

A Review on Key Performance Indicators for Measuring Real Estate Project Success

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ABSTRACT

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real estate, construction sector, customer satisfaction, success factor, key performance indicators, budget, project management, scheduling

The purpose of this study is to find numerous key performance indicators for measuring real estate project success. A Systematic literature review was adopted to achieve the research objective. The main objective of a systematic literature review is to identify, evaluate, and synthesize existing research. A total number of "82" papers from ABDC journals and other journals and conference papers, including thesis, book chapters, were used to identify all the success factors. The study reveals that most of the previous studies have considered three-factor cost, quality, and time, but a few factors have taken other success factors such as budget, schedule, client satisfaction, project manager competence. So there is a dire need to explore additional determinants as the real estate project success is influenced by several other variables. After the systematic literature review there are many other performance indicators such as customer satisfaction, budget, manager qualification and schedule are becoming important for good performance of construction project. The findings of the study have numerous suggestions and these implications are not only for the educational area but also for the construction sector. The study provides a direction for construction organizations and the researcher's future studies.

1. INTRODUCTION

The real estate industry attracts the most attention as compared to other industry and the construction sector plays a vital role in improving the fiscal development of any country [1-3]. The national budget is greatly affected by the performance of the construction industry. Infrastructure development is one of the main key tools for the financial development of a country. There is a dire need to improve the performance in the construction industries across the world economies. The purpose of the project management team is to achieve successful outcomes of the construction projects. The performance measures are considered as the important indicators in an organization that help identifying whether a process of activities undertaken or a progression of outputs achieves the organizational objectives.

In 2019, construction sector invested Rs 43,780 crore. The real estate sector directly employs sixteen percent of the workforce [4]. It will generate an increase in employment and growth of the economy in large numbers [5]. The construction sector creates a major contribution to employment. It is expected to be 30 percent higher than in the next era. In the present scenario's real estate sector, to achieve a competitive advantage over the firms, the success and efficiency of each project are required. Every business aims to achieve success and profit. The real estate sector is a project-based business and its success are determined by the project's success to a great extent. So, there's a need to discover the critical success aspect of the building industry [6]. The project is considered to be successful if it is completed in time, with a lesser cost

and meets the quality requirements [7, 8]. This is a traditional way of measuring the project success. By undertaking this research, we attempted to explore the other significant components that play a crucial role in the project success. Time, cost, and quality factors are the main factors for measuring project success. The study highlighted the seven indicators of project performance, namely: time, cost, quality, budget, schedule, client satisfaction, and project manager competency. Therefore, this study will provide future directions for the researchers and the real estate sector. Similarly, it will also help Real Estate developers, contractors for framing, and revising policies and strategies [9]. This study could help in improving their organizational performance regarding the ongoing projects. A number of key performance indicators (KPIs) were proposed in order to measure and evaluate the performance of the projects as well as the organizations in the construction industry. The performance can be measured by establishing KPIs and such KPIs provide objective criteria for measuring the project success [10]. The performance of a construction project has been assessed by the traditional factors such as time, cost and quality. With respect to the project success, majority of the studies have focused on time, cost, quality [11-16]. KPIs have been deliberated to reflect the worth of output or the outcomes related to the key aspects of a project. Some of the performance areas are common to the list, but there is no general consensus in the literature on the factors that need to be considered to measure the project success [12]. The review of the extant literature suggests that the performance evaluation of the construction projects has been gradually shifting beyond the traditional

measures. The several researchers suggest that in addition to the iron triangle measures, but the customer satisfaction, budget, schedule, and the project manager's competence should also be considered as the performance evaluation criteria [17-28]. The buildings and infrastructure need to be evaluated based on their iron triangle, customer satisfaction, budget, schedule, and project manager competence for the overall success and well-being of their end users. Consequently, the future agenda of the project performance evaluation needs to be more comprehensive and should include not only the iron triangle, but the aforementioned variables such as customer satisfaction, budget, schedule, project manager's capability should be considered as criteria [23, 29, 30]. Based on the discussion above, the purpose of this research is to conduct a systematic investigation of the KPIs to measure the success of construction projects in order to contribute to apply understanding of effective and the successful ways of delivering such projects.

1.1 Research gap

Project Success Consists of Two Components (1) Project Management (2) Project Performance. A project can be successful when the project is completed within time, schedule, budget, good leadership skill and customer satisfaction. Project performance indicators specify the measurable evidence needed to prove that a project planned effort achieved the desired result.

The work of the Real Estate Sector is project-oriented. Most of the studies were carried out to determine the often referred to as the "Iron triangle" (cost, time, and quality). This research shall be exploring additional project success factors, which are helping various ongoing construction projects. With the help of these factors, risks can be reduced and it will also help in the success of the project. Therefore, apart from the 'iron triangle', the construction industry needs to pay special attention to success factors. Still the cost, time, and quality are most relevant to evaluate the organization's success [31]. When the project is completed on time, within cost, and quality and it is considered a successful construction project [32, 33]. Its a traditional way to measure the project success. Through this research, we will explore the other important elements that play a significant role in project success. Time, cost, and quality factors are the main factor for the measure of project success. These studies consist of seven project performance indicators, namely: Time, cost, quality, budget, schedule, client satisfaction, and project manager competency. Therefore, this study will provide future direction for researchers and real estate sector [34]. To bridge this gap, the aims of this study to identify the Key Performance Indicators (KPIs) for measuring in the context of a construction project [35]. The review of the extant literature suggests that the performance evaluation of the construction projects has been gradually shifting beyond the traditional measures. The several researchers suggest that in addition to the iron triangle measures, but the customer satisfaction, budget, schedule, and the project manager's competence should also be considered as the performance evaluation criteria [16, 36, 37]. According to Toor et al. [35] The traditional project indicators of construction projects are iron triangles and that these indicators are not sufficient to measure performance. Other performance indicators such as customer satisfaction, budget, manager qualification and schedule are becoming important.

1.2 Real estate sector

The real estate sector is one of the developing areas worldwide. The organization's growth is one of the major tools for a country's financial growth, and this sector plays a chief contribution to the improvement of each country. The construction sector plays a vital role in improving the fiscal development of any country [38]. This sector has been ascended as one of the recognized areas at domestic as well as global level. The term 'Real Estate' is defined as property which includes buildings or structures over it. It can also include business houses like residential buildings, commercial offices, theatres, hotels and restaurants, industrial shops like retail shops, factories and government buildings. The Indian real estate sector has been witnessing some liveliness and positive market attitudes after reforming during the worldwide financial crisis over the years. A huge number of building projects were completed in India during the last decade [39]. The demand for the construction of residential houses is also coming on a large scale. Therefore, it is necessary to understand how the construction sector is keeping up with the pace of completed projects. The Real estate sector is an important area for the growth of any economy. This sector has been ascended as one of the recognized areas at domestic as well as global level. The term 'Real Estate' is defined as property which includes buildings or structures, property over it. It can also include business houses like residential buildings, commercial offices, theatres, hotels and restaurants, industrial shops like retail shops, factories, and government buildings. The core objective of every industry is to achieve success [40]. Real estate projects generally consider successful while it's far finished scheduled time, within finances, a proper plan, good quality, and customer satisfaction [41]. Project success is depending on project management strategy and manager's leadership skills, customer satisfaction, profitability [42].

1.3 Project success: An overview

Defining project success is an exclusive theme. The topic may be more complex in the context of the construction industry. The success of the project has a direct effect on the organization's goodwill. There are standard indicators of project success by which project success or failure can be estimated, and aspects of success contribute to organizational structures that directly or indirectly lead to project or business success [43]. The construction project is generally considered successful when it completes a time, a clearly defined budget, and customer satisfaction [36]. The project achievement is measured in phrases of achieving project goals, projects completed within budget, and with the performance of the organization [44]. Some Researchers considered the scope, time, and cost criteria to be the reason for the success of the project, which was known as the triple iron triangle [45, 46]. In most studies, time, budget, and value-related factors are considered to be the most significant in evaluating the performance of the organization. These criteria are called "the iron triangle" [16, 35, 47].

1.4 The iron triangle

According to White and Fortune [20] a real estate projects are generally recognized as successful when it is accomplished within budget, on time, without cost overruns [33]. Time is representing the available time to deliver and completion of a

business task, the cost is representing the quantity of finance and available assets and the quality of the project is representing the capability to perform satisfactorily [48]. Most of the studies were carried out to determine the "Iron triangle" (Figure 1).

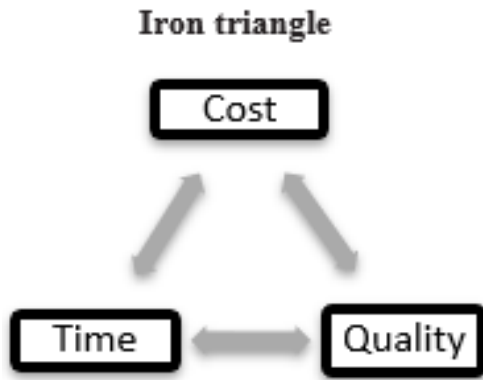


Figure 1. Iron triangle

2. LITERATURE REVIEW

The success or failure of a project is measured by the success criteria. The factors that make up the success criteria are usually referred to as key performance indicators [31, 35, 49]. Time, cost, and quality are three main factors for the success of every project [31, 35, 50-53]. The majority of the studies in consideration to measuring performance areas were based on time, cost, and quality [11, 31, 54-62]. But few studies have focused on the impact of other crucial factors such as customer satisfaction, budget, schedule, and project manager competence [11, 12, 18, 19, 27] on the project outcomes. Ingle et al. [12] investigated the customer relation, safety, schedule, cost, quality, productivity, finance, communication and collaboration, the environment and stakeholder satisfaction in this regard. According to Moradi et al. [63], the ability of project managers is of utmost importance for collaborative construction projects. Scheduling is one of the driving factors in the success of the construction project because it guides about when and where to do the work [64, 65].

According to Gemünden et al. [66], project success is measured by time, internal and external factors, budget, and quality. These factors, along with the Iron triangle are also very necessary to make a project successful [67]. However, according to the review of relevant literature, it has been noticed that many researchers have contended with the customs of plan success that emphasizes time, budget, and quality of the project, but many other factors hold a significant place in the project success [67, 68]. Moreover, five categories were identified by Ahadzie [62]: Internal and external environment related factors, customer satisfaction, quality, cost, and time-related factors. According to Chan and Chan, [69], the success factors for the project include the safety, functionality, budget, cost, schedule, and quality of the project. The project success was measured [70] through cost, quality, safety [71], schedule, and the customer satisfaction. Project manager's leadership style and skills, coordination with project team members and project manager, availability of the financial resource, client's satisfaction, and project completion on time are very significant factors for project success [10, 18, 32, 57, 72, 73].

2.1 Background of study

Project success related research isn't new research in social science studies. Since the 1960s, numerous researches have been directed to find out the factors that are very essential for achieving the success of projects [35]. In their review, according to Cui et al. [74], the first introduced the concept of "factors of success" was recognized by Ronald Daniel of McKinsey & Company in 1961 [74]. The "success" word is focused on organizational productivity, time, and budgets. The Key Success factors are summarized as follows; Plan, people, Processes, power, Contingency strategy [75].

3. METHODOLOGY

The methodology is a method implemented to achieve our objective. This paper is mainly based on the systematic literature review of the construction project's success.

3.1 Aim and objectives

The methodology is a method implemented to achieve our objective. This paper is mainly based on the literature review of the construction project's success. The purpose of this study is to find numerous key performance indicators for measuring real estate project success.

A Systematic literature review was adopted to achieve the research objective. To investigate a review on key performance indicators for measuring real estate project success. A systematic literature review was carried out, applying the guidelines developed [7, 53, 76-79]. The purpose of a systematic literature review faithfully reports the existing body of knowledge of a particular research area and it is a structured protocol. The main objective of a systematic literature review is to identify, evaluate, and synthesize existing research [7, 53]. The step-by-step procedures used in the review indicated in Table 1.

Firstly identified acceptable search related to the current research, then selected the critical studies and after the selected all critical studies then finally carried out the analysis. The process of data collection used in the review indicated in the Figure 2.

3.2 Search term and information source database

Several key performance indicators for measuring project success were recognized through a systematic literature review from reputed journals. The databases such as Emerald, Elsevier, Springer, Research Gate, and Scopus etc. were explored to identify the most relevant papers to have a systematic literature review. The reputed journals list for this purpose is included. The reputed journals list for this purpose is included in Table 2.

A paper with these specific words in the title, abstract, or keyword was considered to meet the need of the research. Furthermore, the search related to this research was limited to the subject areas of social science studies, economics, financial management, business, construction, engineering and management, environment, accounting, [2, 7, 34]. After using various online research databases, 82 publications were received using various keywords, Titles, and abstracts related to this research.

Table 1. Research protocol

Research protocol	Detail description
Research online databases	Searches were performed in Scopus, Emerald Insight, Springer Link (Springer), Science Direct (Elsevier), Wiley, Taylor and Francis, Research Gate, and Sage, web of science, <i>IEEE Access</i>
Keywords	Real estate, construction sector, building projects, customer satisfaction, success factor, iron triangle, performance, key performance indicators, budget, project management, scheduling
Language	English
Search fields	Title, keywords and abstract
Publication types	Peer-reviewed
Time period	One year
Search engine	Google, Google scholar
Inclusion criteria	Research studies published from 2021-1982
Exclusion criteria	Informal studies (irrelevant paper excluded)
Document and bibliography management	Mendeley software, Microsoft Excel software, Zotero Software, and EndNote Software,
Subject areas	Social science studies, economics, financial management, business, construction, engineering and management, environment

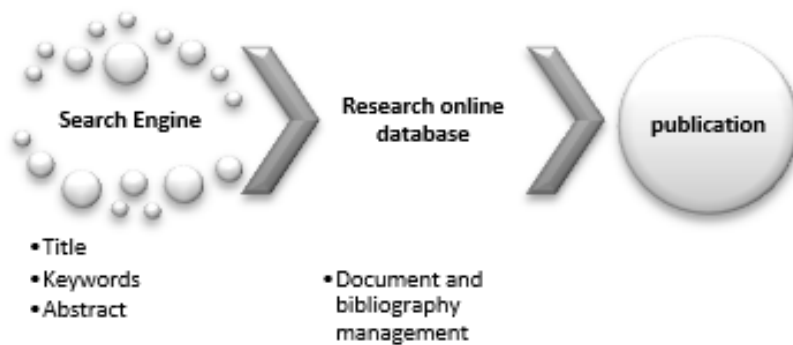


Figure 2. Review process

Table 2. Journal publication details

Journal Name	Number of publications Year
International Journal of Construction Management	2020,2020
Construction Management and Economics	2020, 1985
International Journal of Business and Management	2012
Construction Innovation	2009, 2009
<i>International Journal of Sustainable Development and Planning</i>	2020, 2018
Journal of Construction Engineering and Management	2021, 2012, 2008, 2021, 2005
International Journal of Managing Projects in Business	2020, 2020
Journal of Management in Engineering	2021, 2009, 2014, 2014, 1995
Project, Programme and Portfolio Management	2021
International Journal of Project Management	2005, 2005, 2007, 2010, 2004, 2018, 2017, 2005, 1999, 2013, 2008
Contemporary Engineering Sciences	2011
International Journal of Sustainable Construction Engineering and Technology	2020
Cogent Engineering	2017
Sustainability	2020
Pakistan Journal of Statistics and Operation Research	2020
MIT Sloan Management Review	1982
International Research Journal of Engineering and Technology	2015
International Journal of Advanced Science and Technology	2020
International Journal of Information Management	2020
Project Management Journal	1988, 2005, 1987
International Journal of Management Science and Business Administration	2017
Journal of Engineering, Project, and Production Management,	2020
Decision Support Systems	2010
Project management handbook	1997
Project Management Institute	1987, 1992
Journal of Infrastructure Systems	2021

Engineering, Construction and Architectural Management	2020,2004,2004, 2020
Middle-East Journal of Scientific Research	2011
Journal of Computing in Civil Engineering	2014, 2014
Journal of Facilities Management	2009
World academy of science, engineering and technology	2010,2008
Buildings	2021
Robotics and computer-integrated Manufacturing	2020
IEEE Access	2020
Journal of Foodservice Business Research	2021
Journal of Thrombosis and Haemostasis	2021
International Journal of Information Management	2020
<i>Journal of Applied Environmental</i>	2016
Proceedings papers	2004,2010, 2008
International Conference on Management and Service Science	2011
Built Environment Project and Asset Management	2015, 2020
USA: John Wiley & Sons	2017
Computers & Industrial Engineering	2016
International Journal of Engineering Research and General Science	2020
Benchmarking: an international journal	2004
NICMAR Journal of Construction Management and Research	2012
Construction Economics and Building	2002
European journal of operational research	1996

3.3 Data collection

Figure 3 [28, 29, 66] shows the number of articles published by year. A total number of "82" papers from ABDC journals and other journals and conference papers, including thesis, book chapters, were used to identify all the success factors in the construction sector. The processes of data collection and with journal name and keywords used in the review indicate in Figure 4.

Figure 5 shows the frequency distribution of the articles appeared in various databases considered for the review.

Mendeley software, Microsoft Excel software, Zotero

Software, and EndNote Software, were used to support this screening stage.

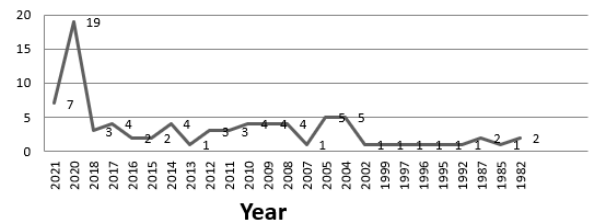


Figure 3. Year wise data

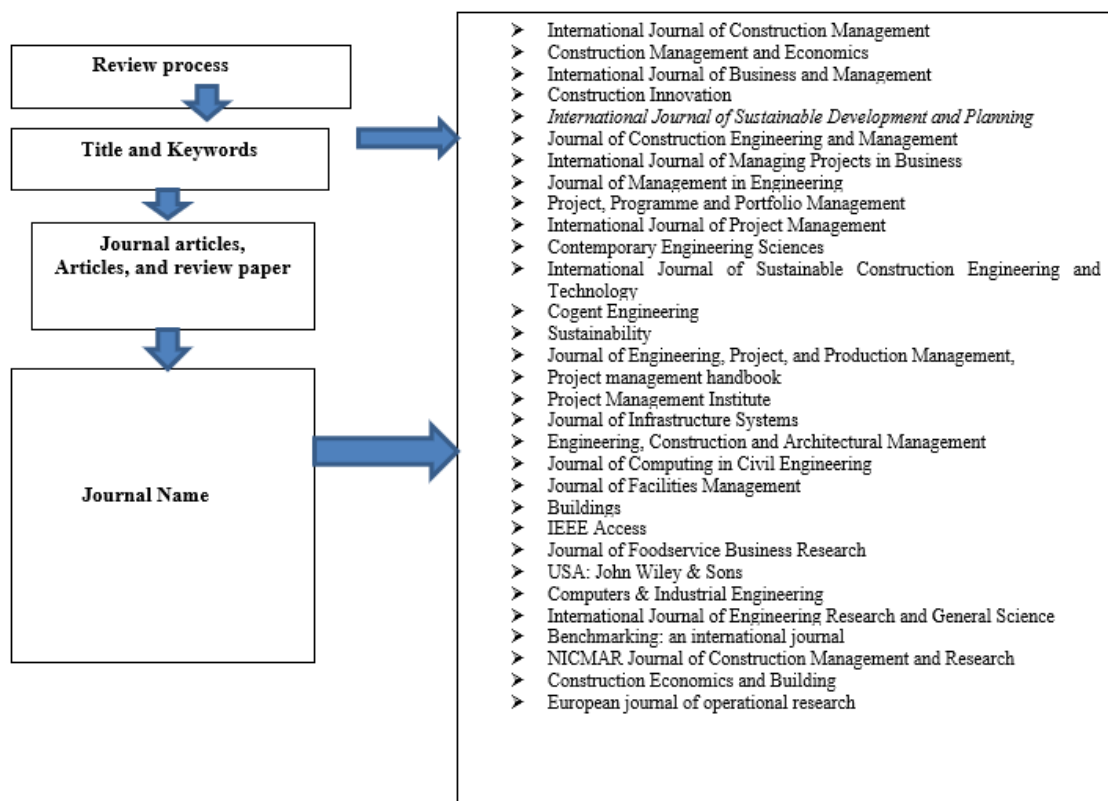


Figure 4. Data collection process

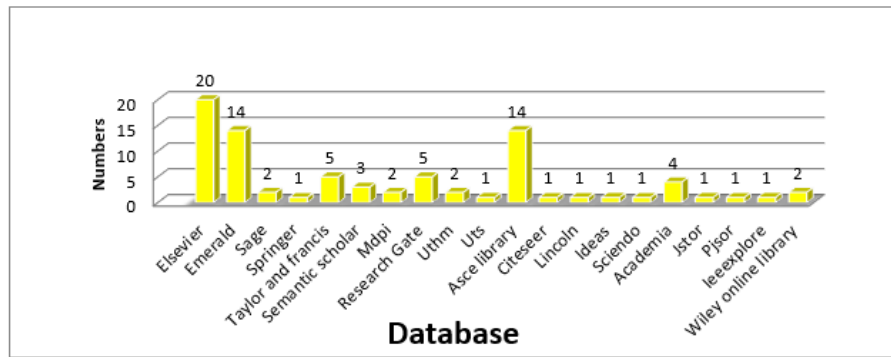


Figure 5. frequency distribution

Table 3. Success factor

Researcher/Year → Success Factor ↓	Gunduz (2020)	Madushikaa (2020)	Tsiga 2017	Ning 2013	Collins 2004	Lim & Mohammed (1999)	Chan and Chan (2004)	Elatar (2009)	Castro et al., 2020	Muller 2012	Panwar & Jha, 2021	Jugdevetl 2012	Ogunrind20 21	Castro.2020	Chen et al.,2021	Total
Cost	√			√	√	√	√				√	√	√	√		10
Schedule	√			√				√	√						√	05
Project Quality				√	√	√	√	√		√	√		√	√		09
Customer Satisfaction	√	√		√		√		√		√						06
Time	√				√	√	√				√	√	√	√		08
Budget,	√	√						√								03
Project Manager Competence	√	√	√						√							04

Furthermore, the search was limited to the subject areas of social sciences, economics, financial management, business, accounting, construction engineering and management, environment, and decision sciences with publications such as research articles, journals, and review articles. The findings from the extensive literature were assessed and determined on the criteria based on the level of publication, author, and material. The articles for review gathered from various journals, research papers, books, thesis, reports, articles, libraries, websites, etc. to gather relevant information for this study. The period for the search of papers for this review was selected from 1982 to 2021.

The work of the Real Estate Sector is project-oriented. A project is the main part of all activities to fulfill a specific objective. Project management includes project planning, monitoring, and control [73]. The iron triangle related success factor remains the major elements of every task [80]. Table 3 shows the list of success factors taken from reputed Journals through literature reviews.

In the traditional era, an iron triangle was considered an important aspect of the success of the task. The iron triangle was considered an important aspect to plan and manage a successful project. But other criteria were not given much attention to the organization. Customer satisfaction, budget, schedule, and project manager competence are also important parameters of a successful project [81].

The most studies were carried out to the "Iron triangle". The factors of all related to the iron triangle shown in Table 4. But in the present era, many authors suggested that customer satisfaction about the project also be taken into attention [82]. Customer satisfaction can be viewed as a measurement tool for construction project success. If the end-product does not meet customers' expectations, end-users will not be happy [35]. A project does not succeed without customer satisfaction.

Customer satisfaction is an essential technique of evaluating the performance of projects along with the traditional era iron triangle. There have been many studies on the Iron triangle.

Table 4. Iron triangle factor

COST TIME QUALITY	Gunduz (2020) [28]
	Kerzner (2017) [47]
	Safaei. (2020) [58]
	Atkinson (1999) [71]
	El-Rayes & Kandil (2005) [8]
	Ireland (1985) [82]
	Babu et al. (1996) [33]
	Shankar et al. (2011) [83]
	Collins (2004) [73]
	Lim and Mohammed (1999) [84]
Chan and Chan (2004) [85]	
Mohamma dipour & Sadjadi, (2016) [86]	

Customer satisfaction is often allied with performance. Many customers are often dissatisfied with the quality of the project and the service quality. Project performance and customer satisfaction are very closely related. Because when the customer is satisfied with the quality of the project, the organization will get more profit [12]. Customer satisfaction is measured by the distribution of services and the quality of projects that meet customer expectations [12, 64]. Customer satisfaction is based on understanding customer needs [12]. Thus, customer expectations play a vital role in estimating performance. The factors related to customer satisfaction are shown in Table 5.

Customer satisfaction is associated with many characteristics such as Location, Transportation and banking facilities, Living facilities, Co-operation Site supervision and subcontracting Communication, and Environment and safety

at work.

This research is exploring additional project success factors, which are helping various ongoing construction projects. With the help of these factors, risks can be reduced and it will also help in the success of the project. Therefore, this research will seek toward classifying the CSF and these CSF is lead to project success and this research will contribute to filling this gap that how successful the project can be made from combinations of common and superior factors for the project success.

Table 5. Customer satisfaction

Customer satisfaction <ul style="list-style-type: none"> • Location • Transportation and banking facilities • Living facilities • Co-operation Site supervision and subcontracting • Communication • Environment and safety at work 	Ingle et al. (2020) [45]
	Oppong et al. (2017) [51]
	Alshihre et al. (2020) [87]
	Yang (2011) [88]
	Zahari (2016) [89]
	Rashvand et al. (2014) [41]
	Sweis et al. (2013) [90]
	Yeheyeyes (2018) [91]
	Karna et al. (2009) [4]

4. DISCUSSION AND CONCLUSION

Some project plans did not include all of the important aspects for the success of the project, but some researchers identified additional critical elements. Real estate projects are generally considered successful when the project is finished on time, proper schedule, good quality, within budget, and customer happiness [38]. A project must meet the expectation of the users regarding the quality performance to become successful. The level of success and performance in carrying out construction, project development activities will depend heavily on customer satisfaction, quality, time, cost, budget, project management skills, and project schedule. The present review reveals that there are several commons as well as distinctive factors highlighted by the researchers in this field. From an extensive review of the literature, the iron triangle is the most vital aspect of project success. The study reveals that most of the previous research considered the three above mentioned factors, but a few studies have taken the other success factors such as budget, schedule, client satisfaction, and project manager competence. So there is a dire need to explore additional determinants as the real estate project success is influenced by several other variables. The findings suggest that traditional project indicators of construction projects are iron triangles and that these indicators are not sufficient to measure performance. Other performance indicators such as customer satisfaction, budget, manager qualification and schedule are becoming important. The current paper will help the project managers in understanding the vital determinants of project success so that these can be considered while executing the existing and new real estate development projects.

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