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Potential management factors influencing the construction projects

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Project management is the application of specialized knowledge, abilities, techniques, and methodologies to deliver something of value to people. To measure these applications, terms such as productivity, performance, and efficiency are utilised. In addition, construction is a highly competitive industry that necessitates the enhancement of management-oriented aspects. Thereby, this study focused on identifying the potential management factors that influence construction projects. From the literature, the factors were collected and grouped as organisation system, operational management, management & control, management & limitation, and recruitment & selection. Questionnaire survey was opted as the research method and was completed among the frontline practitioners in the Indian construction industry. As a result, 108 responses were analysed using the frequency tests, reliability tests, and the Relative Importance Index (RII). The findings highlight the importance of resource availability, individual learning, decision making, proper work design, and resource allocation as the most influencing management factors. Moreover, this study provides improved insights for management teams and allows them to focus on the influencing factors that are necessary to execute a project successfully.

Key words:
construction management, productivity, organisation system, management factors, operational management

Izvorni znanstveni rad

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Potencijalni čimbenici upravljanja koji utječu na građevinske projekte

Upravljanje projektima je primjena specijaliziranih znanja, sposobnosti, tehnika i metodologija kako bi se ljudima pružila određena vrijednost. Za mjerenje uspješnosti primjene takvih znanja koriste se pojmovi kao što su produktivnost, performanse i učinkovitost. Osim toga, građevinarstvo je vrlo konkurentna industrija koja zahtijeva poboljšanje aspekata orijentiranih na upravljanje. Stoga se ovo istraživanje usmjerilo na prepoznavanje potencijalnih čimbenika upravljanja koji utječu na građevinske projekte. Faktori prikupljeni iz literature su grupirani kao organizacijski sustav, operativno upravljanje, upravljanje i kontrola, upravljanje i ograničenja te zapošljavanje i selekcija. Kao metoda istraživanja odabran je upitnik, a istraživanje je provedeno među stručnjacima u indijskoj građevinskoj industriji. 108 odgovora analizirano je primjenom testova učestalosti, testova pouzdanosti i indeksa relativne važnosti (engl. Relative Importance Index - RII). Nalazi su istaknuli važnost dostupnosti resursa, individualnog učenja, donošenja odluka, pravilne organizacije rada i raspodjele resursa kao čimbenike upravljanja koji imaju najznačajniji utjecaj. Ovaj rad pruža poboljšane uvide za menadžerski tim i omogućuje im da se usredotoče na čimbenike utjecaja koji su nužni za uspješno izvršenje projekta.

Ključne riječi:
upravljanje izgradnjom, produktivnost, organizacijski sustav, čimbenici upravljanja, operativni menadžment

1. Introduction

Effective project management is essential for increasing construction performance [1]. The performance of an organization or management is mostly measured in terms of productivity. Thus, many researchers frequently used the word "productivity" for the development of the construction industry. Moreover, productivity is a significant determinant of the economy as a whole [2] and it is critical for construction firms' competitiveness, achievement of set goals, and fulfilment of stakeholder value propositions [3]. Similarly, improving productivity is a method of achieving economic growth, raising the standard of living, and hence achieving better value for money [4]. Furthermore, optimal productivity is referred to as the highest sustainable level of output that is possible under standard management [5-7]. Meanwhile, Hanna and Heale [8] stated that declining productivity is a complex issue and problems within the management's control must be corrected. Additionally, they mentioned that increasing productivity is widely recognized as a management function. Consequently, the management factors serve as the production or process function in the transformation of inputs into outputs.

However, performance is a fundamental aspect of project management. Therefore, quantifying and enhancing performance has remained a primary concern for all project stakeholders [9]. Similarly, measuring the success or failure of a construction project seems simple, but it is quite a complex process [10]. Additionally, Horner and Zakieh [11] explained the 80/20 rule that 80 % of the results depend on 20 % of the actions. Moreover, they stated that the 80/20 rule can be applied to construction projects for developing new methods of cost estimation and control. Ineffective management is widely regarded as the primary cause of low construction productivity [12]. Thus, these statements emphasise the critical role of management factors (20) in maximising the output (80) by controlling the process.

In the construction industry, project management practices play a significant role in terms of information, communication, technology-driven changes, and the unpredictable nature of socio-political forces [13]. Due to the complexity of construction and the inherent difficulty in isolating the effect of causal factors, estimating the impact and cost of construction projects is becoming increasingly difficult [9, 14]. Accordingly, the first objective of this study was to collect and prioritize management factors from the literature, the second was to analyse and evaluate the significance of the influencing factors, and the third was to suggest a feasible solution based on the obtained results.

2. Literature review

Chan and Kaka [15] conducted a survey among contractors, and their study represents one of the first attempts in the UK to collect the perspectives of management personnel on the potential for enhancing the construction industry. They stated that the purpose of productivity estimation in a people-oriented industry is to increase output while maintaining the same input. As a result, they concluded there is a strong need to improve the areas of supervision, communication, retention of skilled labour, simple building design, and information flow management.

Zhai et al. [16] examined the impact of Human Resource (HR) practices and Organisational Learning (OL) on construction firm performances in China. They conducted the survey and the data were analysed using structural equation modelling (SEM). The findings indicate that OL acts as a moderator in the relationship between HR practices and organizational performance. Moreover, the result implies that construction firms should perceive OL as a critical element of competitive advantage throughout the organization's development process, and invest in improving OL through enhanced HR practices.

Abdul Rasid et al. [17] analysed the extent to which one public agency had adopted project management knowledge areas in terms of project integration, scope, duration, cost, quality, human resource management, communication, risk management, and procurement. They revealed that the majority of respondents believed all of these project management knowledge areas were essential for managing construction projects.

Espinosa-Garza et al. [18] attempted to improve productivity and the management of construction projects to maximize the efficiency and effectiveness of resources. The case study among the two Mexican companies was evaluated and data were processed over two years. The findings showed that the planned value of an estimated project without standardized data has a higher percentage of error in comparison to a project with standardized data. As a result, they stated that the lack of standardization of data will reduce productivity and increase investment.

Ghodrati et al. [19] stated that in order to increase labour productivity on construction projects, it is necessary to identify and acknowledge the effects of management strategies. In this study, the effects of 9 management strategies were examined on labour productivity, and it was discovered that construction projects with greater implementation of management strategy resulted in increased labour productivity. In construction projects, communication, incentive programs, and labour management were observed to have the strongest relationship with labour productivity.

Haugbølle et al. [20] aimed to increase the understanding of construction output by focusing on the changes in the quantity of products, their characteristics, and the composition of the aggregate. Their findings indicated that the construction cost almost tripled over the past 50 years and improvements in technical performance accounted for only approximately 20 %. They also suggested that identifying and analysing the long-term factors will assist the growth of the construction industry, and could help improve productivity.

Gurmu and Ongkowijoyo [21] developed a logistic regression model for estimating construction project productivity based on the extent to which HR management practices are planned or implemented. They stated that effective HR management can help businesses to avoid unnecessary expenses associated with low productivity. In addition, they stated that the implementation

of construction management techniques varies from company to company, and a lower level of implementation is always associated with a lower level of productivity. From the model result, the relationship between firm size and human resource management practices was found to be both positive and significant.

In summary, as the firm size increases, the demand for HR management, OL, organisation systems, and management strategies increases significantly. Similarly, the management factors in each phase of the project contribute directly to the productivity and success of the project. Thereby, this study focused on identifying the potential management factors influencing construction projects.

3. Context of this study

Construction productivity provides the basic information for cost estimates, budget planning, and scheduling of construction activities [22, 23]. Management practices for increasing productivity can vary considerably between project types and countries, as well as between different local construction markets [24]. Similarly, inadequate planning and management during the preconstruction phase result in conflicts during the construction phase [25, 26]. Moreover, Durdyev et al. [27] stated that the management team are accountable for the productivity results.

To achieve economic growth and improve the lives of their citizens, developing countries face challenges in utilising their available resources [28]. Among the available resources, labour is undoubtedly the most valuable in the construction industry [29, -30]. In Asian countries, manpower forecasting is stated as a rare occurrence [29]. Additionally, Yates [31] stated that in India, if the management is effective, productivity for earthwork tasks can be up to four times that of standard measures. Furthermore, 92 % of workers are employed in informal employment [32] and the two most significant factors affecting productivity are found to be ineffective HR management and labour strikes [10]. Moreover, inefficient workforce management can account for up to 65 % of total work hours on a project [33]. Along with the availability of resources, other management factors were considered in this study. Furthermore, Agrawal and Halder [34] stated that the majority of Indian construction projects are facing time overruns and delays. Therefore, it is important to evaluate the management factors among the construction practitioners to improve the execution of projects. The factors acquired from the literature are detailed in Table 1.

Table 1. Groups, statements, and references of the factors involved in this study

Group	ID	Statement	References
Organization System [OS]	OS1	A well-defined organizational hierarchy results in a better management process.	[16, 19, 21, 24, 27, 31]
	OS2	Organizational practices and organizational culture have a direct impact on management performance.	[16, 27, 35, 36]
	OS3	Formulating organizational strategies improves management performance.	[16, 24, 31, 36]
	OS4	Organizations encouraging individual learning emphasize better performance.	[1, 16, 31, 36-39,]
Operational Management [OM]	OM1	Proper planning of work designs and participation impacts management performance.	[16, 19, 24, 40]
	OM2	Assigning proper responsibility to the worker should be facilitated by the management.	[16, 19, 24, 40]
	OM3	Adoption of advanced technology can enhance project performance.	[1, 16, 19, 35, 41]
	OM4	Right decision-making resembles proper management practices.	[16, 19, 24, 42]
	OM5	Knowledge about ergonomics helps in achieving long-term performance.	[16, 43, 44]
Management & Control [MC]	MC1	Management should control the errors prior by proper planning of activities.	[16, 24, 35, 39, 45-47]
	MC2	Proper leadership and coordination have to be maintained by the management.	[16, 24, 35, 39, 42, 46]
	MC3	Management should provide proper services and maintenance to the workers.	[16, 19, 24, 31, 39]
	MC4	Management should focus on crew development.	[16, 19, 24, 39, 48, 49]
	MC5	The allocation of resources should be well planned by management.	[1, 16, 24, 31, 39, 40, 50]
Management & Limitation [ML]	ML1	Improper cash flow affects the project's performance.	[1, 27, 31, 51]
	ML2	The management performances are limited by economic and market conditions.	[1, 27, 31, 45, 51]
	ML3	Contractual limitations have an impact on the management process.	[24, 52-54]
	ML4	The project's execution varies depending on the availability of resources.	[1, 16, 31]
Recruitment & Selection [RS]	RS1	Selection of contract & sub-contract influences the project performance.	[24, 27, 36, 46, 53, 55]
	RS2	The selection of labour emphasizes management performance.	[1, 16, 19, 24, 27, 31, 38]
	RS3	The size and selection of the crew impact the management performance.	[16, 19, 21, 36, 38, 55, 56]

4. Methodology

From the literature, the management factors for this study were collected. Based on the nature and measure of the factors, they were grouped under a specific category to predict the individual and the group effect of the selected factors. Thus, the questionnaire was framed by involving these factors as a statement. Accordingly, the statements involved in the questionnaire and their respective groups are presented in Table 1. To evaluate the potential management factors influencing the construction projects, this study opted questionnaire survey as the research method. The questionnaire contains two sections and was developed in consultation with experts. Consequently, the survey's content and structure were revised to make it more appealing and increase the likelihood that respondents would finish it. Moreover, the survey was targeted to identify the potential management factors that influence construction projects. Thereby the data were collected from responsible or frontline industry professionals in the construction industry (i.e., owners, engineers, architects, project managers, consultants, contractors, and academicians). The questionnaire was randomly distributed to 150 Indian construction practitioners through mail and post. The respondents were instructed to complete the questionnaire using a five-point Likert scale to determine the influence of each factor (very low-1; low-2; neutral-3; high-4; very high-5). The total of 108 responses were received from practitioners and their demographic information is shown in Table 2. Overall, this survey obtained the response rate of 72 %. From the obtained data, frequency tests, reliability, quartile tests, and the RII were analysed and appropriate solutions were suggested based on the results.

5. Results and findings

5.1. Respondent information

The process of planning and organising the available resource for obtaining the targeted goal is termed management. Management incorporates each and every aspect of a process or production. Accordingly, to evaluate the influence of management factors among the construction practitioners, the questionnaire was distributed to owners, engineers, project managers, architects, consultants, contractors, and academicians in the Indian construction industry. Among them, most of the responses were obtained from the engineers (38.9 %) and owners (22.2 %). Moreover, the working experience was measured in years and the minimum of 3 years is considered as the time for gaining expertise in a field. From Table 2, the experienced practitioners accounted for more than 70 % of the total response in this study. Additionally, the questionnaire survey includes the organization's turnover for categorizing each organization as micro (less than 5 crores), small (5–75 crores), medium (75–250 crores), or large (above 250 crores). From the survey results, 50 % of the responses were received from organizations with a turnover of less than 5 crores and the response from organizations with turnover above 250 crores accounted for approximately 23.1 %. Usually, in micro and small-scale projects, the engineers and owners manage the projects from start to end. Therefore, the data collected will provide pertinent information about the management factors influencing Indian construction projects.

Table 2. Respondents' information

Parameter		Frequency	Percent
Designation of the respondent			
Owner		24	22.2
Consultant		11	10.2
Project manager		16	14.8
Engineer		42	38.9
Others		15	13.9
Experience in the construction industry			
1-3 years		26	24.1
4-10 years		31	28.7
11-20 years		28	25.9
Above 20 years		23	21.3
The size of the organization in terms of turnover			
< 5 crore	< 568.706,90 EUR	54	50
5-75 crore	568.706,90 - 8.530.603,50 EUR	13	12
75-250 crore	8.530.603,50 - 28.435.345,00 EUR	10	9.3
> 250 crores	> 28.435.345,00 EUR	25	23.1
Government / NGO		6	5.6
Total		108	100

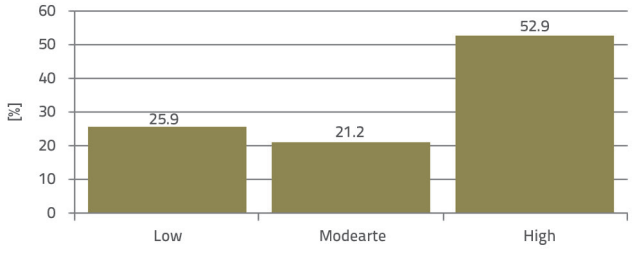
Note: In the Indian monetary system. crore is used and it denotes ten million Indian rupee, at which 1 EUR = 87.9142 rupee). 1 crore = 10.000.000.00 rupee = 113.741,38 EUR (January 2023)

5.2. Data quartiles

Quartiles are used to divide continuous data (survey results) into multiple equal groups and represent the acquired data in terms of different levels (i.e., low, medium, and high). In the present sample of 108 responses, the 25th percentile level (Q1) falls at 83, the median (Q2) is at 88, and the 75th percentile level (Q3) is at 95.25. A score below Q1 indicates a low level, between Q1 and Q3 indicates a medium level, and above Q3 indicates a high level. Moreover, Figure 1 illustrates the percentage of data obtained at the low, medium, and high quartiles. However, the 108 responses indicate the opinions of 108 respondents. In particular, 52.9 % of data fall in the high category, indicating that 52.9 % of respondents who participated in this study had provided a high value to the selected management factors. Similarly, 25.9 % of data fall at the low level and 21.2 % of data fall at a moderate level. In addition, more than half of the respondents provided the higher value, indicating a greater acceptance of the influence of management factors. Furthermore, to examine the percentage of quartiles based on the practitioners' experience, another quartile test was conducted.

Figure 2 depicts further division of the quartile based on the respondents' experience. By comparing the percentage of quartiles, the greater percentages can be seen at the high level

than at the low and moderate levels. For example, the percentage of respondents with more than 20 years of experience is 3.7 % at the low level and 13 % at the high level. Similarly, the percentage of respondents with 4–10 years of experience is 7.4 % at the low level and 16.7 % at the high level.



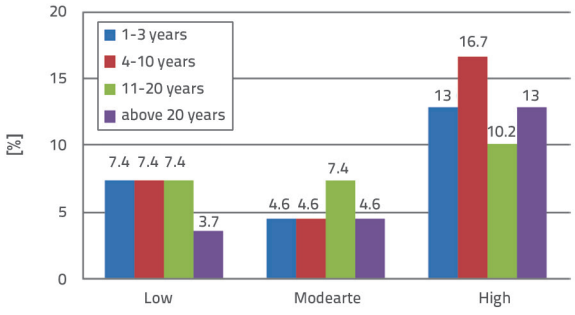


Figure. 1. Levels of management factors

Figure. 2. Levels of management factors based on respondent's experience

5.3. Reliability test

The homogeneity of variables in the questionnaire was determined using Cronbach's alpha. Similarly, the value for this questionnaire data was computed using SPSS. Cronbach's alpha value is considered low when it is less than 0.3; whereas, a value of 0.7–0.9 is considered reliable and good [57]. The reliability test results for the management factors are provided in Table 3. The overall value of 0.913 indicates that the survey data is more consistent and reliable.

Table 3. Cronbach's alpha results

Factor	Cronbach's alpha
Organization System - OS	0.893
Management & Control - OM	0.892
Management & Control - MC	0.899
Management & Limitation - ML	0.906
Recruitment & Selection - RS	0.900
Overall	0.913

5.4. Relative importance index

The data analysis was conducted using the RII method, as suggested by Doloi [58] and Vigneshwar et al. [57]. Where W denotes the weight assigned by respondents to each factor (in this case, in the range of 1 to 5), A denotes the highest weight

Table 4. RII and ranking results

ID	Owner		Contractor		Consultant		Architect		Project manager		Engineer		Academician		All response			Group-wise	
	RII	*R*	*RII*	*R*	*RII*	*R*	*RII*	*R*	*RII*	*R*	*RII*	*R*	*RII*	*R*	*RII*	*R*	*RG*	*RII*	*R*
OS1	0.791	21	0.855	4	0.734	14	0.8	14	0.800	4	0.834	9	0.842	14	0.812	20	4		
OS2	0.867	8	0.764	19	0.867	3	0.825	8	0.800	4	0.667	21	0.842	14	0.830	15	3		
OS3	0.881	4	0.837	8	0.800	8	0.788	17	0.767	12	0.800	17	0.850	11	0.843	9	2		
OS4	0.886	3	0.819	11	0.734	14	0.863	3	0.800	4	0.867	3	0.875	6	0.863	2	1*	0.837	4
OM1	0.877	5	0.819	11	0.800	8	0.875	2	0.700	21	0.834	9	0.892	3	0.860	4	2		
OM2	0.853	11	0.837	8	0.867	3	0.788	17	0.734	16	0.834	9	0.875	6	0.839	10	3		
OM3	0.834	16	0.873	2	0.934	1*	0.825	8	0.834	2	0.800	17	0.825	19	0.836	13	4		
OM4	0.910	1*	0.782	16	0.600	21	0.85	4	0.800	4	0.867	3	0.875	6	0.863	2	1*		
OM5	0.862	9	0.8	15	0.934	1	0.825	8	0.734	16	0.834	9	0.825	19	0.836	13	4	0.847	1*
MC1	0.843	15	0.764	19	0.734	14	0.763	21	0.800	4	0.834	9	0.850	11	0.819	17	5		
MC2	0.877	5	0.782	16	0.734	14	0.888	1*	0.767	12	0.834	9	0.875	6	0.856	6	2		
MC3	0.858	10	0.855	4	0.800	8	0.775	19	0.800	4	0.867	3	0.842	14	0.838	11	3		
MC4	0.848	13	0.837	8	0.867	3	0.838	6	0.800	4	0.834	9	0.825	19	0.838	11	3		
MC5	0.877	5	0.928	1*	0.800	8	0.825	8	0.734	16	0.900	1*	0.850	11	0.860	4	1*	0.842	2
ML1	0.853	11	0.819	11	0.667	19	0.85	4	0.800	4	0.900	1*	0.900	1*	0.854	8	2		
ML2	0.805	19	0.746	21	0.800	8	0.813	12	0.734	16	0.867	3	0.892	3	0.819	17	3		
ML3	0.829	17	0.819	11	0.867	3	0.775	19	0.734	16	0.867	3	0.859	10	0.825	16	4		
ML4	0.891	2	0.855	4	0.800	8	0.813	12	0.834	2	0.867	3	0.884	5	0.867	1*	1*	0.841	3
RS1	0.848	13	0.873	2	0.667	19	0.838	6	0.867	1*	0.834	9	0.900	1*	0.856	6	1*		
RS2	0.824	18	0.782	16	0.734	14	0.8	14	0.767	12	0.767	19	0.842	14	0.812	20	3		
RS3	0.805	19	0.855	4	0.867	3	0.8	14	0.767	12	0.734	20	0.842	14	0.813	19	2	0.827	5

ID - indicator, R - ranking among the factors, RG - ranking of factors within the group,* indicates the top ranking factor

(in this case, equal to 5), and N denotes the total number of respondents (i.e., 108 in this study). The analysis findings were ranked as shown in Table 4.

RII = SW / (A x N)

Based on the RII value, the influence of the management factors can be classified as low (less than 0.500), medium (0.500–0.700), and high (above 0.700). From Table 4, all management factors are rated as high and indicate the higher respondent's acceptance to the influence of management factors on the construction projects.

6. Discussion

In the performance management of any organisation or company, productivity modelling and the identification of relevant trends and causes have become absolutely essential [59]. Moreover, productivity affects the overall performance of any organization, whether it is large or small [60, 61]. Furthermore, the construction industry is competitive and participants must increase their productivity performance in order to survive [62]. Thus, the management factors act as the predominant factors in determining the productivity of any construction project. This study therefore focused on the potential management factors influencing construction projects.

From the survey results, most of the responses were provided from practitioners with four or more years of experience and constituted approximately 70 % of the total, as shown in Table 2. Therefore, this data is considered valid for analysis and discussion of the management factors influencing construction projects. To determine the levels of acceptance by the respondents, the quartiles were considered. As illustrated in Figures 1 and 2, the majority of responses fall into the high-level category and imply higher percentage of acceptance to the selected management factors. Moreover, to demonstrate the relative importance of management factors, the RII was analysed, and the following sections discuss further classifications based on the top influencing factors and grouping effects.

6.1. Influencing groups

From Table 4, the top influencing group was found to be OM with the RII value of 0.847. OM is a term that refers to a measure of management's performance in operating a task in terms of work design, responsibility assignment, adoption of technology, decision-making, and long-term development. It also explains the capability of the management in carrying out the task or activity in their unique way. The second most influential group was found to be MC with the RII value of 0.842. Although the outcome of a project or activity can vary, the management's stability is determined by how they handle the factors within their control. Consequently, concentrating on the controllable aspects of management will always produce superior outcomes. Here, the MC attributes the factors like pre-planning, leadership and coordination, providing proper services to the workers/employees, crew development, and allocation of resources.

The findings from the most influencing groups demonstrate the value of pre-planning management activities, and it has a constant effect on a project's operation and success. Thus, the proper planning and operation of projects can affect up to 30 % of a project's cost [40]. Similarly, proper planning can reduce the substantial source of rework. The researchers discovered that the design stage could account for up to 79 % of all rework [63]. Ineffective planning and scheduling are considered the cause of delays and rework, but they also have a significant impact on unnecessary human efforts, supervision, and wastage of resources [64, 65]. Thus, focusing on the factors of operational management and management control can enhance the execution of projects.

6.2. Influencing factors

From Table 4, ML4 was found to be the most influencing factor with the RII value of 0.867. This is attributed to the importance of resource availability during project execution. The availability of resources (i.e., man, material, machine, and money) plays a significant role in every construction project. Among the resources, the human factor is the dynamic element of project success [66, 67] and causes further variations in terms of skill, crew, etc. As labour is the most adaptable resource available to management, most researchers and practitioners have concentrated on increasing construction labour productivity [68]. Meanwhile, OM4 and OS4 are the second most influential factors with the RII value of 0.863. This emphasizes the importance of individual learning and decision-making in an organization. In this technologically advanced decade, individual continuous learning is essential and organizations should promote individual learning for long-term development. The learning process is assumed to be more significant in labour-intensive industries because automated work is constrained by the fact that machines cannot benefit from prior experience and thus continuous learning can increase the production rate [69]. Similarly, decision-making is viewed as a critical component of success from the management perspective. Moreover, based on experience and personal value, decision-making can be significant and it prioritizes the business value [19]. Thus, experienced professionals are appointed to ensure an organization's continued growth. During the actual construction phase, the necessary decisions on the practical implementation will enhance productivity [24].

The third most influential factors with the RII value of 0.860 are OM1 and MC5. This demonstrates the significance of proper work design and allocation of resources by management. This result is in line with the findings of Peng et al. [70], as they estimated that workforce planning can save approximately 9.2 % on total installed costs. Thus, proper work design and workflow forecasting are critical to increasing productivity [71]. In global insights, business management reflects quality and flexibility [72]. Furthermore, the efficient and effective use of resources demonstrates proper

management control. The resource allocation decisions made at the activity level have a significant impact on a project's overall time and cost schedules [73, 74].

Among the recruitment and selection group, RS1 was found to be the important factor, and it is attributed to the selection of contractors and sub-contractor. The selection of an appropriate contractor or subcontractor enables on-time completion, cost control, and an increase in the organization's value.

Overall, the selected factors emphasise the importance of the project manager in the construction industry [75]. Thus, within the scope of project management activities, the project manager must continuously evaluate and synchronise the management approaches with which he controls project execution [76]. Moreover, Ljevo and Vukomanović [77] stated that the importance of individual quality factors varies during different phases of construction projects based on management perspectives. Thus, developing a standard model for measuring the management effort can help in better visualisation of the whole project.

7. Recommendations

By concentrating on these management factors, it is possible to structure the process of converting the available input to the desired output. Focusing on these management factors can increase project productivity, which benefits the entire industry [24]. Therefore, it is necessary to manage the fluctuations in terms of resources (labour, material, machinery, and capital), and policymakers should standardize the management practices. Hence, predicting the labour/crew outturn, encouraging unionization [32], prioritizing the scheduling activities, and implementing the knowledge of construction management practices increase the percentage of successful completion.

The availability of resources fluctuates continuously across different locations (particularly the labour force). This is due to the presence of an excess non-unionized labour force. Similarly, the allocation of resources is found to be the major constraint. Thus, a need for a proper estimate of the workforce, equipment, and efficiencies is required to enhance the proper allocation of the resources. As the availability and allocation of resources are completely interrelated, the development of a tool to compute the total availability of resources (particularly the labour force) and analyse efficiencies (skill, experience, etc) can aid in enhanced prediction. Proper prediction of available resources can aid in the better planning and scheduling of construction activities.

Usually, organizations transfer part of a project to a contractor/subcontractor and every transfer process involves contracts and commissions. As the number of transfers increases, the initial capital investment and risk will increase. Similarly, the quality of the project will decrease. Additionally, the selection of contractors and sub-contractors plays an essential role in project success in terms of budget, schedule, and disputes. Accordingly, the performance assessment of the contractor and sub-contractor has to be initiated and progressed.

8. Conclusion

This study evaluated the importance of management factors by analysing the perception of construction practitioners. The management factors involved in this study were collected from the literature review and grouped as organisation system, operational management, management & control, management & limitation, and recruitment & selection. To evaluate the influencing management factors, this study conducted a questionnaire survey among Indian construction practitioners. The total of 108 responses were collected, and the data were analysed using SPSS software. The findings of the study demonstrate the importance of the availability of resources, individual learning, decision making, proper work design, and resource allocation by management as the top influencing factors. Consideration of these management factors by an organization can assist in better achievement of project results. In addition, the results of this study can help construction practitioners in determining the importance of the management factors. Moreover, a systematic model and stable management framework are required for the construction industry. Accordingly, from the factors and group in this study, a model can be developed for further prediction of management influences on project performance. To achieve an organization's objectives, future research will emphasise a long-term model for measuring management performance in the construction industry. Similarly, future studies can focus on implementing the management framework for micro, small, and medium organisations.

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