Kufa Journal of Engineering
Vol. 16, No. 3, July 2025, P.P. 499-518
Article history: Received 10 October 2024, last revised 4 December 2024, accepted 27 December 2024

ANALYSIS AND PRIORITIZATION OF FACTORS AFFECTING THE MOTIVATION OF ENGINEERS WORKING IN IRAQI CONSTRUCTION INDUSTRY

Mohammed Abdulelah Neamah Alomar

Department of Building and Construction Technologies Engineering, Islamic University, Al-Najaf Al-Ashraf, Iraq, Email:m.shabib@iunajaf.edu.iq
https://orcid.org/0009-0005-0038-1522

https://doi.org/10.30572/2018/KJE/160328

ABSTRACT

Motivation is one of the soft sub-dimensions in human resources management. The study's purpose is to investigate how motivation affects productivity in the Iraqi construction industry, with a particular emphasis on identifying and prioritizing the motivational factors that influence architects and engineers (AE). The research methodology involved identifying 25 motivational factors for AE, refining them to 21 through interviews, and conducting an online survey using a Likert-scale questionnaire. Data from 73 valid responses were analyzed using SPSS, with an 18.25% response rate, considering the impact of survey length and lack of incentives. This study shows that the most important motivational factors for engineers include good interaction with colleagues, the Existence of Clearly Defined Duties, Fit of Duties with Personal Interests and Abilities, Good Interactions with Managers, and a Variety of Duties all of which increase learning, growth and job satisfaction. These factors are rooted in theories such as Maslow's hierarchy and goal setting.

KEYWORDS

Motivation, Iraqi Construction Industry, Productivity, Human resource management.

1. INTRODUCTION

As one of the few sectors capable of providing drastic and practical answers for any social, economic, or climatic changes and problems, the construction sector is vital to Iraq's economy (Hatem et al., 2018). One of Iraq's most significant businesses, the construction sector is essential to the future success of the nation. Being a labour-intensive business with the potential to increase Iraq's employment rate, it has a significant influence on the political, social, and economic landscapes of the nation (Alfaiz et al., 2021). Human resources management is one of the most critical key performance indicators for improving construction companies (Tofan and Breesam, 2018).

The productivity rate is the main indicator for the development of construction projects for any developed country (Yasser and Khaleel, 2019). Due to the high percentage of failure in Iraqi construction projects especially which is mainly related with time and cost. The human resources productivity represents one of the main challenges which prevent project planers to figure out the actual productivity in the field (Dakhil et al, 2017). In recent decades, the topic of motivation and its impact on productivity has garnered the attention of many management researchers. The application of motivation in the construction industry has also been explored by some construction management specialists (Sugathadasa et al., 2021, Maloney, 1981). In fact, the impact of motivation on productivity is so crucial that some researchers have identified it as the most influential factor in project outcomes (Funso et al., 2016, Johari and Jha, 2020).

Given that the productivity of construction workers leads to overall project productivity (Johari and Jha, 2020), research in the field of labor productivity in construction projects has generally focused on how to increase worker productivity, with less attention given to engineers, architects, and project managers. Accordingly, very few studies have been conducted on the motivation of AE. Considering the importance of motivation in fostering creativity and generating new ideas (Hartmann, 2006), and the nature of the work of AE, which heavily relies on creativity in design, it is crucial to examine the motivational factors for this group of professionals in the construction industry. Demotivation among AE can lead to increased design time, reduced quality of design documents, and disruptions in the overall success of the project (Aghayeva and Ślusarczyk, 2019, Momade and Hainin, 2019).

Based on previous studies, it can be seen that studies on motivation in the construction industry have been limited to labour and employees, and there are very limited studies on engineers, especially in Iraq. Hence, the need for this current study is limited to AE and Iraq. Although motivation has been studied in some countries, it is important to examine motivation in the context of Iraq because different policies and standards are implemented in different countries.

Based on these arguments, we hypothesise the following: The use of a structured case study approach facilitates the identification and prioritization of key motivational factors affecting architects and engineers in the Iraqi construction industry.

1.1. Aim and Objective of the Study

Since motivational factors are influenced by environmental aspects such as culture, politics, and economics, identifying and prioritizing these factors according to the conditions of each society is essential. The objective of this research is to analysis and prioritization the motivational factors that influence AE in the construction industry. In the present study, the researcher first defined and explored the concept of motivation and its relevant theories. Then, the researcher identified the factors affecting the motivation of architects and civil engineers based on the results of the literature review. Finally, the researcher ranked and introduced these factors by surveying professionals specializing in workforce productivity (Oyedele, 2010).

2. LITERATURE REVIEW

2.1. Motivating Construction Industry Workers

Employees and managers with low motivation, even if they possess high technical and managerial skills, will have poor performance (Germann, 2004). Employee participation in organizations has two key aspects: A. Satisfying individual needs, and B. Achieving outcomes that can only be obtained through interaction with others. To improve organizational performance, it is essential to first identify the factors affecting employee motivation and plan for their fulfillment (Wiley, 1997).

Research related to motivational factors in the workplace has a long history, with numerous studies conducted over the past 60 years (Bruton et al., 2020, Dwivedula and Bredillet, 2010, Hall et al., 2009). Many of these studies have examined the methods managers use to motivate their employees. The U.S. Labor Relations Organization (1946) published a list of ten motivational factors in the workplace: A. Full appreciation of work done, B. Feelings of "being in on things", C. Sympathetic help with personal problems, D. Job security, E. Good wages, F. Interesting work, G. Promotion and growth in the organization, H. Personal or company loyalty to employees, I. Good working conditions and J. Tactful discipline

According to Menninger and Levinson (1956), the first and fifth criteria are the most important motivational factors. Other studies have also emphasized the significance of pay and rewards in motivating employees (Baddoo et al., 2006, Jurkiewicz et al., 1998). Motivating construction workers has been proposed as a strategy to improve productivity in the construction industry (Hewage and Ruwanpura, 2006, Maloney and McFillen, 1986). In Maloney's (1983) study,

using expectancy theory, motivational factors for construction workers were categorized into five main groups: expectancy, instrumentality, valence, organizational constraints (a set of managerial errors negatively impacting employee motivation), and satisfaction (Maloney, 1983). Additionally, in the study by Maloney and McFillen (1986), contractors were asked to make work more enjoyable for workers by defining high-value and performance-dependent factors to increase their satisfaction (Maloney and McFillen, 1986). Kim et al. (2015) also examined the importance of cultural differences in motivating workers and the significance of motivational factors from the perspective of Korean construction workers in South Korea. They categorized motivational factors affecting worker productivity into three main groups: economic, social, and Psychological, as detailed in Table 1 (Kim et al., 2015).

Table 1 Selected motivation factors related to productivity (Kim et al., 2015)

Group factor	Factors
Economic factors	Amount of pay, incentives, timing of pay, welfare, employment guarantee
Social factors	Social security insurance, participation in decision making, company policy, management policy, social recognition, social life opportunity, job autonomy, self-development opportunity, social status, cultural differences, job discretion
Psychological factors	Working conditions, sense of belonging, achievement, relationship with colleagues, satisfaction, relationship with managers, possibility of growth, sense of responsibility, equal promotion opportunity, challenge

Damci et al. (2020), applying Maslow's hierarchy of needs theory, identified the fulfillment of physical, safety, belonging, and esteem needs as the most important factors for motivating engineers (Damci et al., 2020). Oyedele and Tham (2007) examined key success factors influencing the motivation of AE and suggested that several specific factors are essential for evaluating the motivation levels of AE. Oyedele (2010) further explored how to maintain the motivation of AE in engineering consulting firms. According to his findings, "Favorable project working condition", "Employee's organisational support", "Design "process efficacy", "Efforts recognition" are the most influential factors in motivating AE (Oyedele, 2010).

In 2013, Oyedele also investigated the factors contributing to the demotivation of AE, concluding that seven key factors are responsible for reducing motivation: 'organisational injustice', 'project induced stress', 'dysfunctional design team', 'poor interpersonal relationships', 'perceived career decline', 'negative leadership behaviour', and 'poor organisational culture' (Oyedele, 2013). Damci (2016) also explored the impact of demographic characteristics (such as marital status, education, experience, and age) on the motivation of

engineers. The most important motivational factors identified were "Job satisfaction," "efficient collaboration with friendly and congenial teammates," and "achieving success in my work". In this recent study, socio-cultural factors examined within Hofstede's model—such as power distance, masculinity, individualism, and uncertainty avoidance—were considered significant in motivating individuals. According to the study's findings, there is a meaningful correlation between demographic characteristics and motivational factors. For instance, for individuals under the age of 35, the opportunity to learn and acquire skills was a stronger motivational factor compared to justice in reward distribution, whereas for those over 35, the reverse was true (Damci, 2016).

3. METHODOLOGY

After reviewing the theoretical foundations, 25 factors influencing the motivation of AE were selected (Dwivedula and Bredillet, 2010, Aghayeva and Ślusarczyk, 2019, Damci, 2016, Sugathadasa et al., 2021). To understand the impact of these factors in the Iraqi construction industry, interviews were conducted with Iraqi engineers who have been working in this industry for more than 20 years. These identified factors were refined and reduced to 21 criteria after initial interviews with some modifications. Initial interviews were conducted in person and definitions of each criterion were provided to ensure that the definitions clearly conveyed the researchers' intended meaning for each factor. After that, a general classification of factors affecting employee motivation was created. The factors were then formulated in a questionnaire with a 5-point Likert scale, which is explained quantitatively in Section 3.2 of this article.

3.1. Definition and Classification of Factors Influencing the Motivation of AE

AE play an influential and undeniable role in the productivity of construction companies and infrastructure projects. Demotivation among design AE can lead to longer design times, lower quality of design documents, and disruptions in the project's ultimate success. In this study, based on a review of the theoretical foundations, the most influential factors affecting the motivation of construction industry employees were identified in the form of 5 main criteria and 21 sub-criteria. These factors, along with the motivational theory associated with each, are presented in Table 2. In this table, each sub-criterion is identified by a specific code. The definitions of each criterion and its related sub-criteria are provided below.

Table 2 Categorization of Motivational Factors for Engineers

			Related Motivational Theories:					
	Main Criterion	**Sub-Criterion**	**Maslow's Hierarchy of Needs**	**ERG**	**Equity**	**Expectancy**	**Reinforcement**	**Goal-Setting**
F1	Leadership Management	Equality in Treatment, Payments, and Legal Procedures			*			
F2		Consideration of Employees' Personal Life	*	*				
F3		Work Independence and Autonomy	*	*				*
F4		Opportunity for Teamwork	*	*				
F5		Participation in Decision-Making	*	*				
F6		Appropriate Mechanisms for Providing Feedback and Employee Evaluation			*	*	*	*
F7	Compensation System	Receiving Adequate Salary	*	*		*		
F8		Reward Based on Organizational Success			*	*	*	
F9		Reward Based on Project Success			*	*	*	
F10	Organizational Climate	Recognition for Completed Work	*	*			*	
F11		Good Interactions with Colleagues	*	*				
F12		Good Interactions with Managers	*	*				
F13		Mutual Trust	*	*				
F14		Challenging, Competitive, and Dynamic Environment						*
F15	Social Status	Organizational/Project Brand	*	*				
F16	Nature of Work and Current Tasks	Existence of Clearly Defined Duties						*
F17		Fit of Duties with Personal Interests and Abilities						*
F18		Variety of Duties	*	*				
F19	Career Development (Future Outlook)	Job Security	*	*				
F20		Opportunities for Personal Learning and Growth	*	*				*
F21		Opportunities for Advancement	*	*				*

3.1.1. Management and Leadership

The management and leadership criterion addresses motivational factors related to organizational management and assesses the impact of various human resource management approaches on employee motivation. The sub-criteria for management and leadership include:

- Equality in Treatment, Payments, and Legal Procedures: A sense of fairness in compensation (proportionate to effort and competence), fairness in treatment (absence of discrimination in managerial behavior towards staff), and fairness in managers' adherence to rules and procedures (e.g., treating everyone equally in cases of tardiness or absenteeism).
- Consideration of Employees' Personal Life: Considering individual challenges in special circumstances, showing empathy and compassion, and creating opportunities for employees to spend time with family and friends.
- Work Independence and Autonomy: Providing a degree of autonomy in how specialized tasks are performed.
- Opportunities for Teamwork: The ability to perform job duties as part of a team.
- Participation in Decision-Making: Involving staff in decisions related to their duties and respecting their opinions and expertise.
- Appropriate Mechanisms for Providing Feedback and Employee Evaluation: Designing an effective and fair performance evaluation system.

3.1.2. Compensation System

Compensation is a significant factor in employee motivation, generally provided in two forms: material and non-material.

- Receiving Adequate Salary: A suitable salary is provided regardless of individual performance quality.
- Reward Based on Organizational Success: Equal rewards are given to all employees for the organization’s success, regardless of their specific project performance.
- Reward Based on Project Success: Employees are given a share of the profit from the specific project in which they are actively involved.
- Recognition for Completed Work: Appreciation and recognition of employees’ work and efforts through non-material means, such as verbal praise or providing certificates of appreciation.

3.1.3. Organizational Climate

The organizational climate refers to the collective perception of individuals about the prevailing atmosphere in the organization, whether positive or negative, which strongly impacts employee

performance.

- Good Interactions with Colleagues: Friendly and respectful relationships (mutual respect) with colleagues.
- Good Interactions with Managers: Friendly and respectful relationships (mutual respect) with managers.
- Mutual Trust: A sense of trust between employees and management in the work environment.
- Challenging, Competitive, and Dynamic Environment: The presence of goals that are neither too difficult to be unachievable nor too easy to become boring, along with a competitive atmosphere where staff strive to perform their duties better.

3.1.4. Social Status

The social standing criterion addresses the importance of the brand and social position of the organization or project in motivating employees. It reflects how significant and motivating it is for employees to work in a well-known company or on a recognized project.

3.1.5. Nature of Work and Current Tasks Career Development (Future Outlook)

The nature of work criterion examines the motivational factors related to the job itself and its tasks, categorized into two main groups: current tasks (present situation) and career development opportunities (future outlook).

- Existence of Clearly Defined Duties: The absence of ambiguity in what managers expect from employees.
- Fit of Duties with Personal Interests and Abilities: Tasks that match the individual's interests and strengths.
- Variety of Duties: A job composed of multiple and diverse tasks.
- Job Security: Stability and assurance in one's employment.
- Opportunities for Personal Learning and Growth: The potential for career advancement.
- Opportunities for Advancement: Learning opportunities through experienced professionals, gaining experience within the organization, or continuous and specialized training programs for employees.

3.2. Statistical Population and Data Collection Tool

The statistical population for the present study comprises AE. Given the unlimited number of individuals in this population, an infinite population sampling formula was employed. To enhance the accuracy of the research and improve the response rate, a number of individuals

exceeding the primary sample size were approached. The data collection tool used in this study was a questionnaire.

After finalizing the criteria mentioned above, a questionnaire containing 5 sections and a specific question for each of the motivation criteria, which are subsets of the 5 main criteria Table 2, was prepared and distributed online to AEs active in the construction industry. The demographic characteristics of the respondents can be seen Fig 1. The questionnaire utilized a Likert scale with a range from 1 to 5, where 1 indicates very low importance and 5 signifies very high importance. Despite distributing 400 questionnaires, 73 responses were received. Consequently, the response rate was estimated to be 18.25%. Given that data collection for this study was conducted online, several aspects should be considered regarding the obtained response rate. According to a meta-analysis by Shih and Fan (2009), the average participation rate for online surveys was estimated to be 19% (Shih and Fan, 2009). Key factors affecting participation rates include the attractiveness of the topic, the length of the questionnaire, follow-up efforts after distribution, and financial incentives. Given that the study on motivational factors for AE in Iraq utilized a database from several active construction companies for distributing questionnaires, a similar proportion of inactive recipients was not unexpected. This rate appears acceptable when accounting for the length of the questionnaire and the absence of financial incentives, especially in light of the average participation rate of 19% for online surveys. Finally, the data were edited and analyzed using SPSS version 26. The following sections will present the results derived from processing the received responses Fig 1.

4. RESULTS ANALYSIS

Various statistical tests have been used to analyze the data in this study. A summary of the results of these tests is presented in Table 3, where the first column shows the criterion (sub-criterion) code, and the second column presents the average score obtained by the criterion (a number between 1 and 5, with a higher number indicating greater importance of the criterion). In the third column, the standard deviation of the data related to each factor is displayed. The fourth column provides the reliability test results to examine the consistency of the questionnaire. It is worth noting that the overall Cronbach's alpha was calculated as 0.913, which, being greater than 0.70, indicates acceptable reliability. Various tests can be used to examine the difference between the means obtained for different groups. Based on the results of the Shapiro-Wilk test, the assumption of normality was rejected. Therefore, considering the independence of the groups, the Mann-Whitney test was used for two-group populations (marital status, age, gender, and expertise), and the Kruskal–Wallis test was applied for populations with more than two groups (experience and education) (Rayner and Livingston Jr,

2020). The significance values obtained from the tests for each criterion are presented in columns 5 to 10. A significance level of 0.05 was considered for the 95% confidence interval, and the obtained significance values from each test were compared with 0.05. Values greater than 0.05 indicate 95% confidence that there is no significant difference between the groups, while values less than 0.05 indicate a significant difference in the average opinions of each group Table 3.

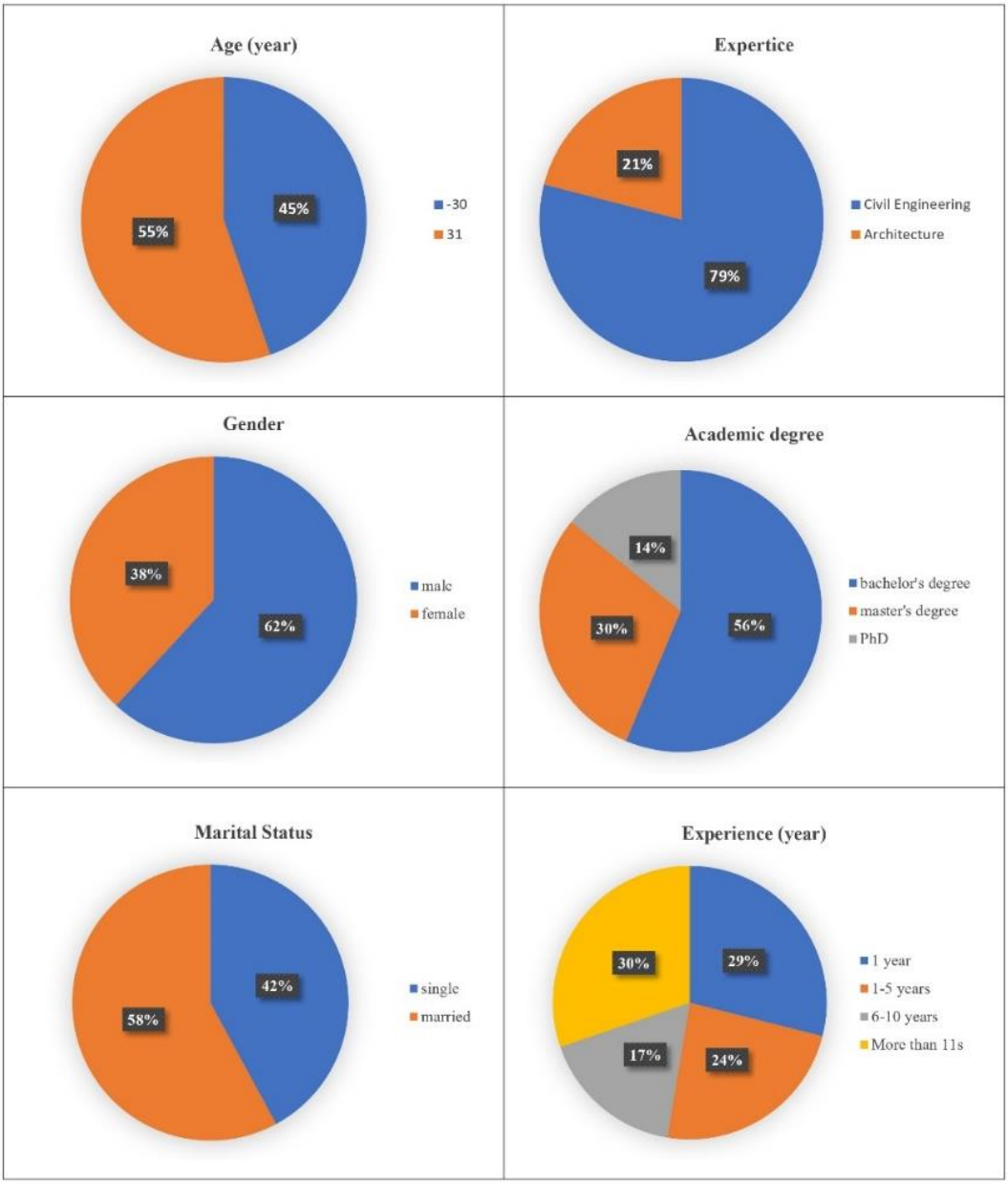

Fig 1. The demographic characteristics of the respondents

4.1. Ranking of Factors

In the last two columns of Table 3, the intra-group ranking of the sub-criterion and the overall ranking of the sub-criterion are displayed, respectively. Based on this, the most important

factors influencing the motivation of consulting engineers actively in the construction industry have been, in order, as follows:

Good Interaction with Colleagues: A closer look at the demographic characteristics of the respondents Fig 1shows that the majority of them are engineers over the age of 31, with work experience ranging from 1 to 5 years and more than 5 years. Considering this context, it is not surprising that the opportunity for learning and growth is regarded as the most important motivational factor for this group. This factor, based on Maslow's hierarchy of needs theory, reflects the highest level of needs, which is the need for self-actualization.

Existence of Clearly Defined Duties: As mentioned in Table 2,, the factor of having a clear definition of responsibilities is derived from goal-setting theory. According to this, the lack of clarity in responsibilities and undefined goals reduces motivation. Based on this theory, providing a general definition of tasks (rather than detailed, step-by-step instruction) plays a significant role in increasing the motivation of specialized employees. In any case, confusion and ambiguity in responsibilities are factors that contribute to demotivation.

Fit of Duties with Personal Interests and Abilities: An important source of motivation for engineers is the fitness between duties and personal interests and abilities. Their level of engagement and productivity increases when assignments are tailored to their interests and talents. This idea is based on goal-setting theory, which emphasises that defining and achieving tough but meaningful objectives increases motivation. While a poor fit can lower motivation and performance, a high match promotes greater work satisfaction and professional advancement. Engineers may reach their full potential and maintain motivation by matching their work to their skills.

Good Interactions with Managers: Respectful and courteous behavior from managers towards AE represents the fourth influential factor. The need for respect constitutes the fourth level in Maslow's hierarchy of needs. A noteworthy point is the greater importance placed on good interactions with managers compared to interactions with colleagues.

Variety of Duties: According to Table 2, Variety of Duties is the sixth component that engineers find motivating. It is related to both the ERG theory and Maslow's hierarchy of needs. According to both ideas, people want for diversity in order to satisfy higher-order demands like self-actualization and personal growth. Diverse work avoids monotony, promotes learning, and keeps engineers interested. This variation improves motivation and job satisfaction by meeting higher psychological and development demands in addition to fundamental needs.

Table 3 Analysis of statistical data results related to the motivational factors of Iraqi engineers

Sub-Criterion	Mean	Standard deviation	Reliability	Mann-Whitney test				Kruskal-Wallis test		Ranking	
			Cronbach's Alpha if Item Deleted	Marital Status	Gender	Age	Expertise	education	Experience	Intra-group	Overall
1											
F1	2.57	1.193	0.913	0.622	0.652	0.910	0.699	0.860	0.520	5	18
F2	2.43	1.170	0.910	0.493	0.035	0.250	0.399	0.335	0.062	6	19
F3	2.75	1.223	0.906	0.444	0.096	0.698	0.645	0.753	0.105	4	15
F4	3.34	1.172	0.908	1.000	0.182	0.987	0.389	0.009	0.925	2	11
F5	3.43	1.124	0.910	0.703	0.312	0.259	0.952	0.125	0.101	1	9
F6	2.99	1.227	0.907	0.623	0.166	0.979	0.139	0.073	0.900	3	14
2											
F7	2.75	1.297	0.909	0.483	0.240	0.056	0.809	0.009	0.552	1	16
F8	2.11	1.239	0.907	0.859	0.497	0.859	0.829	0.490	0.080	4	21
F9	2.13	1.237	0.908	0.617	0.676	0.952	0.772	0.546	0.934	3	20
F10	2.72	1.282	0.907	0.750	0.595	0.212	0.958	0.216	0.461	2	17
3											
F11	4.05	0.937	0.911	0.860	0.215	0.669	0.185	0.779	0.642	1	1
F12	3.72	0.932	0.908	0.321	0.090	0.738	0.548	0.057	0.398	2	4
F13	3.70	0.938	0.907	0.513	0.308	0.502	0.185	0.492	0.144	3	6
F14	3.62	1.006	0.911	0.291	0.875	0.125	0.049	0.573	0.319	4	8
4											
F15	3.64	0.962	0.910	0.184	0.124	0.332	0.297	0.780	0.250	1	7
5											
F16	4.03	0.816	0.911	0.484	0.251	0.332	0.150	0.347	0.577	1	2
F17	3.72	1.053	0.909	0.387	0.364	0.217	0.005	0.142	0.614	2	3
F18	3.70	1.083	0.909	0.857	0.982	0.634	0.053	0.555	0.084	3	5
F19	3.01	1.342	0.906	0.403	0.042	0.332	0.019	0.091	0.525	6	13
F20	3.36	1.251	0.907	0.478	0.200	0.106	0.087	0.024	0.520	4	10
F21	3.12	1.222	0.908	0.815	0.074	0.825	0.026	0.020	0.062	5	12

4.2. Ranking of Factors by Group

To gain a more precise understanding of the motivational components of AE active in the construction industry, the ranking of motivational factors for each group is presented separately. Accordingly, based on the groupings provided in Fig 1, which are based on the demographic characteristics of the participants, the ranking of motivational factors is displayed in Table 4 through Table 9.

4.2.1. Ranking by Marital Status

Based on what is presented in Table 4, the most important motivational factors among single individuals are, in order: Good Interactions with Colleagues, Existence of Clearly Defined Duties, Organizational/Project Brand, Fit of Duties with Personal Interests and Abilities, and a Challenging, Competitive, and Dynamic Environment. Meanwhile, the most important

motivational factors among married individuals are Good Interactions with Colleagues, Existence of Clearly Defined Duties, Good Interactions with Managers, Mutual Trust, and Variety of Duties. It appears that although married people prioritise employment stability, trust, and supportive connections inside the office, single people place greater importance on personal development and dynamic work settings.

4.2.2. Ranking by Gender

As shown in Table 5, the most important motivational factors among men, in order, are: Existence of Clearly Defined Duties, Good Interactions with Colleagues, Variety of Duties, Fit of Duties with Personal Interests and Abilities, and Mutual Trust. Meanwhile, the most important motivational factors among women, in order, are: Good Interactions with Colleagues, Existence of Clearly Defined Duties, Good Interactions with Managers, Organizational/Project Brand, and Fit of Duties with Personal Interests and Abilities.

Table 4 Ranking of factors by marital status

Sub-Criterion	Single		Married	
	Mean	Rank	Mean	Rank
F1	2.47	19	2.64	18
F2	2.50	18	2.39	19
F3	2.63	16	2.84	15
F4	3.34	11	3.34	10
F5	3.53	9	3.36	9
F6	2.91	14	3.05	13
F7	2.63	17	2.84	16
F8	2.13	20	2.09	21
F9	2.06	21	2.18	20
F10	2.78	15	2.68	17
F11	4.09	1	4.02	1
F12	3.56	7	3.84	3
F13	3.56	8	3.80	4
F14	3.72	5	3.55	7
F15	3.81	3	3.52	8
F16	4.09	2	3.98	2
F17	3.78	4	3.68	6
F18	3.69	6	3.70	5
F19	3.16	12	2.91	14
F20	3.47	10	3.27	11
F21	3.03	13	3.18	12

Table 5 Ranking factors by gender

Sub-Criterion	Male		Female	
	Mean	Rank	Mean	Rank
F1	2.51	18	2.66	19
F2	2.23	19	2.76	18
F3	2.57	17	3.03	15
F4	3.19	10	3.59	11
F5	3.32	9	3.62	8
F6	2.83	13	3.24	14
F7	2.62	16	2.97	16
F8	2.00	21	2.28	20
F9	2.06	20	2.24	21
F10	2.66	15	2.83	17
F11	3.96	2	4.21	1
F12	3.60	7	3.93	3
F13	3.64	5	3.79	6
F14	3.62	6	3.62	9
F15	3.53	8	3.83	4
F16	3.96	1	4.14	2
F17	3.66	4	3.83	5
F18	3.72	3	3.66	7
F19	2.77	14	3.41	13
F20	3.19	11	3.62	10
F21	2.91	12	3.45	12

4.2.3. Ranking by Age

As shown in Table 6, the most important motivational factors among young individuals aged 30 and under are: Good Interactions with Colleagues, Existence of Clearly Defined Duties, Fit

of Duties with Personal Interests and Abilities, Challenging, Competitive, and Dynamic Environment, and Organizational/Project Brand. Meanwhile, the most important motivational factors among individuals over 31 years old are: Good Interactions with Colleagues, Existence of Clearly Defined Duties, Good Interactions with Managers, Mutual Trust, and Variety of Duties.

4.2.4. Ranking by Expertise

Two main groups of civil and architectural engineers participated in the present study. As shown in Table 7, the most important motivational factors for civil engineers were: Recognition for Completed Work, Organizational/Project Brand, Good Interactions with Colleagues, Good Interactions with Managers, Fit of Duties with Personal Interests and Abilities. Meanwhile, the most important motivational factors for architectural engineers, in order, were: Good Interactions with Colleagues, Fit of Duties with Personal Interests and Abilities, Existence of Clearly Defined Duties, Challenging, Competitive and Dynamic Environment, Variety of Duties.

Table 6 Ranking of factors by age

Sub-Criterion	30 years or younger		31 years or older	
	Mean	Rank	Mean	Rank
F1	2.56	18	2.57	17
F2	2.62	17	2.29	19
F3	2.82	16	2.69	16
F4	3.32	11	3.36	9
F5	3.62	9	3.29	10
F6	3.00	14	2.98	14
F7	2.44	19	3.00	13
F8	2.21	20	2.02	21
F9	2.15	21	2.12	20
F10	2.94	15	2.55	18
F11	4.06	1	4.05	1
F12	3.71	6	3.74	3
F13	3.71	7	3.69	4
F14	3.79	4	3.48	8
F15	3.74	5	3.57	7
F16	4.06	2	4.00	2
F17	3.82	3	3.64	6
F18	3.71	8	3.69	5
F19	3.18	12	2.88	15
F20	3.62	10	3.14	11
F21	3.15	13	3.10	12

Table 7 Ranking of factors by expertise

Sub-Criterion	Civil Engineer		Architect	
	Mean	Rank	Mean	Rank
F1	2.53	18	2.69	18
F2	2.48	19	2.25	19
F3	2.72	16	2.88	15
F4	3.30	10	3.50	12
F5	3.45	9	3.38	13
F6	2.88	13	3.38	14
F7	2.77	15	2.69	17
F8	2.08	21	2.19	20
F9	2.13	20	2.13	21
F10	2.72	1	2.75	16
F11	3.98	3	4.31	1
F12	3.68	4	3.88	7
F13	3.63	8	3.94	6
F14	3.50	6	4.06	4
F15	3.58	2	3.88	8
F16	3.97	7	4.25	3
F17	3.57	5	4.31	2
F18	3.60	14	4.06	5
F19	2.83	1	3.69	10
F20	3.23	11	3.81	9
F21	2.97	12	3.69	11

4.2.5. Ranking by Education

As shown in **Error! Not a valid bookmark self-reference.**, the most important motivational factors for participants with less than one year of experience were: Good Interactions with Colleagues, Challenging, Competitive, and Dynamic Environment, Existence of Clearly Defined Duties, Fit of Duties with Personal Interests and Abilities, Variety of Duties. Meanwhile, the most important motivational factors for individuals with 1 to 5 years of experience, in order, were: Existence of Clearly Defined Duties, Good Interactions with Colleagues, Organizational/Project Brand, Fit of Duties with Personal Interests and Abilities, Good Interactions with Managers.

Table 8 Ranking factors by education level

Sub-Criterion	Bachelor's degree		Master's degree		PhD	
	Mean	Rank	Mean	Rank	Mean	Rank
F1	2.63	17	2.57	18	2.40	17
F2	2.58	18	2.43	19	2.07	19
F3	2.70	16	2.90	16	2.67	14
F4	3.30	11	3.86	4	2.73	12
F5	3.68	6	3.33	15	2.93	10
F6	2.88	12	3.48	13	2.60	15
F7	2.45	19	3.48	14	2.53	16
F8	2.18	20	2.24	21	1.73	21
F9	2.15	21	2.33	20	1.80	20
F10	2.83	14	2.90	17	2.20	18
F11	4.08	2	4.05	1	4.00	1
F12	3.63	8	4.05	2	3.53	4
F13	3.80	4	3.62	10	3.53	5
F14	3.63	9	3.76	7	3.40	7
F15	3.68	5	3.67	9	3.53	6
F16	4.10	1	4.05	3	3.80	2
F17	3.93	3	3.62	11	3.33	8
F18	3.65	7	3.86	5	3.60	3
F19	2.88	13	3.52	12	2.67	13
F20	3.33	10	3.81	6	2.80	11
F21	2.83	15	3.71	8	3.07	9

4.2.6. Ranking by experience

As shown in Table 9 For individuals with 6 to 10 years of experience, the factors, in order of importance, were: Good Interactions with Colleagues, Existence of Clearly Defined Duties, Mutual Trust, Organizational/Project Brand, Opportunity for Teamwork. Among individuals with more than 11 years of experience, the factors, in order of importance, were: Good

Interactions with Colleagues, Existence of Clearly Defined Duties, Variety of Duties, Good Interactions with Managers, Fit of Duties with Personal Interests and Abilities.

Table 9 Ranking of factors by work experience (years)

Sub-Criterion	Less than one year		One to five years		6 to 10 years		More than 11 years	
	Mean	Rank	Mean	Rank	Mean	Rank	Mean	Rank
F1	2.64	18	2.56	19	2.46	17	2.57	17
F2	2.64	17	2.67	18	2.00	19	2.30	19
F3	2.68	16	3.11	13	2.54	16	2.65	15
F4	3.00	13	3.89	6	3.62	5	3.09	10
F5	3.50	10	3.89	7	2.92	15	3.30	9
F6	3.00	14	3.00	16	3.15	14	2.87	12
F7	2.32	19	3.06	14	3.31	10	2.61	16
F8	2.23	21	2.28	20	1.92	20	1.96	21
F9	2.27	20	2.17	21	1.85	21	2.13	20
F10	3.27	11	2.78	17	2.31	18	2.39	18
F11	3.95	1	4.11	2	4.08	1	4.09	1
F12	3.59	7	3.94	5	3.54	6	3.78	4
F13	3.68	6	3.78	8	3.85	3	3.57	6
F14	3.91	2	3.61	11	3.46	8	3.43	7
F15	3.55	9	4.06	3	3.69	4	3.39	8
F16	3.91	3	4.33	1	4.00	2	3.91	2
F17	3.77	4	4.00	4	3.54	7	3.57	5
F18	3.73	5	3.72	9	3.31	11	3.87	3
F19	3.14	12	3.06	15	3.23	12	2.74	14
F20	3.59	8	3.67	10	3.38	9	2.87	13
F21	3.00	15	3.39	12	3.23	13	2.96	11

5. CONCLUSION

The effectiveness of human resource motivation among AE working in Iraq's construction sector was carefully assessed in this study. The study found and ranked important motivators using a structured questionnaire, offering insightful information for raising sector performance and productivity. The following is a summary of the key findings:

- Key Motivational Factors: For AE, Good Interaction with Colleagues, Existence of Clearly Defined Duties, Fit of Duties with Personal Interests and Abilities, Good Interactions with Managers, Variety of Duties are the most important motivational factors for the mentioned group.
- Significance of Organisational Climate: the study's findings highlight that Organizational Climate, Nature of Work and Current Tasks, and Career Development (Future Outlook) also

play significant roles in motivating the surveyed population.

- Impact of Social and Cultural Conditions: The study highlights how social and cultural aspects affect human resource motivation, emphasising the necessity of cross-cultural comparisons to deepen knowledge and extract useful insights.

In conclusion, it is important to note that creating sufficient motivation for AE depends on various factors. Considering these factors in designing human resource subsystems, such as job analysis, performance evaluation, compensation systems, training, and promotion programs, plays a crucial role in improving performance and increasing productivity. Additionally, motivation is one of the key factors in employee retention. Therefore, it is recommended that human resource management specialists in the construction industry design appropriate HR systems to provide the necessary conditions for enhancing employee motivation in the construction sector.

5.1. Future research

Future researchers are encouraged to undertake cross-cultural studies to explore the role of culture and societal conditions in motivating employees in the construction industry. In order to investigate the interdependencies and interactions among motivational elements in greater detail, future research might benefit from the use of statistical techniques like network analysis, correlation analysis, and structural equation modeling. Future studies can concentrate on analysing how engineers' motivation affects their output in Iraq's construction sector and suggesting methods to boost output via increased motivation.

6. REFERENCES

Aghayeva, K. and Ślusarczyk, B. (2019) ‘Analytic hierarchy of motivating and demotivating factors affecting labor productivity in the construction industry: The case of Azerbaijan’, Sustainability, 11(21), p. 5975. doi: https://doi.org/10.3390/su11215975 .

Alfaiz, S.K. , Abd Karim, S.B. and Alashwal, A.M. (2021) “Critical Success Factors of Green Building Retrofitting Ventures in Iraq”, International Journal of Sustainable Construction Engineering and Technology, 12(1), pp. 12–17. Available at: https://publisher.uthm.edu.my/ojs/index.php/IJSCET/article/view/6136 (Accessed: 3 December 2024).

Baddoo, N., Hall, T. and Jagielska, D. (2006) ‘Software developer motivation in a high maturity company: A case study’, Software Process: Improvement and Practice, 11(3), pp. 219–228. doi: https://doi.org/10.1002/spip.265 .

Bruton, S.V. et al. (2020) 'Personal motivations and systemic incentives: Scientists on questionable research practices', Science and Engineering Ethics, 26(3), pp. 1531–1547. doi: https://doi.org/10.1007/s11948-020-00182-9 .

Damci, A. (2016). Impact of Personal Demographics on Civil Engineers' Motivators: Case Study of Turkey. Journal of Management in Engineering, 32(2). doi: https://doi.org/10.1061/(ASCE)ME.1943-5479.0000406.

Damci, A., Arditi, D., Polat, G. and Turkoglu, H. (2020). Motivation of civil engineers and architects in Turkey. Organization, technology & management in construction : an international journal, [online] 12(1), pp.2044–2052. doi: https://doi.org/10.2478/otmcj-2020-0001.

Dwivedula, R. and Bredillet, C.N. (2010). Profiling work motivation of project workers. International Journal of Project Management, 28(2), pp.158–165. doi: https://doi.org/10.1016/j.ijproman.2009.09.001.

Funso, A., Sammy, L. and Gerryshom, M. (2016). Impact of Motivation on Productivity of Craftsmen in Construction Firms in Lagos, Nigeria. International Journal of Economics and Finance, 8(4), p.271. doi:10.5539/ijef.v8n4p271

GERMANN, M.(2004) Influence of project managers on the motivational factors of a project team. 13th International Conference on Management of Technology IAMOT, Washington, DC. April, 2004.

Hall, T., Baddoo, N., Beecham, S., Robinson, H. and Sharp, H. (2009). A systematic review of theory use in studies investigating the motivations of software engineers. ACM Transactions on Software Engineering and Methodology, 18(3), pp.1–29. doi: https://doi.org/10.1145/1525880.1525883.

Hartmann, A. (2006). The role of organizational culture in motivating innovative behaviour in construction firms. Construction Innovation, [online] 6(3), pp.159–172. doi: https://doi.org/10.1108/14714170610710712.

Hatem, W.A., Abd, A.M. and Abbas, N.N. (2018). Barriers of Adoption Building Information Modeling (BIM) in Construction Projects of Iraq. Engineering Journal, 22(2), pp.59–81. doi:https://doi.org/10.4186/ej.2018.22.2.59.

Hewage, K.N. and Ruwanpura, J.Y. (2006). Carpentry workers issues and efficiencies related to construction productivity in commercial construction projects in Alberta. Canadian Journal of Civil Engineering, 33(8), pp.1075–1089. doi: https://doi.org/10.1139/l06-050.

J.Dakhil, A., M.Naji, Z. and K.Faleh, S. (2017) "FACTORS AFFECTING CONSTRUCTION LABOUR PRODUCTIVITY IN IRAQ USING BASRA CITY AS A CASE STUDY", Kufa Journal of Engineering. Kufa, Najaf, IRAQ, 8(3), pp. 55–75. doi:https://doi.org/10.30572/2018/KJE/8031157.

Johari, S. and Jha, K.N. (2020). Impact of Work Motivation on Construction Labor Productivity. Journal of Management in Engineering, 36(5), p.04020052. doi:https://doi.org/10.1061/(ASCE)ME.1943-5479.0000824.

Jurkiewicz, C.L., Massey, T.K. and Brown, R.G. (1998) 'Motivation in public and private organizations: A comparative study', Public Productivity & Management Review, 21(3), p. 230. doi: https://doi.org/10.2307/3380856.

Kim, S., Kim, J.-D., Shin, Y. and Kim, G.-H. (2015). Cultural differences in motivation factors influencing the management of foreign laborers in the Korean construction industry. International Journal of Project Management, 33(7), pp.1534–1547. doi:https://doi.org/10.1016/j.ijproman.2015.05.002.

Locke, E.A. (1968). Toward a Theory of Task Motivation and Incentives. Organizational Behavior and Human Performance, [online] 3(2), pp.157–189. doi: https://doi.org/10.1016/0030-5073(68)90004-4.

Maloney, W.F. (1983). Productivity Improvement: The Influence of Labor. Journal of Construction Engineering and Management, 109(3), pp.321–334. doi: https://doi.org/10.1061/(ASCE)0733-9364(1983)109:3.(321)

Maloney, W.F. and McFillen, J.M. (1986). Motivational Implications of Construction Work. Journal of Construction Engineering and Management, 112(1), pp.137–151. doi:https://doi.org/10.1061/(ASCE)0733-9364(1986)112:1.(137)

Momade, M.H. and Hainin, M.R. (2019) 'Identifying motivational and demotivational productivity factors in Qatar Construction Projects', Engineering, Technology & Applied Science Research, 9(2), pp. 3945–3948. doi: https://doi.org/10.48084/etasr.2577 .

Oyedele, L.O. (2010). Sustaining architects' and engineers' motivation in design firms. Engineering, Construction and Architectural Management, 17(2), pp.180–196. doi: https://doi.org/10.1108/09699981011024687.

Oyedele, L.O. (2013). Analysis of architects' demotivating factors in design firms. International Journal of Project Management, 31(3), pp.342–354. doi:https://doi.org/10.1016/j.ijproman.2012.11.009.

Rayner, J.C.W. and Livingston, G. (2020). The Kruskal–Wallis tests are Cochran–Mantel–Haenszel mean score tests. METRON, 78(3), pp.353–360. doi:https://doi.org/10.1007/s40300-020-00192-4.

S. Tofan, A. and K. Breesam, H. (2018). Identify the Appropriate Key Performance Indicators for Evaluating the Performance of Construction Companies in Iraq. International Journal of Engineering & Technology, 7(4.20), p.459. doi: https://doi.org/10.14419/ijet.v7i4.20.26243.

Shih, T.-H. and Fan, X. (2009). Comparing response rates in e-mail and paper surveys: A meta-analysis. Educational Research Review, 4(1), pp.26–40. doi: https://doi.org/10.1016/j.edurev.2008.01.003.

Sugathadasa, P.T.R. et al. (2021) 'Motivation factors of engineers in private sector construction industry', Journal of Applied Engineering Science, 19(3), pp. 795–806. doi: https://doi.org/10.5937/jaes0-29201.

Wiley, C. (1997). What motivates employees according to over 40 years of motivation surveys. International Journal of Manpower, [online] 18(3), pp.263–280. doi: https://doi.org/10.1108/01437729710169373.

Yasser S. Nassar, Y. S. N. and Khaleel, T. (2019) "BUILDING MODEL TO PREDICT LABOUR PRODUCTIVITY USING MULTIPLE LINEAR REGRESSION TECHNIQUE FOR 'FORMWORK CONCRETE COLUMNS' ", Kufa Journal of Engineering. Kufa, Najaf, IRAQ, 10(2), pp. 12–26. doi: https://doi.org/10.30572/2018/KJE/100202 .