distance, and then permissible design speed [21]. The resource management impartiality across various planning prospects should be stated for each category. For instance, a road needs to be constructed first for a parcel of land's timber crop, then for the native population's access to gather firewood or graze, and finally for administration of watershed rehabilitation works. If the qualities of the road operator vary during the course of the road's existence, the planner should be in charge of that [22].

3. related studies

Mohammed, et al, in 2016 presented to fill a figurative need for a textbook on the classification of roads, different types of pavement, materials, construction tools and activities, drainage, necessary safety and upkeep, contracts, work procurement, revisions to the FIDIC conditions of contract, supervisions and organization, and issues with controlling road construction. - Interviews and a questionnaire were used in the study to analyze the issue [23]. Hemant, et al., in 2022 examined the mean score of risk management practice based on contractor perceptions demonstrates mediocre management awareness[2].Yucai Wu, et al., in proposed application of green highway construction is done in the following four ways: "building traffic infrastructure regime integrated in to the non- artificial scenery," "promoting green construction technology in which of environmental regulation, energy conservation, and big efficiency," "generating tourism type Freeway pilot program," and "promoting green construction technology."[24]. Mohane and H. Ambre, in 2019 study defined the management system necessary for planning and regulating the quality and quantity of equipment, prompt equipment installation, good price, and the appropriate quantity as needed [25]. Mohamed, in 2010 study roads to be considered important national assets. Roads need to be maintained on a regular basis just like any other asset to keep them functional. [26]. Seboru, in 2016, in this study, Nairobi County was used as a case study to determine the effect of material acquisition on performance in which road construction projects in Kenya. The hypotheses were tested using the Fisher (F) test to determining the quantity of materials needed had a statistically significant impact on the project to build the road. [27]. Wichard, in 2018 study showed the new Environment and Planning Act that being created in the Netherlands. This matrix suggests participative process approaches that are appropriate for a project's problem environment. [28]. Rahman, et al., in 2020 study showed the highway construction projects as frequently involve substantial risk because of how crucial they are to the political, social, and economic progress of a country. This study adds to the existing body of knowledge by giving researchers and practitioners a set of alternative elements that are influencing the success of highway projects. The knowledge gained from this study will help the industry to support the success of highway projects in Malaysia. [3].

4. METHODOLOGY

New methods, a lack of experience, the necessity for additional testing and inspection during road building, and the absence of manufacturer and supplier support and performance data all contribute to cost overruns in the road construction business. The earliest phase of a project's life cycle is the preparation of a cost estimate, which is a crucial element of any organization's budgeting and resource allocation procedures. Due to the lack of clarity surrounding the task's scope, it may be difficult to obtain the essential input data for the factors estimation process, leading to estimates that are ambiguous and incorrect. Since more project requirements have been identified, estimates may be more accurate if the project's scope is outlined in greater detail. The inherent factors and vast amounts of money required to initiate and maintain a railroad project requires careful planning. Budgets might deviate from real costs if cost estimates are too low or too high. As a result, there has been an increase in interest in the approaches employed in this field, as well as their correctness and, yes, even their flaws. The major purpose of project management is to ensure the effective completion of the

project within the stated time and budgetary limits, while taking quality concerns into account. There is discussion of uncertainty as a risk factor for budget and schedule overruns. There is a possibility that the project may fail to reach its objectives due to poor management and performance control. Project management is a systematic strategy that evaluates the probability of each occurrence and identifies the elements that influence it in order to prevent the project from deviating from its intended objectives. Managers can improve opportunities and eliminate threats to the project's objectives by identifying, evaluating, and responding to project-related factors. Competent management is one of the most critical components in making the best decisions for a project. Unique aspects of each project can have a substantial effect on the project's overall timeliness, efficiency, cost, and quality.

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4.1 5DPM adaptive method

Since the five-dimensional project management (5DPM) methodology presented in this dissertation is meant to complement rather than replace established PM practices, it has the potential to enrich the framework and methods used in road construction projects. Flexible and inherently management-dependent, this approach allows for the adoption of a wide variety of approaches, tools, and tactics. The priorities for Iraq's infrastructure have switched from building brand-new facilities to repairing, modernizing, and enlarging existing ones. Road infrastructure renewal construction requires a different set of project management issues than road infrastructure building from scratch. Incorporating novel project management ideas into standard practice is essential for accelerating completion times, decreasing costs, and lessening the likelihood of conflicts across all project sizes and types. The complexity of renewal projects has increased over the years due to underfunded maintenance and replacement initiatives. Numerous renewal projects have grown more challenging as a result of the need to avoid significant traffic interruptions and, in some cases, infrastructure breakdowns. Factors such as project kind, engineering complexity, scale, modality, jurisdictional control, finance strategies, contract type, and delivery mode all contribute to a project's overall level of difficulty. Different approaches to project management will be needed for various tasks. Managing complex projects with the help of the five dimensions of 5DPM is not a new idea. But it has been carefully considered, described, and organized for inclusion in this thesis. The five dimensions are as follows:

(1) cost,
(2) schedule,
(3) technical,
(4) context,
(5) finance.

The 5DPM methodology relies on five techniques that are tailored to each individual project:

- Specify the important project success elements for each metric, if needed.
- Identify the most important reasons a project could fail and categorize them accordingly.
- Put together a team of specialists to work on the project.
- Pick factors to be included in project arrangements.

It is important to anticipate costs and account for them in an early financial plan. One of your tasks should be to create project action plans. The most pressing next steps are applying the material to real-world complex projects and integrating the philosophy and tools into the existing project programs and project management policies and procedures, although several additional research ideas

have been identified during the course of the project. To better distribute resources and identify where more are needed, your project team can benefit from creating a complexity map. As shown in Figure 3.1, complexity maps can also be used as a basis for using the five complex-project planning approaches and making decisions about complex-project management tools.

4.2 the 5DPM adaptive factors

Rather than focusing on individual geotechnical issues, this study took a holistic approach and adopted the factors found in the work by Douglas et al. in [29] and Kerim Koc et al. in [30] and Sissakian et al, [31]. The effective factors have been characterized, and their efficacy has been verified, by professionals. Professional assistance will be sought in the next step of this investigation, which will focus on identifying potential risks associated with transportation projects. A questionnaire was developed to collect responses from specialists managing different infrastructure projects in Iraq after a comprehensive list of relevant indicators was established based on a literature search. The type of soil around the structure's foundation is significant. The soil underneath the researcher's home may not have been adequate for the foundation. There is also a relationship with the moisture content of the soil. Along the foundation's perimeter, the soil is more compacted and drier. However, water-saturated soil becomes more flexible and delicate. The water leak will erode the soil surrounding the foundation's footing, causing the footing to droop. When the earth is either too dry or too moist, hydrostatic pressure can arise. The chemical composition of the soil is the primary cause of this stress[32][33]. Vegetation growing within a relatively limited radius of the project could promote settlement. Specifically, a tree's roots can absorb rainwater from the soil. This occurs frequently during dry spells and droughts. Dry circumstances cause the planet to compress. The most common reason is tree roots seeking water close to and beneath the foundation. Surrounding foundations with shallow depths and proximity to the ground's surface, there is a higher incidence of soil drying up. Because they stretch so deeply underground, basement foundations are particularly susceptible to shifting soil[34].

4.3 RANKING THE FACTORS

The primary objective of this study is to dete rmine which risk variables are the most rele vant and crucial for infrastructure projects.

A trained and experienced crew is required t o complete the rating. For the researcher, the Delphi approach offers a tool that is versatile and open to adaptation for the purposes ofdata collection and interpretation. The following are some of the justifications for using the Delphi method[35][36]. the Delphi meth od is one of the ways to forecasting that is used the most frequently in the technical sectorand across the industry as a whole. It is resp onsible for more than 90 percent of technological forecasts and research.

Before commencing the investigation, the D elphi method was conceived of, developed, a nd put into practice with subject selection an d time periods as the primary focuses of atte ntion.

A low response rate, inadvertent influence o n responses, and questioning panelists about their lack of experience on the topic rather than demanding their expert judgments are so me of the additional safeguards that should be taken [37].

The fundamental purpose of this research is to identify the factor effect factors that are the most important and significant for the development of infrastructure projects. To successfully fulfill the rating, you will need a crew that is both trained and experienced. For the objectives of data gathering and analysis, the Delphi method provides the researcher

with a tool that is flexible and open to change in order to meet the requirements of the project. The use of the Delphi approach can be justified in a number of different ways.

4.4 Evaluation based on distance from average solution EDAS

Keshavarz Ghorabaee, Zavadskas, Olfat, and Turskis developed the Evaluation based on Distance from Average Solution (EDAS) method to handle MCIC issues. It is also applicable to MADM and MAGIC issues, which involve weighing several factors. The EDAS method outperforms other decision- making and classification strategies primarily because it is more efficient and uses less computing power. Here, we need to find the nadir or idle solution, which is found by taking the maximum value of the positive distance from the average solution and the minimum value of the negative solution and summing them up. Not all DMs have the same level of knowledge, background, or experience, so this must be taken into account while evaluating them individually in GDM with uncertainty. A researcher's strengths, interests, and personality style might all be quite different from one another. EDAS is unique since its conclusion is based on the median answer, which removes the bias that may exist across experts. With the data already normalized thanks to the use of an average solution, the probability of deviating from the ideal answer is dramatically reduced. Therefore, in comparison to TOPSIS and VIKOR, it provides a more accurate and efficient solution to the actual problems. the procedure of this approach is [38][39]. It begins with defining the problem and the criteria that will be used to evaluate the solutions.

The second step is to build the decision- defining matrix A by arranging the possible options and evaluation criteria in the fashion shown. To rate x option using y standards is denoted by the notation AXY.

$$A=\left[A_{XY}\right]_{pxr}=\begin{bmatrix} A_{11} & A_{12} & .... & A_{1r} \\ A_{21} & A_{22} & .... & A_{2r} \\ . & . & . & . \\ . & . & . & . \\ . & . & . & . \\ A_{p1} & A_{p2} & .... & A_{pr} \end{bmatrix}$$

Third, we average the solution values for each alternative we've identified thus far. Often abbreviated as "AVG," the term "average" describes the middle value.

$$AVERAGE=\left[AVG_{Y}\right]_{1Xr}$$

Where r= {1, 2, 3 …}, where AVG is the new matrix of size 1Xr.

$$AVG=\frac{\sum_{X=1}^{p}A_{XY}}{p}$$

The fourth step involves deriving the positive distance (PD) and negative distance (ND) from the average solution matrices, respectively, depending on whether the criteria are positive or negative. To the extent that a matrix is different from the mean in a positive way. Fifth, for each candidate, we compute a sum of positive distances (SSoP) and a sum of negative distances (SSoN), as shown. In which w represents the importance placed on a subset of the aforementioned r criteria.

$$SoP_{X}=\sum_{j=1}^{r}w_{r}PD_{XY}$$

$$SoN_{X}=\sum_{j=1}^{r}w_{r}ND_{XY}$$

Sixth, as shown in the figure, standardize the SoP (SSoP) and SoN (SSoN) values for all the preferred options.

$$SSoP_{X}=\frac{SoP_{X}}{\max_{X}SoP_{X}}$$

$$SSoN_{X}=1-\frac{SoN_{X}}{\max_{X}SoN_{X}}$$

The APS is then calculated for each of the finalized options in Step 7.

$$APS_X = \frac{1}{2}\left(SSoP_X + SSoN_X \right.$$

Where the values of APS_X will be $0 \le APS_X \le$

Step 8: Rank the possibilities by arranging the appraisal score values from highest to lowest. Among all of the possible solutions, the one with the highest appraisal score is the one you should pick.

5. RESULTS AND DISCUSSION According to projections, road constructionprojects will be completed on time and underbudget. In the transportation business,budgets and schedules are frequentlymodified at the eleventh hour. Possibleeffects of initiatives to improve publicinfrastructure include claims, cost overruns,and missed deadlines.

Transportationprojects frequently incur cost increases as aresult of change orders. Disputes andconfrontations can emerge over even thetiniest alterations to a construction project.This research's primary objective is toexamine the reasons of claims, rework, andcost overruns. Several books and articlesexamine cost overruns and claims in civilconstruction projects, such as buildings, roads, tunnels, and hydropower or water infrastructure. In Iraq, study has been conducted on cost overruns, modification orders, and claims. Moreover, each locationhas specific hydrogeological and hydrochemical characteristics. The objectiveof the survey was to determine not only how frequently the hazards identified in this study occurred during the construction of various types of infrastructure, but also the consequences of their occurrence. The objective of the survey's questionnaire was to collect information that would enhance our comprehension of the factors and effects that practitioners encounter on a daily basis. The most pertinent comments were made by experts who are currently participating in Iraqi initiatives. This study aims to investigate the factors that contribute to the success of road pavement construction projects. The EDAS method was utilized to evaluate the smartphones accessible on the Indian market in order to identify the most effective smartphones from a variety of smartphones. The objective of this study is to determine which of the previously selected smartphones is the best. An impartial public survey was utilized to choose the study's variables. In which they ranked the aforementioned features as most important when acquiring a smartphone. The characteristics, which were then evaluated by specialists to decide the outcome.

5.1 DELPHI RESULTS

The Delphi method has been shown to be an effective and commonly used method in the field of information systems research for the purpose of determining and ranking the challenges associated with management decision-making. On the other hand, the vast majority of the previous Delphi investigations did not follow a method that was systematically designed. The Delphi procedure is frequently used by researchers when they are unable to employ alternative methods that produce higher levels of evidence because the information they have access to is either insufficient or susceptible to some degree of doubt. The purpose of this activity is to uncover areas of consensus by compiling the knowledgeable opinions of a diverse group of participants and analyzing the results. The Delphi method has been used successfully for many years to find answers to research questions. This can be accomplished by selecting a point of view that is supported by an extremely strong majority of specialists in the relevant field. It offers the opportunity for reflection among the participants, who are able to modify and

evaluate their perspective in light of the unnamed perspectives of others that were expressed throughout the session. This gives the participants the chance to reflect on what they have learned from the session. In order to correctly foresee the implications of potential future scenarios, calculate the probability of an event occurring, or arrive at a conclusion on a particular topic, the Delphi method requires the participation of specialists who have knowledge in construction costs. As a result, it will be possible for the specialists to take part in the survey. When determining how much money should be spent on the construction of a building, the application of the percentage scoring technique discussed earlier in this thesis was employed to calculate how much should be spent. The process of identification calls for the development of a comprehensive plan that is able to single out all of the aspects that are essential to the successful functioning of the building project.

5.1.1 First Round Delphi Method

The first round of Delphi method is to specify the successes group including evaluation of the successes effect in 10 deferent road construction projects. A professional evaluation is conducted by someone who has received training in accessibility techniques and is conversant with existing standards. Some of the principles will likely be used implicitly by the reviewer(s) in an expert evaluation; however, the reviewers will not explicitly assign problems to certain heuristics. Instead, they will rely on their expertise in UX design (and with interfaces that are similar) to help them spot issues. One legitimate argument against heuristic evaluations is that they place too much faith in the heuristics themselves and the reviewer's understanding of them. A heuristic evaluation's validity can be assured without requiring the reviewer to have any specific expertise.

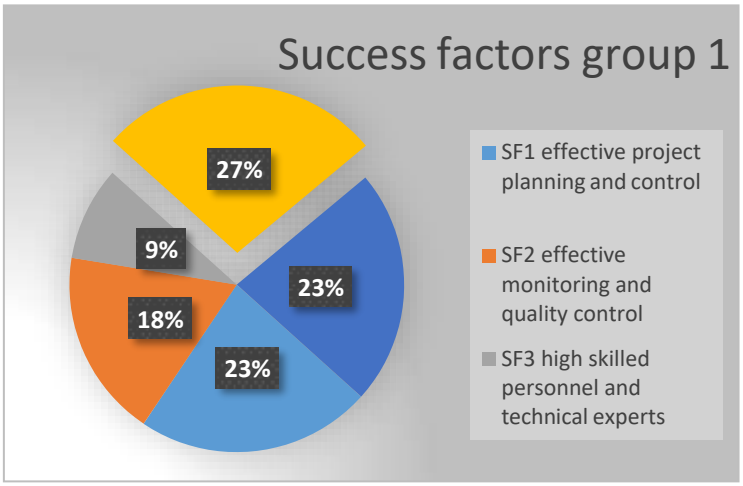
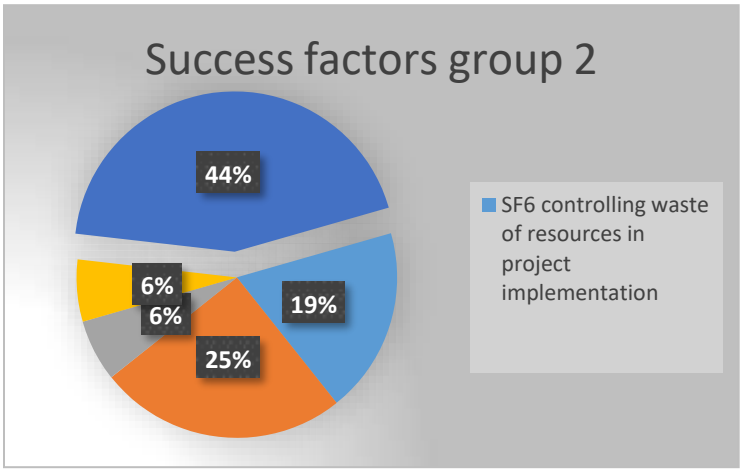


Figure 1: success factors, group 1 of First Round Delphi Method



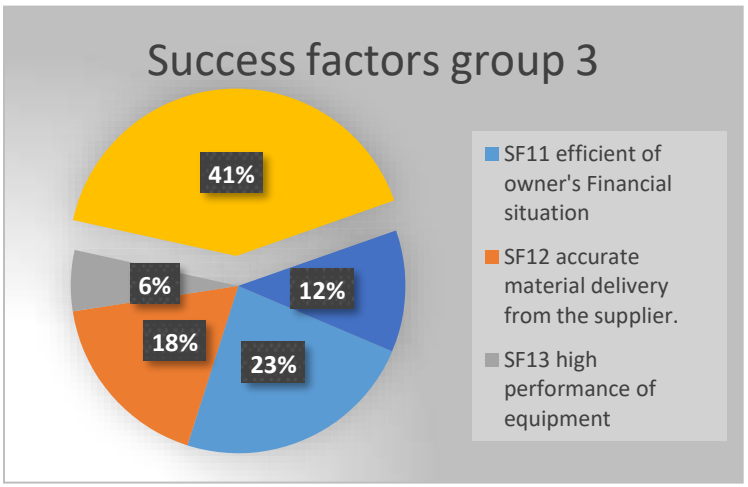


Figure 3: success factors, group 3of First Round Delphi Method

5.1.2 Second Round Delphi Method

The second round of Delphi method is to specify the groups of factors that can cause a fail in the road projects. these factors were 40 factors classify into six groups. The expert's evaluation of the frailer factors depends on 12 deferent road construction projects. Evaluators give detailed explanations of the ratings they assigned to each category of criteria. Each set of considerations is screened in advance by expert evaluators to identify any potential monetary concerns. All surveys and questionnaires for this review have to be completed online. There is no need for a separate signing session for this examination because it may be done over the phone. In theory, fifteen specialists are tasked with assessing each factor first. Experts who reviewed the ideas in question meet in a consensus group to compare notes on their separate assessments and settle on a final score and commentary. Following the group discussion, everyone agrees on a final score and the reasons behind those scores, as well as any dissenting opinions. It is the researcher's duty to ensure that the final conclusion is an accurate reflection of the group's consensus. In most cases, the debate happens in Iraq and involves professionals who were involved in the particular assessment. The results shown in the figures.

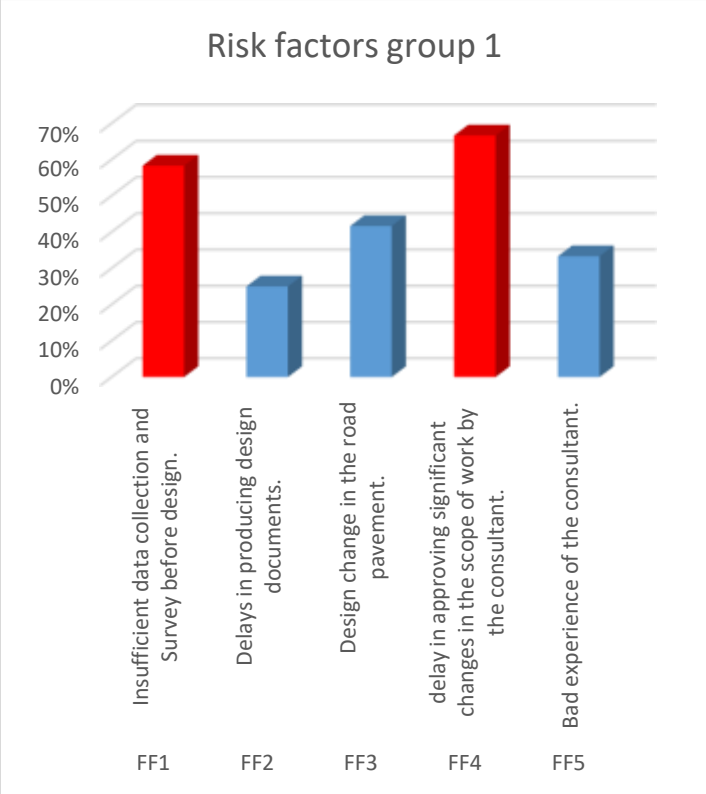


Figure 4: failure factors, group 1 of second Round Delphi Method

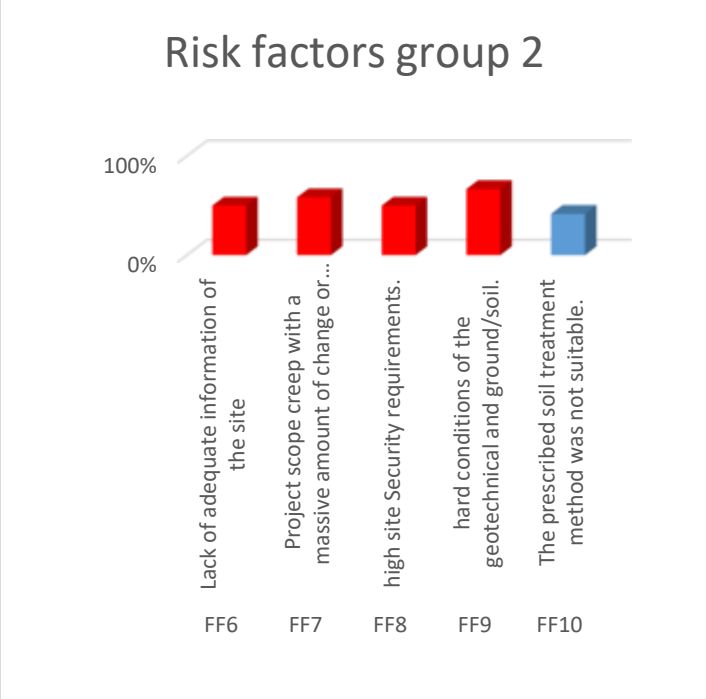


Figure 5: failure factors, group 2 of second

Round Delphi Method

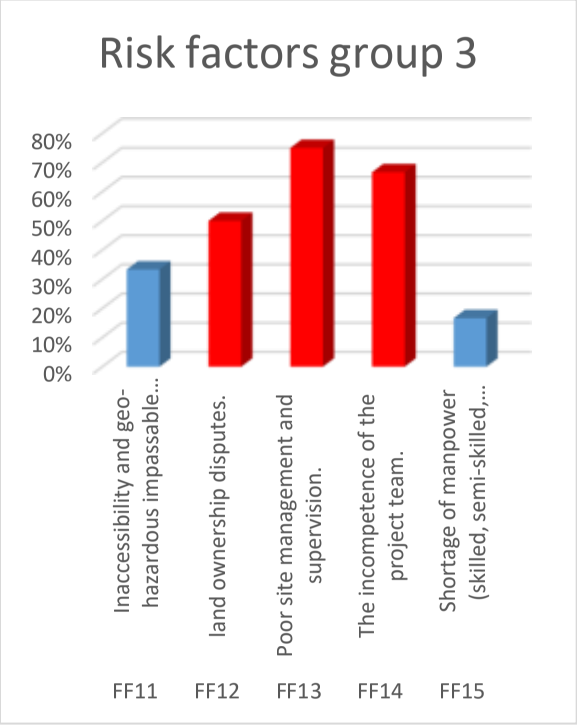


Figure 4.6: failure factors, group 3 of second Round Delphi Method

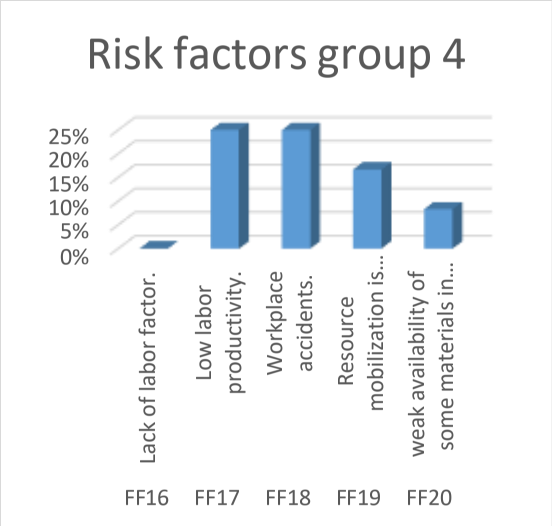


Figure 7: failure factors, group 4 of second Round Delphi Method

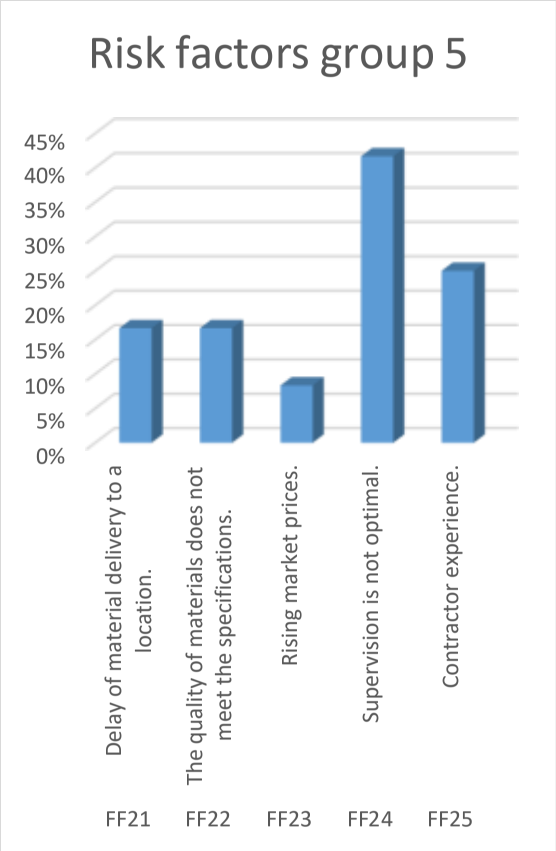


Figure 8: failure factors, group 5 of second Round Delphi Method

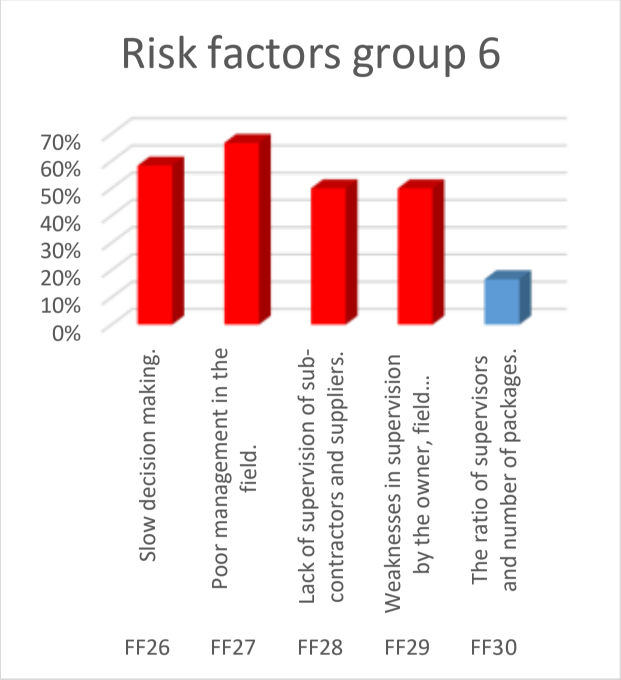


Figure 9: failure factors, group 6 of second Round Delphi Method

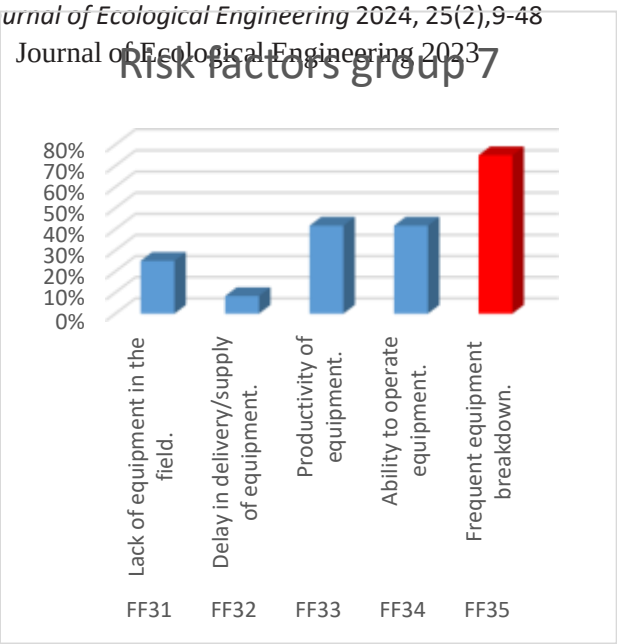


Figure 10: failure factors, group 7 ofsecond Round Delphi Method

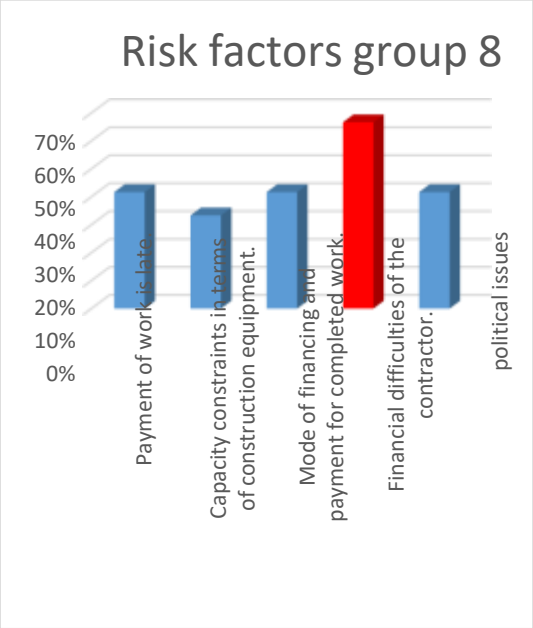


Figure 11: failure factors, group 8 ofsecond Round Delphi Method

The results show that the main effective failure factors in road construction were as in below.

Table 1. the results of probability of failure factors

Code of factor	description	Probability of occurrence
FF1	Insufficient data collection and Survey before design.	58%
FF4	delay in approving significant changesin the scope of work by the consultant.	67%
FF6	Lack of adequate information from	50%

	the consultant.	
FF 7	Project scope creep with a massive amount of change or variation orders.	58%
FF 8	high site Security requirements.	50%
FF 9	hard conditions of the geotechnical and ground/soil.	67%
FF 12	land ownership disputes.	50%
FF 13	Poor site management and supervision.	75%
FF 14	The incompetence of the project team.	67%
FF 26	Slow decision making.	58%
FF 27	Poor management in the field.	67%
FF 28	Lack of supervision of sub-contractors and suppliers.	50%
FF 29	Weaknesses	50%

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	in supervision on by the owner, field supervisors.	
FF35	Frequent equipment breakdown.	75%
FF39	Financial difficulties of the contractor.	67%

5.3 EDAS RESULTS

A number of road construction projects in Iraq were analyzed using the EDAS method to discover what contributed to their success or failure. In this section, we'll focus on what works. Independent public polling was used to select the variables for this study. This is what they considered to be the most important considerations. Using a suitable amount of time as the schedule's foundation, two hypotheses can be formulated to account
for the unknown result of the project: likelihood and potential. Examining the causes of the delay is essential to resolving the problem. The most important conclusion to be drawn from this study is that numerous analytical approaches can be used to describe the aspect of road building and associated projects, hence facilitating the finding of the most effective application processes. It is impossible to exaggerate the significance of this, given the fundamental purpose of the study is to enhance and identify the most efficient methods currently applied for model construction and analysis. The degree of uncertainty in these variables influences whether or not the current methodologies for building roads with as few variables as feasible are effective.

5.3.1 success factors group

The EDAS success factors group is the first step to detect the main success reason in road construction.

Table 2: success factors EDAS results

	EDAS results	rank
SF1	0.526	3
SF4	0.513	4
SF5	0.697	2
SF10	0.000	5
SF14	0.896	1

SF14 (efficient site management and supervision.)

5.3.2 The EDAS failure factors

The EDAS failure factors group is the second step to detect the main success reason in road construction.

Table 3. the failure factors EDAS results

ode factor	DAS results	ank	ode factor	DAS results	ank
F1	.653602		F26	.83153	
F2	.407852		F27	.888937	
F3	.344164		F28	.275653	
F4	.169284		F29	.023219	
F5	.997527		F30	.054744	
F6	.925846		F31	.82679	
F7	.10096		F32	.441571	
F8	.939348		F33	.169607	
F9	.444613		F34		
F10	.378932		F35	.263997	
F11	.436695		F36	.322674	
F12	.244884		F37	.847088	
F13	.5		F38	.418622	
F14	.477683		F39	.320071	
F15	.459733		F40	.295619	

- The EDAS result of the first group is Bad experience of the consultant.
- The EDAS result of the 2ed group is high site Security requirements.
- The EDAS result of the 3ed group is Poor site management and supervision.
- The EDAS result of the 4th group is Poor management in the field.
- The EDAS result of the 5th group is Ability to operate equipment.
- The EDAS result of the 6th group is Capacity constraints in terms of construction equipment.

In summary, the bad experience of the consultant, high site security requirements, poor site management and supervision, poor

management in the field, ability to operate equipment, and bad experience of the consultant considered the main effective factors that can cause the fail in the road construction projects.

5 CONCLUSIONS

Studies and analyses of what makes road construction projects successful are essential. The length of time spent waiting can be cut down by taking advantage of some of the available options. This article takes a close look at delays from the viewpoint of road construction management, and it provides a thorough framework for delay management. Adaptive features, key criteria, information to lessen delays, and overall project procedures can all be found and prioritized with the help of this framework. A system for identifying and ranking road construction project delays using the EDAS technique was developed. The EDAS technique is used in a system management framework to look into and lower the number of anomalies that are found. The Ishikawa chart and the EDAS technique have both been validated for their ability to identify and rate both qualitative and quantitative threats. Think about how a road-building project could benefit from an adaptive management framework and how its structure could guide its implementation. To get there, we used these strategies and procedures: First, we examined the findings of two surveys, the opinions of infrastructure project specialists, interviews with those specialists, and exploratory research from prior studies to identify the components of successful factors and their consequences. The creation of EDAS models begins with the selection of an appropriate software application. The EDAS methodology relieson Microsoft Excel for its usability and ability to draw conclusions. Thirdly, the concept was evaluated in a scenario based on the road construction environment in Iraq.
According to EDAS, four out of five clientshad a poor opinion of the consultant.
Incompetent site administration and supervision, incompetent field management, incompetent equipment operation, and poor consultant experience.

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