Critical Success Factors for Managing Construction Small and Medium-sized Enterprises in Developing Countries of Middle East: Evidence from Iranian Construction Enterprises

Abstract

The study aims to study the critical success factors (CSFs) for managing construction small and medium-sized enterprises (SMEs) in the developing countries of the Middle East. The statistical population included active experts in the field of construction in the study area. The sample size was determined using the Cochrane formula, and purposive and convenience sampling was used to select 118 participants as the primary sample. The questionnaire used in this study was based on 63 CSFs items derived from the extant literature, which were categorised into eight CSFs categories. The findings indicated that the mean rank score of the CSFs for managing construction SMEs for the CSFs categories and each CSFs item ranged between medium and high, and all CSFs items and areas can be considered significant CSFs for managing construction SMEs in developing countries of the Middle East. Furthermore, in the ranking of the CSFs categories, technology with an average (MS) of 6.38 was rated the most significant CSFs category, followed by human resource management aspect (MS=5.48), dynamic capabilities (MS=5.30), and organisational management (MS=4.76). It is expected that the study findings and recommendations would significantly contribute to improving project success and efficiency of construction SMEs in developing countries while deepening stakeholders' awareness of critical variables for prioritisation in order to remain competitive in the construction industry.

Keywords: Critical success factors; construction enterprises; developing countries; SMEs; project success.

1. Introduction

The construction industry makes up a significant portion of the gross domestic product of each country, and its success can result in long-term economic success (Olatunji et al., 2016). According to international reports regarding the status of projects in various countries, a massive part of budgets in countries is dedicated to the construction industry (World Economic Forum, 2016). Therefore, the success of construction companies and the successful completion of their projects is important for the governments (Sarvari et al., 2020a).

A project is a combination of events and occurrences which could be planned or unplanned, which continue during the project's life cycle and influences some changes in the environment. Lim and Mohammed (1999) defined success factors as a set of environmental factors, realities, and other influential factors that can affect projects' output. These factors can facilitate the implementation of a project or create problems during its execution but cannot be used to evaluate the project. Among these factors, some have a more significant influence on the success or failure of the project (Khosravi and Baradaran, 2019).

The results of various studies (Albert et al., 2017; Rengamani, 2018; Gemino et al., 2021) indicated that along with the success factors of each project, other factors such as comprehensive project management, scope management, time management, cost management, quality management, human resource management, communication management, risk management, and support management could play important roles in the success of construction enterprises. Furthermore, four areas of project safety management, environmental management, financial management, and demand management, are the main areas of special importance in the construction industry (Stanitsas et al., 2020; Harris et al., 2021). Other factors that can also affect the success of construction projects and companies include the implemented construction system, type of materials, implementation method, building application, resource allocation, and other similar factors (Noorzai and Golabchi, 2020).

Furthermore, it is worth mentioning that today's markets face a higher amount and variety of competition than in the past. Therefore, achieving a suitable strategy for expanding the activities of construction SMEs to complete more projects and gain more profit is one of the main concerns of managers in these companies. In this environment, many companies attempt to create new

comparative strategies and gain comparative advantages to facilitate their development through their products and services (Kryscynski et al., 2021). It is evident that in this intense competition, successful companies are those who pay special attention to factors such as project management methods, organisational structures, organisational resources, comparative strategies, relations within the company, tenders, marketing methods, use of novel technologies, cost management, support, and supply chain, as well as management processes (Lu and Shen, 2008).

Furthermore, companies require a more comprehensive knowledge regarding their status and their competitors and other environmental factors to make better decisions when faced with every situation (Carneiro, 2000). Without sufficient understanding of their competition or incomplete analysis of their business environment, companies would fail to provide suitable strategies for their dynamic environment, resulting in decline and damage over time (Bartlett and Beamish, 2013). Based on these factors and because the construction industry is one of the most dynamic industries in developing countries, especially in the Middle East region, it is necessary for companies active in this field to understand factors affecting their success and failures over their competition.

Therefore, the current study aims to answer the following questions: (i) What factors affect the success of construction SMEs in the Middle East developing countries? (ii) What are the levels of importance of factors affecting the success of construction SMEs in Middle East developing countries?

The current study aims to identify and rank critical success factors (CSFs) for construction SMEs in Middle East developing countries. Since the majority of previous studies (Luo et al., 2017; Alvarenga et al., 2020) have investigated the success of civil or construction projects or have analysed the opportunities, threats, weaknesses, and strengths of these projects, very few studies have specifically investigated the CSFs for construction companies. Therefore, the current study can fill the gap in previous studies in this regard. Furthermore, a review of previous literature indicates that only a small number of studies have investigated CSFs in civil projects (Li et al., 2019; Thneibat et al., 2021), introducing factors such as customer satisfaction, time, income and profit, quality, costs, project management satisfaction, suitable budget allocation, experienced and multidisciplinary team, and accessible resources among CSFs of construction projects.

However, the success of civil and construction companies, which can, in turn, result in the success of civil projects, has been rarely investigated in previous studies. The current study aims to fill this

existing gap in the current knowledge. The results of the current study can be used by employers, contractors, and other participants in civil projects. Attention to these CSFs can help companies achieve better results in their future projects and become one of the more active companies in their industry. Furthermore, the results of the current study can create a suitable environment and conditions for the growth and development of SMEs active in civil and construction projects.

2. Literature Review

2.1. Definition of Small and Medium-Sized Enterprises (SMEs)

The definition of SMEs differs from one country to the next (Zubair et al., 2020). However, despite different definitions, these companies share similar characteristics. Table 1 shows the number of employees and total cash flow of companies in developed and developing countries. In general, and according to various sources, it can be said that the most common criterion used to distinguish SMEs is the number of their employees. Other criteria include total capital, total assets, annual cash flow or sales, and type of ownership. Compared to larger companies, the unique characteristics of these companies mean that SMEs and large construction companies act in two separate worlds.

The differences between SMEs and large companies mean that offering a singular method for analysing their successes in the construction industry would be unrealistic. Since SMEs are the backbones of the economy and would dominate the future of the construction industry (Shelton et al., 2016), it is important to analyse the CSFs of construction SMEs in order to develop their role in the industry (Dainty et al., 2017). Construction SMEs are different; however, similar results can be achieved despite differences in their business formations, which guides their strategies toward new business paths (Saka and Chan, 2020).

Table 1. The summary of definition for SMEs

Category	Country	SMEs	Size of employees	Annual turnover	Sources
Developed Countries	Australia	98%	<200	Unknown	Shelton et al. (2016)
	Canada	98%	<499	<$5 million	Poirier et al. (2015)
	France	98%	<250	<€50 million	Enjolras et al. (2019)
	United Kingdom	98%	<250	<£ 22.8 million	Lam et al. (2017)
	USA	98%	<500	Unknown	USITC (2010)
Developing Countries	Indonesia	96%	<100	Unknown	Furry et al. (2017)
	Malaysia	98.5%	<200	<RM50 million	SMEinfo (2019)
	Nigeria	96%	<200	<₦499 million	Oyelaran-Oyeyinka (2007)
	Turkey	99%	<250	<TL25 million	KOSGEB (2012); Şener et al. (2014)
	Iran	96%	<100	Unknown	Central bank of Iran

2.2. Critical success factors (CSFs) of projects vis-à-vis CSFs of construction SMEs

It is a fact that the efficiency of an organisation largely depends on the successful implementation of the projects it undertakes (Pinto and Covin 1989). Characteristics like high cost, the low extent of political stability, and the complexity of construction projects unfavourable economic environments in developing countries decrease the success probability of construction projects. It is, however, important to emphasise that a project perceived as successful by an organisation may be seen as a failure by another company. In fact, besides having common stakes, all participants have their own unique sets of stakes involved in a construction project (Sanvido et al., 1992). However, de Wit (1986) concludes that a project can simultaneously be a disaster for one organisation and success for another. Therefore, so what makes projects successful may not be the foundation for companies' success. So, organisations must employ relevant CSFs if it was to avoid missed opportunities and unpleasant surprises. Moreover, according to industry literature outside the construction projects, CSFs should include issues critical to the organisation's current operations and future success. While the construction stage is where all the project objectives like time, cost, performance, quality, safety and the like are established and tested (Alias et al., 2014).

Unlike large organisations, many construction SMEs have not evaluated the success and failure factors (Bhamu and Sangwan, 2014). Research has argued that success factors in small

construction businesses face many specific challenges or barriers different from those of large organisations (Ghobadian and Gallear, 1996). For example, authors like Dombrowski et al. (2010) and Rymaszewska (2014) stated that construction SMEs are generally unable to provide necessary resources like budget, workforce, and time as well as experts' know-how to implement and adhere to the projects. Furthermore, these companies rely on a short-term vision and require that the implementation costs and the subsequent benefits of project implementation be projected upfront before they can commit (Achanga et al., 2006). Therefore, most studies investigating success factors in the construction industry cannot be useful for SMEs since they do not integrate construction SMEs' specific needs and expectations.

On the other hand, it is well observed that most of the published literature continues to address the issue of the investigation of the critical factors affecting project success in general or with a focus on large enterprises rather than construction SMEs (e.g., Jadhav et al., 2014; Netland, 2015). So, there is an immense need for further research that focuses on identifying critical success factors (CSFs) of construction SMEs.

2.3. CSFs for managing construction SMEs

With the rapid growth of the construction industry and the increase in large-scale construction projects, determining the CSFs of the companies undertaking these projects becomes more critical (Shan et al., 2020). The construction industry is known as a highly comparative industry in many countries, including developing countries, and those active in this field must pay attention to various factors and parameters to succeed in competition, attract customers, creating brands, gaining customer loyalty, and successfully implement their projects (Zainon et al., 2020).

Despite successful adoption and effective implementation models and methods, plans fail due to a lack of attention among managers and planners toward the implementation methods. This results in a waste of time and resources and increases the company's resistance against future changes while decreasing the motivation of managers and employees. CSFs are factors that are necessary for achieving a company's mission and its goals. CSFs, on the one hand, determine the short-term strategies of the company while, on the other hand, are one of the primary sources for determining the company's future strategy and can help guide the company toward achieving critical competence (Afolabi et al., 2019).

Khosravi and Baradaran (2019), in their study, concluded that there is a positive and significant correlation between the success of the projects and factors such as project management leadership, project management staff, project management approaches and policies, project management resources and partners, project management lifecycle process, and main project management performance criteria. Other findings indicated that project management performance criteria, project management staff, project management lifecycle process and project management leadership are good predictors of project success.

Furthermore, to increase the probability of success in projects, it was suggested that project managers pay special attention to four main factors of performance: staff, life cycle processes, management, and leadership (Jiang et al., 2017; Zuo et al., 2018). Banihashemi et al. (2017) stated that the most important success factors of construction projects include achieving project aims, customer satisfaction, time, income profit, quality, cost, project management satisfaction, team satisfaction, different design, technical specifications, control, and accountability systems, desirability, renown, market share, and profits for developing organisations.

Gudienė et al. (2014) stated that factors such as having a clear outlook, correct decision-making regarding the future, facilities (including sufficient budget for project's duration, access to necessary documents, access to resources, effective participation of project's stakeholders, and presence of strong project management), cooperation between team members, capabilities (including novel technologies, use of previous experiences, knowledgeable teams and selection of suitable contractors and consultants), the commitment of all project members and stakeholders to the project's success, precise planning and control, quality of workforce and group work are among the most important success factors of projects.

Tayeh et al. (2018) presented various CSFs for construction projects. These factors included having a clear outlook of the project, the experience of the design team, experience of the contractors, access to skilled workforce, access to sufficient financial resources, precise payment mechanisms, lack of delays in project's financial payments, sufficient time for design, and contractor's desire for presenting quality work. Lamprou and Vagiona (2018) concluded that the success criteria of the projects and CSFs are two essential parts of the projects' success. According to their definition, success criteria are the dependent variables that are used to measure the success of the projects. At the same time, CSFs are independent variables that affect the project and

increase its probability of success. In general, planning for project schedule, budget and costs, quality, performance, and customer satisfaction are among the most important success factors of the projects present in every project.

Furthermore, other important CSFs of the projects include a clear definition of goals and outlooks, planning for project implementation, support of senior management, communication methods between stakeholders and project staff, sufficient budget, and project size and complexity. According to Silva et al. (2016), short-term CSFs of construction projects include cost, time, quality, security, and cash flow management, while long-term CSFs include environmental performance, customer satisfaction, employee satisfaction, learning, development of new knowledge and speciality and use of novel technologies.

Ramlee et al. (2016), in their review, concluded that most researchers believed cost, time, quality, customer satisfaction, project management method, project safety, organisation of project implementation methods, external factors of the project such as human resources, employer, contractors and physical and environmental conditions of the project, and accessibility of project resources as the main success factors of construction projects. According to the project stakeholders, factors such as communication, cooperation, consultation, time, and achieving project aims and strategic gains are among the CSFs of the projects (Davis, 2014).

Other researchers believe that CSFs of construction projects can be divided into three categories: project management factors, product success factors, and market success factors (Samiaah et al., 2011). According to Elattar (2009), the evolution of performance and success in construction projects can differ according to owners, designers, and contractors. According to Nguyen et al. (2004), the competence of senior management and commitment and communication among project stakeholders can be among CSFs of construction projects. Chan and Chan (2004) also suggested two groups of key criteria for evaluating success in construction projects. The first group includes external and objective actions such as time, cost, safety, and environmental considerations. In contrast, the second group comprises subjective and internal factors such as quality, performance, and stakeholder satisfaction.

Since the construction industry is one of the most dynamic industries – companies, and enterprises active in this industry must use factors that ensure their success over their competition. Examples of factors that can help in the success of construction enterprises include awareness of project

managers regarding changes in the environment, structure, and technologies used in construction and experienced and knowledgeable individuals in the company. Others include flexible strategies, speciality, and experience of company managers; the focus of project management on cost, quality, and timeframe of the project; identification of innovative and creative opportunities, focus on agile operation in project management, plan-centric management; knowledge-centric management; and market-centric management of construction companies. However, the success of construction SMEs is also affected by other factors such as the company's size and local laws and regulations.

On the other hand, in many developed and developing nations of the world, SMEs are now appreciated as a necessary complement to the industrial structure of any modern economy (Nyoni and Bonga, 2018). Therefore, SMEs continue to be accepted worldwide as instruments of economic growth and development. This is precisely why the government of Iran has made tremendous efforts to establish policies to enhance the capacity of construction SMEs. Lack of knowledge of CSFs apparently compromises the ability of construction SMEs to operate successfully. Despite efforts made by the emerging countries (for example, Iran) to assist construction SMEs, most of them fall short of expectations. The failure rate of construction SMEs is high throughout the world (Fang et al., 2009), with the situation no different in Iran. The construction SME sector, as noted by Davig and Brown (1993), Jocumsen (2004), and Nyoni and Bonga (2018), continues to be plagued with high failure rates and poor performance levels. Given this state of construction SMEs in developing countries, there is a need to establish the CSFs to enhance construction SMEs performance. The current study aims to identify and analyse the CSFs for managing construction SMEs in developing countries of the Middle East.

3. Research methodology

A mixed research method was employed in the study to identify and rank the CSFs for construction SMEs in developing countries of the Middle East. Available options for collecting data from respondents are qualitative, quantitative or a combination of both using mixed methods (Creswell et al., 2003). Of these, the mixed-methods approach is regarded as the most effective for conducting research in the fields of management and organisational studies, as argued by Creswell et al. (2003). As illustrated in Figure 1, the design of the mixed methods approach for this study followed the qualitative-quantitative design. This was comprised of conducting a preliminary qualitative-driven study to serve and enhance the findings of a subsequent quantitative approach

(as the primary method), which was termed by reswell et al. (2003) as “sequential exploratory design”. To this end, firstly, factors affecting the success of construction SMEs were investigated in the extant literature, and the obtained list of success factors was revised using the Delphi approach, which is similar to the method used in other recent studies (Khosravi et al., 2020; Sarvari et al., 2020b). The Delphi panel consisted of 20 experts. There is no defined rule regarding the selection of the members in a Delphi panel. However, it is necessary to remember that the quality of experts is more important than their number (Khoshfetrat et al., 2020; Olawumi and Chan, 2018). Therefore, participants in the Delphi method are experts, critics, and managers with sufficient knowledge and experience in a certain topic, enough time for participating in the Delphi rounds, and necessary communication skills (Young et al., 2007).

Concerning the number of experts in the panel, their number is usually less than 50 and usually between 10 to 20 experts (Olawumi et al., 2018). The number of experts depends on several variables, including the uniformity of the sample, the aim of the Delphi method, difficulty range, decision-making quality, the ability of the research team, internal and external validity, data gathering time, available resources, and the scope of the studies problem (Sarvari et al., 2019). The current study used a purposeful sampling method to select the respondents in the Delphi method, which is similar to the methods used by other researchers (Olawumi et al., 2018).

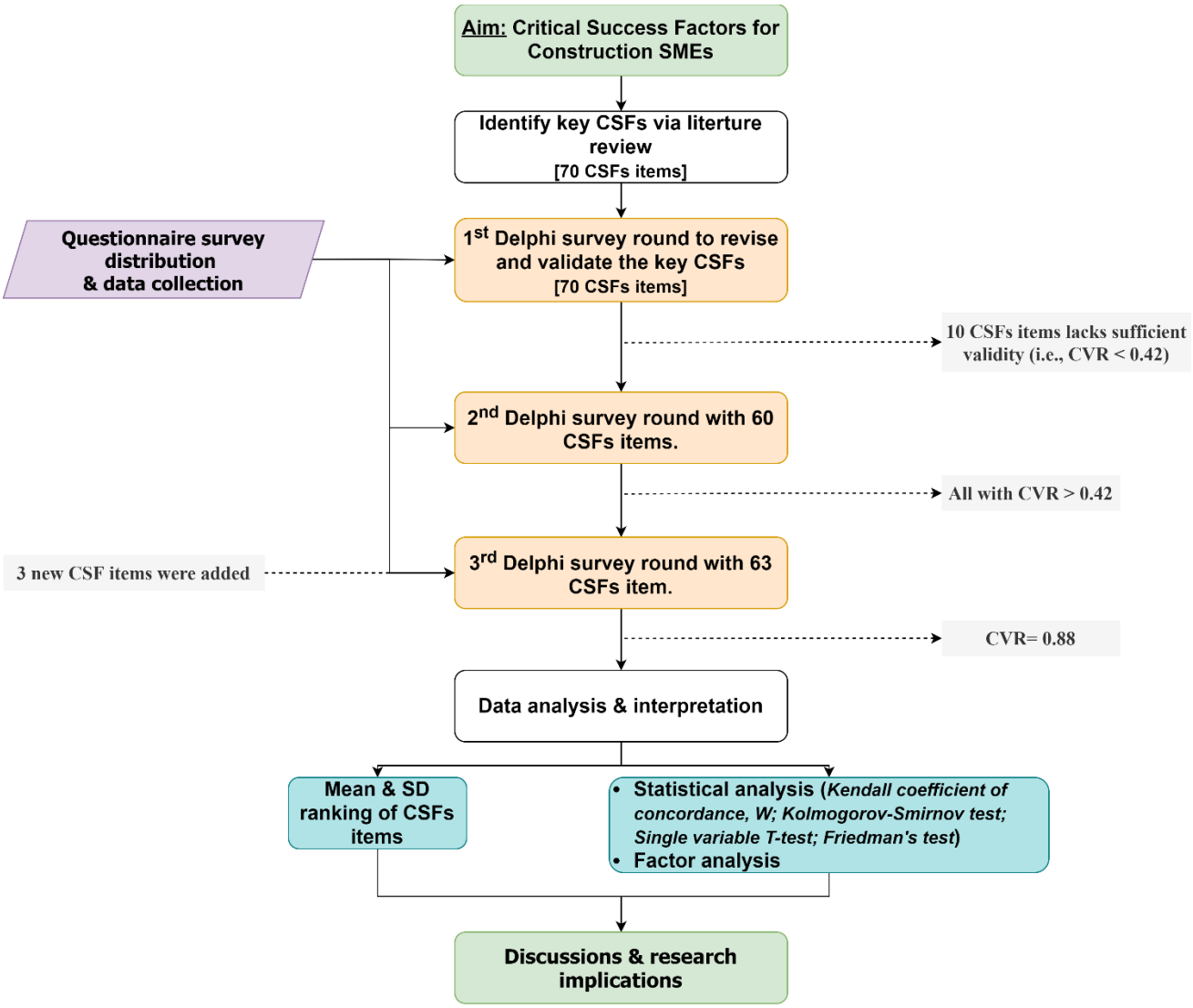

Figure 1: Overall research design for the study

3.1 Statistical analysis tools

The initial Delphi round was carried out with 70 success factors as identified in the extant literature and initial reviews by the authors.

Validity tests. The face validity of the questionnaire was confirmed according to the opinion of some of the participants; content validity was confirmed using a Delphi panel consisting of 20 experts and using three Delphi rounds and based on Lawshe content validity and Kendall's Coefficient of Concordance. Data analysis in each Delphi round was carried out using the Lawshe content validity equation and Kendall's Coefficient of Concordance.

Equation 1 shows the Lawshe content validity equation, while Kendall's Coefficient of Concordance is calculated using Equation 2 (Onwuegbuzie and Combs, 2010).

$$CVR = \frac{(ne - \frac{N}{2})}{\frac{N}{2}} \qquad \text{----------} \qquad Eq.1$$

CVR is the content validity ratio; *ne* is the number of experts agreeing to the suitability of an item in the questionnaire, and *N* is the total number of experts participating in the evaluation.

Kendall's Coefficient of Concordance (W). W is a scale used to determine the degree of compatibility and agreement between several ranking categories related to N items or people (Olawumi and Chan, 2019). Using this scale, it is possible to determine the rank correlation, K, between the set of ranks. This scale is helpful in validity studies among referees. Kendall's Coefficient of Concordance shows whether people who have sorted items according to their importance have used similar criteria for their judgment in regard to these items and whether they agree with each other (Schmidt, 1997). In this study, Kendall's Coefficient of Concordance was computed using SPSS software.

The values of this scale are in the range of 0 to 1 and indicate the amount of agreement among the Delphi panel (W>0.9 indicating very strong agreement; W>0.7 strong agreement; W=0.5 average agreement; W=0.3 weak agreement and W=0.1 very weak agreement). Furthermore, the significance of W does not affect the data from the Delphi panel if the involved experts are more than ten members – even small values of W are sometimes significant (Schmidt, 1997; Olawumi and Chan, 2019).

In the current study, to determine whether the identified factors can be used as CSFs for running SMEs in developing countries of the Middle East, a Delphi panel of 20 experts were asked for their opinions. Then the agreement of each expert with the items in the questionnaire was determined, and the Lawshe content validity ratio was calculated. The calculated validity was compared to Table 2, which shows the minimum value and number of experts for content validity. The results indicated that among 70 items in the questionnaire, ten items lacked sufficient validity and were eliminated from the questionnaire (their CVR was less than 0.42).

In the second Delphi round, a new questionnaire with 60 items was sent to the experts. In this round, all 60 items had sufficient validity, but it was necessary to add another three new items to

the questionnaire. Therefore, in the third round, a new questionnaire with 63 items was sent to the experts, and in this round, the experts conclude that all 63 items can be counted as CSFs for managing construction SMEs in developing countries of the Middle East. The calculated content validity ratio in this step was 0.88. Hence, since the CVR was higher than the minimum value, it can be concluded that all items in the questionnaire have sufficient content validity.

Table 2. Minimum value and minimum number of experts in content validity (Lawshe, 1975)

Minimum number of experts	5	6	7	8	9	10	11	12
Minimum value	0.99	0.99	0.99	0.85	0.78	0.62	0.59	0.56
Minimum number of experts	13	14	15	20	25	30	35	40
Minimum value	0.54	0.51	0.49	0.42	0.37	0.33	0.31	0.29

The identified 63 CSF items for managing construction SMEs in developing countries of the Middle East are presented in Table 3 and categorised under eight CSFs categories: project management, financial management, competitive advantage, organisational management, technology, HSE, human resource management, and dynamic capabilities. These areas were selected according to the studies by Ramlee et al. (2016), Schilke et al. (2014), Hung et al. (2010), Madsen et al. (2010), Ling and Xiping (2006), Chan and Chan (2004), and Teece et al. (1997). These items were used to create a survey questionnaire scored using a 5-point Likert scale measurement.

Table 3. CSFs for managing construction SMEs in developing countries of the Middle East.

Code	Categories	Item	Sources
F_1	Project Management	Management and control of construction projects in regard to time, cost, and physical attributes and preventing the lengthening of projects	Interview
F_2		Familiarity with novel project implementation methods in order to reduce project time	Tayeh et al. (2018); Nguyen et al. (2004)
F_3		Constant survey and monitoring of project progress and comparison with progress graphs	Banihashemi et al. (2017)
F_4		Understanding the socioeconomic environment of the project (demographic and urban economic studies)	Interview
F_5		Understanding the project's external environment (project's urban location, accessibility, networks, and urban infrastructures and facilities).	Interview
F_6		Evaluation and understanding of project's internal environment (land, building and usage, spaces, and possible services in projects)	Interview

Code	Categories	Item	Sources
F_7		Following suitable quality indices based on international project management standards	Gudienė et al. (2014); Samiaah et al. 2011)
F_8		Involving other companies in parts of the project and sharing of the profits	Silva et.al. (2016)
F_9		Management of outsourced projects and controlling contractors' performances	Davis (2014); Samiaah et al. (2011)
F_{10}	Financial Management	Feasibility studies of the project in all design and implementation steps	Banihashemi et al. (2017)
F_{11}		Focusing on varied financing models	Raul (2009); Nguyen et al. (2004)
F_{12}		Centralised management of cost/income of the projects and workshops with geographical diversity	Interview
F_{13}		Preparation of separate and comprehensive financial reports for projects	Interview
F_{14}		Correction of scheduling, budgets, and cash flow distribution	Ramlee et al. (2016); Nguyen et al. (2004)
F_{15}		Creation of added value in projects for creating wealth, increased productivity, entrepreneurship, and investment	Redman and Wilkinson (2006); Lamprou and Vagiona (2018)
F_{16}		Emphasis on valuation studies in policymaking related to construction projects	Banihashemi et al. (2017)
F_{17}		Creating maximum added value in projects using investments, cooperation, and constructions with varied applications	Interview
F_{18}		Economic analysis of projects based on applied models and rent, sale, and pre-sale rates	Interview
F_{19}	Competitive Advantage	Emphasis on the values of traditional architecture in the design and implementation of construction projects	Interview
F_{20}		Increasing technical skills, equipment, and machinery and their effective use based on novel technologies	Interview
F_{21}		Attention to construction projects with vital roles in the development processes of the country	Gudienė et al. (2014); Davis (2014)
F_{22}		Participation in international construction tenders	Ng et al. (2018)
F_{23}		Strengthening the company's brand and creating a credible name in the construction industry through improving service quality, and increasing customer trust and satisfaction;	Ng et al. (2018); Elattar (2009)
F_{24}		Strategies regarding increase in market share and market development	Ng et al. (2018); Lamprou and Vagiona (2018)
F_{25}		Carrying out studies for geographical variety in constructions with emphasis on current comparative advantages	Interview
F_{26}		Attention to innovation in implementation of construction projects	Tayeh et al. (2018); Samiaah et al. (2011)
F_{27}	Organ	Existence of specified communication lines	Sanvido et al. (1992)

Code	Categories	Item	Sources
F_{28}		Communication with research institutes and companies for creation and transfer of knowledge and new technologies	Interview
F_{29}		Positive and constructive cooperation with relevant organisations and institutes such as insurance, taxation, banks, and other relevant organisations	Banihashemi et al. (2017); Elattar (2009) Elattar (2009)
F_{30}		Continued close relation with scientific communities	Sanvido et al. (1992)
F_{31}		Timely completion of obligations and continuous development of communication with stakeholders	Lamprou and Vagiona (2018); Elattar (2009)
F_{32}		Using effective and fast methods for resolving internal conflicts and problems	Westeeveld (2003); Nguyen et al. (2004)
F_{33}		Changes in the company's structure and creating a construction handling company	Interview
F_{34}		Effective management of goods and services, foreign orders, and internal purchases	Westeeveld (2003); Lamprou and Vagiona (2018)
F_{35}		Planning for development of company's business and resource management	Westeeveld (2003); Davis (2014)
F_{36}		Risk management for investment projects	Interview
F_{37}		Creation of effective legal office in the company	Interview
F_{38}		Commitment and accountability regarding current contracts	Interview
F_{39}		Reviewing organisational development plants in order to review the creation and implementation of construction projects	Interview
F_{40}	Technology	Use of materials and construction with zero energy waste	Interview
F_{41}		Development of prefabrication, robotics, and automation in construction process	Interview
F_{42}		The ability to deal with technological changes and new technologies	Silva et al. (2016); Chan and Chan (2004)
F_{43}		Development of decision support systems based on BIM	Gudienė et al. (2014)
F_{44}		Use of the most suitable technologies for the construction of quality buildings according to customers' specifications	Interview
F_{45}		Use of planning software for planning in executive matters	Tayeh et al. (2018); Samiaah et al. 2011)
F_{46}		Use of systems, infrastructures, and software and hardware facilities for implementation of project management processes	Davis (2017)
F_{47}		Use of knowledge management system to prevent repeated mistakes from previous projects	Silva et al. (2016); Lamprou and Vagiona (2018)
F_{48}	HSE	Using suitable health and safety systems	Tayeh et al. (2018)
F_{49}		Emphasis on environmental protection and effective use of national resources	Ramlee et al. (2016); Chan and Chan (2004)
F_{50}		Emphasis on clean, novel, and renewable energies	Interview

Code	Categories	Item	Sources
F_{51}		Following technical principles and quality, safety, health, and HSE standards in all design and implementation steps according to existing regulations	Silva et al. (2016)
F_{52}		Creation of HSE management system for systematic development of projects	Gudienė et al. (2014)
F_{53}		Increasing the company's share in creating social welfare and environmental protection	Interview
F_{54}	Human Resource Management	Training specialised human resources	Lamprou and Vagiona (2018)
F_{55}		Emphasis on satisfaction and productivity of human resources	Elattar (2009).
F_{56}		Hiring specialised employees and improving and dissemination of organisational knowledge through goal-oriented training	Davis (2017); Chan and Chan (2004)
F_{57}		Improving technical and engineering knowledge and improving the quality and skill level of the employees as the most important resource in the company.	Silva et al. (2016)
F_{58}		Training human resources regarding laws, technical regulations, and legal and strategic matters in the construction industry	Silva et al. (2016); Lamprou and Vagiona (2018)
F_{59}	Dynamic Capabilities	Providing strategies and directions for achieving desirable scenarios in development of construction projects	Gudienė et al. (2014)
F_{60}		Analysis of conflicts before pervious projects and their aims	Lin and Wu (2014); Chan and Chan (2004)
F_{61}		Evaluation of the outside environment in order to develop new ideas	Eisenhardt and Martin (2000)
F_{62}		Identification of environmental opportunities and threats	Danneels (2011)
F_{63}		Timely understanding of customer needs and market demand levels	Lamprou and Vagiona (2018)

Table 4 shows the validity of each item in the questionnaire calculated using Lawshe's equation in the final Delphi round. Furthermore, in this study, Kendall's Coefficient of Concordance was calculated to be 0.90, indicating very high agreement between participants.

Table 4. Content validity evaluation of each item in the questionnaire using Lawshe's equation.

Clustered Area	CSFs for construction SMEs	Approval opinion	Opposite opinion	Without any opinion	Content validity rate
Project Management	F_1	20	0	0	1
	F_2	18	1	0	0.8
	F_3	19	0	1	0.9
	F_4	19	0	1	0.9
	F_5	19	0	1	0.9
	F_6	20	0	0	1
	F_7	17	3	0	0.7
	F_8	20	0	0	1
	F_9	18	0	2	0.8
Financial Management	F_{10}	19	0	1	0.9
	F_{11}	20	0	0	1
	F_{12}	16	4	0	0.6
	F_{13}	18	0	2	0.8
	F_{14}	17	3	0	0.7
	F_{15}	19	1	0	0.9
	F_{16}	17	0	3	0.7
	F_{17}	19	1	0	0.9
	F_{18}	19	0	1	0.9
Competitive Advantage	F_{19}	16	4	0	0.6
	F_{20}	17	3	0	0.7
	F_{21}	20	0	0	1
	F_{22}	18	2	0	0.8
	F_{23}	18	0	2	0.8
	F_{24}	19	1	0	0.9
	F_{25}	19	0	1	0.9
	F_{26}	18	2	0	0.8
Organizational Management	F_{27}	20	0	0	1
	F_{28}	18	0	2	0.8
	F_{29}	19	1	0	0.9
	F_{30}	17	3	0	0.7
	F_{31}	20	0	0	1
	F_{32}	20	0	0	1
	F_{33}	20	0	0	1

Clustered Area	CSFs for construction SMEs	Approval opinion	Opposite opinion	Without any opinion	Content validity rate
	F_{34}	18	2	0	0.8
	F_{35}	18	2	0	0.8
	F_{36}	20	0	0	1
	F_{37}	20	0	0	1
	F_{38}	19	0	1	0.9
	F_{39}	20	0	0	1
Technology	F_{40}	18	0	2	0.8
	F_{41}	19	1	0	0.9
	F_{42}	19	0	1	0.9
	F_{43}	17	3	0	0.7
	F_{44}	19	1	0	0.9
	F_{45}	20	0	0	1
	F_{46}	19	0	1	0.9
	F_{47}	18	2	0	0.8
Health–Safety–Environment (HSE)	F_{48}	19	1	0	0.9
	F_{49}	18	2	0	0.8
	F_{50}	19	0	1	0.9
	F_{51}	18	0	2	0.8
	F_{52}	20	0	0	1
	F_{53}	19	1	0	0.9
Human Resource Management	F_{54}	18	2	0	0.8
	F_{55}	19	0	1	0.9
	F_{56}	20	0	0	1
	F_{57}	18	2	0	0.8
	F_{58}	20	0	0	1
Dynamic Capabilities	F_{59}	20	0	0	1
	F_{60}	19	1	0	0.9
	F_{61}	19	0	1	0.9
	F_{62}	20	0	0	1
	F_{63}	20	0	0	1

Factor Analysis. was used to evaluate the structural validity of the questionnaire using the SmartPLS software. In fact, in this study, after thematic experts in 3 rounds completed the research questionnaire, confirmatory factor analysis (CFA) was performed to validate the proposed model. Authors used CFA to investigate whether the number of factors and loads of variables measured on these factors corresponds to what was expected based on the theory and theoretical model and theories obtained by the experts. CFA is a special form of factor analysis, most commonly used in social research (Kline, 2010). It is carried out on the research data in order to test and validate the relationship of the measurement model based on fit indexes (Hoyle, 2012; Schermelleh-Engel et al., 2003). CFA tests the degree of conformity between the theoretical and experimental structures of research and evaluates the causal relationships between the components and sub-components of research (Klein, 1993). As such, CFA is basically a method of testing a hypothesis and is used when the researcher hypothesises the relationships of indicators with factors and wants to measure the data for a predetermined structure (Olawumi & Chan, 2021; Juhari et al., 2020; Shurrab et al., 2019). Figure 2 shows the factor loadings for all items in the questionnaire survey. Since all factor loadings are higher than 0.3, it can be concluded that the model has good fitting (Olawumi and Chan, 2020). The reliability of the questionnaire was calculated using Cronbach's alpha (α) coefficient, and the α-value was 0.91.

Data analysis was carried out using the SPSS software at two levels of descriptive and inferential statistics. Statistical properties such as frequency, percentage, mean, and standard deviation were used in the descriptive statistics, while Kolmogorov–Smirnov test, single variable t-test, and Friedman's test were used in the inferential statistical analysis. The prerequisite for parametric tests is the normal distribution of the variables (Sarvari et al., 2020a). It can be said that parametric tests are often based on mean and standard deviation, which fail to provide a good approximation of the results if the data does not have a normal distribution (Vickers, 2005).

Therefore, **the Kolmogorov–Smirnov test is used where the significance (Sig) is zero and** the normal distribution of data is inferred (Sarvari et al., 2020a). Table 5 shows the results of the normality test of the statistical population.

Table 5. Kolmogorov–Smirnov test results for evaluating the normal distribution of research data.

Variable	Significance level	Statistic	Value	Hypothesis	Sig
CSFs for managing construction SMEs in developing countries of Middle East	0.1	2.229	0.05	H0	Yes

H0: Data gathered using the questionnaire has a normal distribution.
H1: Data gathered using the questionnaire does not have a normal distribution.

As shown in Table 5, the significance level is higher than 0.05 in the entire questionnaire regarding CSFs for managing construction SMEs in developing countries of the Middle East. Therefore, the zero hypothesis is confirmed at the confidence level of 95% and shows that the data has a normal distribution. Therefore, parametric tests can be used in this study. In this section, the study findings based on each research question are presented.

Mean and Standard deviation. The mean score (MS) was used to rank the importance or significance of the CSFs items and their categories in this study. In instances where two or more CSFs have the same MS value, the standard deviation (SD) value is used with the MS value to rank these sets of CSFs. Hence, CSFs with smaller SD values are ranked higher than those with higher SD values (Olatunji et al., 2017).

Single variable T-test. Due to the normal distribution of the data, a t-test was used to determine and interpret the CSFs for managing construction SMEs in developing countries of the Middle East. Single variable t-test is a parametric test that compares the mean of studied variables to the tested waves (Kim, 2015). In this test, if the p-value is higher than 0.05, the tested variable is not significantly different from the mean value (3 in this study). Hence, this study used the 5-point Likert scale measurement to determine the importance of the factors, and the test value was considered equal to 3 (Sarvari et al., 2020a; Momeni and Faal Qayyumi, 2017). Therefore, the investigated factor is close to the mean of the statistical population. However, if the p-value is less than 0.05, the tested value is significantly different from the mean value (Sarvari et al., 2020a). In this case, the tested factor is more substantial than average if its value is higher than the mean; and weaker than average if its value is lower than the mean value.

Friedman's test. Friedman's test was used to prioritise the key CSFs areas of construction SMEs in developing countries of the Middle East. This test is used to analyse two-way variance using the ranking method (MacFarland et al., 2016). Furthermore, this test can also be used to compare the average ranking of different groups.

Furthermore, the study's statistical population used to determine the priority of each identified factor included consultant engineers, experts, consultants, and contractors active in the field of construction and working for construction SMEs in Iran. The Cochran formula with unknown populations was used to determine the sample size, which was 118 individuals. Sampling was carried out using purposive and convenience sampling methods. The population size could not be determined due to the non-availability of the experts' list. A non-probability sampling technique was adopted using purposive and convenience sampling to select 118 respondents. According to Kathori (2004), the researcher uses purposive sampling to select samples that provide the best information to achieve the study's objectives. Moreover, convenience sampling is relatively fast and inexpensive in obtaining samples within a limited period and proximity to the researcher (Creswell, 2009). This sampling method is common in construction and project management research (Alzubi et al., 2020; Badi et al., 2021; Sarvari et al., 2021).

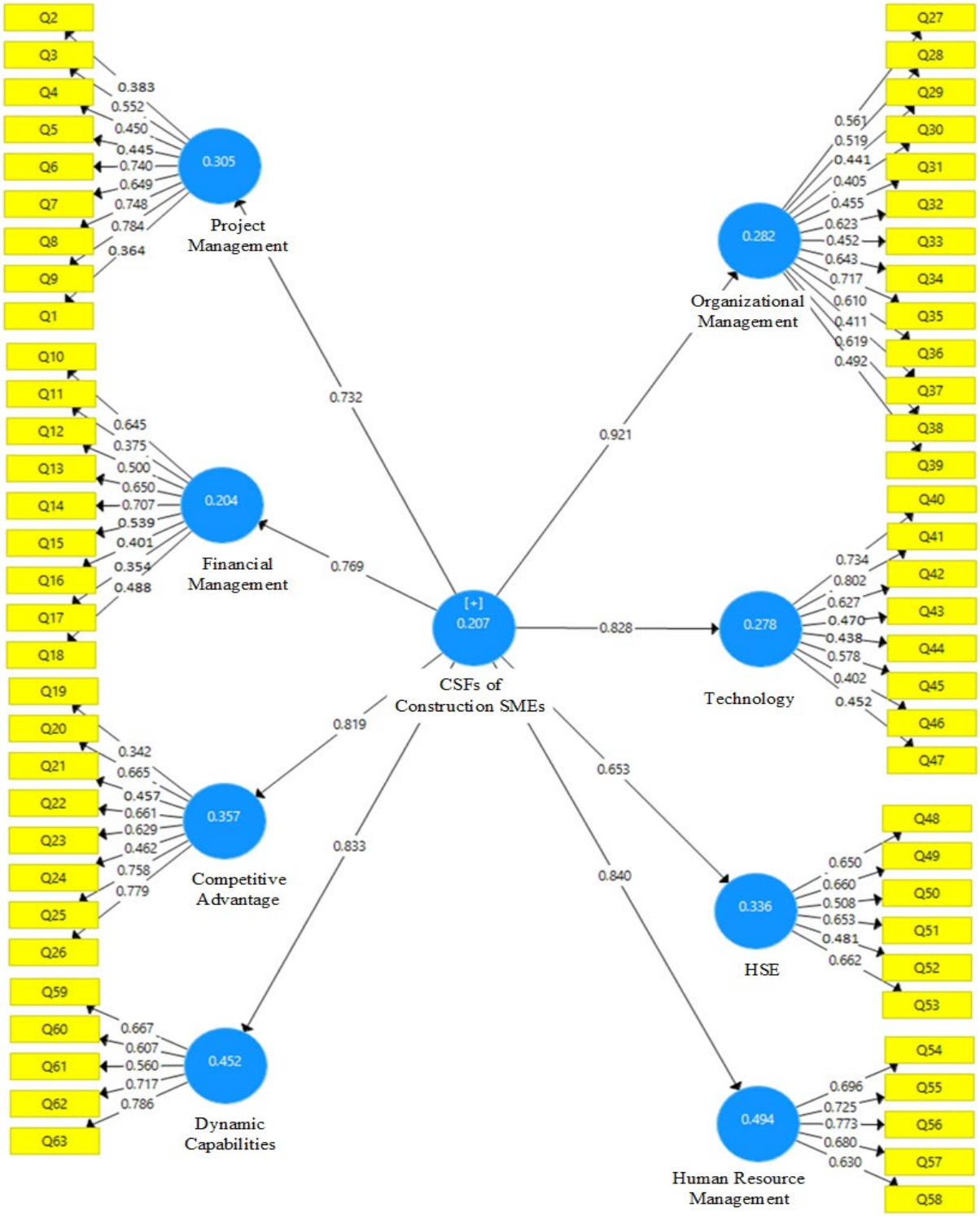

Figure 2: Factor loadings of the CSFs for managing construction SMEs in this study.

4. Results and discussions

In this section, the study findings based on each research question are presented.

4.1. What are the key CSFs categories for managing construction SMEs in developing countries of the Middle East?

The analysis of the collated data revealed that the CSFs categories could be classified as either "very important" ($3.51 \leq MS \leq 4.5$) and "extremely important" ($MS \geq 4.51$) based on Li et al. (2013) scale interpretation. As shown in Table 6, the mean score for the CSFs categories ranges from MS= 4.238 (SD= 0.426) for the "project management" category to MS= 4.757 (SD= 0.280) for the "technology" category at a variance of 0.519; with the mean score of the entire questionnaire being 4.491. Since the p-value is less than 0.05, the CSFs for construction SMEs in developing countries of the Middle East in all factors are significantly different from the average value of three (3) and are all higher than average. On the other hand, since the upper and lower limits of the confidence interval are calculated, it can be concluded that all items and areas can be considered significant CSFs for construction SMEs in developing countries of the Middle East.

Table 6. Single sample t-test and Mean ranking results for the CSFs Categories

CSFs categories	Frequency	Mean	S.D.	Test value = 3			Lower limit	Upper limit
				T	Df	p-value		
Project management	118	4.238	0.426	32.695	117	0.000	1.205	1.361
Financial management	118	4.320	0.379	37.795	117	0.000	1.251	1.389
Competitive advantage	118	4.363	0.470	31.473	117	0.000	1.277	1.449
Organizational management	118	4.566	0.368	46.227	117	0.000	1.499	1.633
Technology	118	4.757	0.280	68.092	117	0.000	1.706	1.808
HSE	118	4.538	0.423	39.469	117	0.000	1.461	1.615
Human resource management	118	4.616	0.453	38.744	117	0.000	1.534	1.699
Dynamic capabilities	118	4.574	0.491	34.788	117	0.000	1.484	1.664
Total	118	4.491	0.299	54.163	117	0.000	1.436	1.545

4.2. What is the importance of each identified CSFs for managing construction SMEs in developing countries of the Middle East?

Friedman's test was used to prioritise the key CSFs areas of construction SMEs in developing countries of the Middle East. The results of the Friedman's test presented in Table 7 are significant at the significance level of 0.05 ($p<0.05$). Therefore, it can be concluded that there is a considerable difference between the different CSFs categories for construction SMEs in developing countries of the Middle East.

Table 7. The results of the Friedman's test (Significance result)

Chi-Squared	Degree of Freedom	Significance level	Result
220.640	7	0.000	H0 is rejected

H0: The mean value of all CSFs categories in the questionnaire is equal.
H1: The mean values of all CSFs categories in the questionnaire are different.

According to the results presented in Table 8, among the CSFs categories of construction SMEs in developing countries of the Middle East, the technology aspect is ranked highest with an average score of 6.38. The "human resource management" aspect is ranked second with a mean value (MS) of 5.48. In contrast, "dynamic capabilities" is rated third (MS = 5.30). The two lowest-ranked CSFs areas are "financial management" at seventh place with MS = 3.06 and "project management" aspect, which is the least ranked (MS = 2.86). The results presented in Tables 9 and 10 show that the significance level is less than the 0.05 threshold ($p<0.05$). Therefore, it can be concluded that there is a significant difference between CSFs for construction SMEs in developing countries of the Middle East.

Table 8. Friedman's test results for average ranking of the CSFs categories

No.	CSFs categories	Rank mean	Rank
1	Project management	2.86	8
2	Financial management	3.06	7
3	Competitive advantage	3.55	6
4	Organizational management	4.76	4
5	Technology	6.38	1
6	HSE	4.61	5

No.	CSFs categories	Rank mean	Rank
7	Human resource management	5.48	2
8	Dynamic capabilities	5.30	3

Table 9. The results of the Friedman's test *(significance results in each category)*

CSFs categories	Chi-Square	Degree of Freedom	Significance level	Result
Project management	29.772	8	0.000	H0 is rejected
Financial management	71.626	8	0.000	H0 is rejected
Competitive advantage	85.032	7	0.000	H0 is rejected
Organizational management	116.191	12	0.000	H0 is rejected
Technology	38.278	7	0.000	H0 is rejected
HSE	74.140	5	0.000	H0 is rejected
Human resource management	6.229	4	0.000	H0 is rejected
Dynamic capabilities	4.069	4	0.000	H0 is rejected
Total	805.862	62	0.000	H0 is rejected

H0: The mean rank of all CSFs categories in the questionnaire is equal.
H1: The mean rank of all CSFs categories in the questionnaire is different.

According to the results presented in Table 10, among the CSFs for construction SMEs in developing countries of the Middle East, the factor (F44) of using "*novel technologies for construction of high-quality buildings according to customer specifications*" with a mean rank score of 40.15 is ranked highest, while factor - F30 "*close relationship between the company and scientific committees*" with a mean rank of 39.17 is ranked second. More so, factor (F33) – "*changes in the company's structure and creating a construction handling company*" with a score of 39.15 is the third-ranked CSF and factor (F19) "*emphasis on the values of traditional architecture in design and implementation of construction projects*" with a mean score of 20.50 is the least ranked CSF (63rd place).

Table 10. The results of the Friedman's test for CSFs items

CSFs Categories	CSFs for construction SMEs	Mean rank in each area	Rank within the area	Mean rank in overall	Rank in overall
Project management	F_1	5.86	1	32.93	32
	F_2	4.76	6	25.71	52
	F_3	4.71	8	24.49	59
	F_4	5.08	3	26.87	50
	F_5	4.53	9	24.09	61
	F_6	4.89	5	25.59	55
	F_7	5.39	2	29.64	45
	F_8	5.03	4	26.95	49
	F_9	4.75	7	25.45	56
Financial management	F_{10}	4.73	5	25.79	51
	F_{11}	5.81	2	34.37	22
	F_{12}	4.38	9	24.53	58
	F_{13}	4.41	7	24.72	57
	F_{14}	4.39	8	24.23	60
	F_{15}	5.18	4	29.72	44
	F_{16}	4.56	6	25.67	53
	F_{17}	5.72	3	33.48	26
	F_{18}	5.82	1	34.07	24
Competitive advantage	F_{19}	3.31	8	20.50	63
	F_{20}	4.35	6	29.58	46
	F_{21}	3.93	7	25.64	54
	F_{22}	4.81	3	32.55	37
	F_{23}	5.29	1	36.60	11
	F_{24}	4.67	5	32.04	40
	F_{25}	4.93	2	33.14	30
	F_{26}	4.72	4	32.01	41
Organizational management	F_{27}	5.78	13	27.52	48
	F_{28}	7.45	5	35.85	14
	F_{29}	5.84	12	27.86	47
	F_{30}	8.13	1	39.17	2
	F_{31}	7.87	3	37.94	8

CSFs Categories	CSFs for construction SMEs	Mean rank in each area	Rank within the area	Mean rank in overall	Rank in overall
	F_{32}	6.63	10	31.86	42
	F_{33}	8.12	2	39.15	3
	F_{34}	6.69	8	32.25	38
	F_{35}	6.22	11	29.97	43
	F_{36}	6.92	7	33.31	28
	F_{37}	6.57	9	32.20	39
	F_{38}	7.19	6	34.74	18
	F_{39}	4.47	4	36.19	12
Technology	F_{40}	4.53	6	37.66	9
	F_{41}	3.97	8	33.76	25
	F_{42}	4.55	5	38.13	7
	F_{43}	4.72	2	39.01	4
	F_{44}	4.83	1	40.15	1
	F_{45}	4.08	7	34.26	23
	F_{46}	4.69	3	38.95	5
	F_{47}	4.65	4	38.67	6
HSE	F_{48}	3.87	2	35.53	15
	F_{49}	3.55	4	33.30	29
	F_{50}	3.47	5	32.68	36
	F_{51}	3.97	1	37.56	10
	F_{52}	2.55	6	23.03	62
	F_{53}	3.67	3	34.91	17
Human resource management	F_{54}	2.89	5	32.92	33
	F_{55}	2.93	4	33.40	27
	F_{56}	3.02	2	34.72	19
	F_{57}	3.17	1	36.14	13
	F_{58}	3.00	3	34.46	21
Dynamic capabilities	F_{59}	3.07	2	34.60	20
	F_{60}	3.12	1	35.06	16
	F_{61}	2.87	5	32.84	34
	F_{62}	2.97	4	32.83	35
	F_{63}	2.98	3	33.03	31

Given the diverse factors influencing construction SMEs performance, there is a need to consider and focus on CSFs for these organisations. These factors were classified into eight categories as below:

Project Management. Project management skills were developed from the requirements of the construction industry to plan, control and manage large and complex 'tangible' projects (Bourne and Walker, 2004). It is universally accepted that efficient management is crucial for the success of any organisation. Even though a sizable number of studies, such as Zacharakis et al. (1999), have uncovered poor management as the leading cause of business failure, some studies such as Lin (1998) still emphasise that efficient management is key to business success. Studies such as Ghosh et al. (2001) have found effective management a critical success factor for SMEs. Entrepreneurs of construction industries in developing countries should acquire project management skills to manage their enterprises properly.

Financial Management. In developing countries, access to capital is one of the most prominent obstacles to the development of new businesses and SMEs. According to Dess and Robinson (1984), though with high interest rates, financial sources constitute substantial contributors to SMEs in developing countries. Studies such as Kristiansen et al. (2003) and Beck et al. (2006) confirm that the availability of financial resources is one of the critical success factors for SMEs as it facilitates SMEs' entry, exit, and growth. Therefore, managing these financial resources is critical for the development of construction SMEs in developing countries. Construction SMEs in developing countries frequently lack adequate legal status. They are continuously exposed to shocks that have always characterised some emerging economies such as Iran.

Competitive Advantage. Access to markets is one of the problems faced by SMEs (Swierczek & Ha, 2003) and can be attributed to poor marketing. For construction SMEs to succeed in developing countries' competitive environments, modern marketing tools should be employed. Many researchers (see, Verhees and Meulenberg, 2004) confirm the significance of marketing in the success of SMEs. In addition, there is no substitute for quality. It is generally perceived that quality is one of the essential success factors for any business. Chaganti and Chaganti (1983) noted that customers look for high-quality products at a reasonably low cost in a highly competitive market. As a critical success factor, the quality of a product or service has been empirically tested by various authors such as Reijonen and Komppula (2007). All of these studies agreed that, indeed,

quality is essential for SMEs success. Attention to innovation in implementation of construction projects and increasing technical skills, equipment, and machinery and their effective use based on novel technologies are two suitable ways to improve the competitive advantages of construction SMEs in developing countries.

Organisational Management. Organisational management is another CSFs for construction SMEs in developing countries (Banihashemi et al., 2017; Lamprou and Vagiona, 2018). Most construction SMEs in developing countries, just like elsewhere, must have positive and constructive cooperation with relevant organisations and institutes such as insurance, taxation, banks, and other relevant organisations. Without a proper plan for developing the company's business and resource management, the managers of construction SMEs will face difficulties managing their organisations. Many studies such as Bhide (1994) and Honig (2004) agreed that organisational management correlates positively with construction SMEs success. Construction SMEs must have close relations with scientific communities (Sanvido et al., 1992); this would ensure that while having specified communication lines and communication with research institutes, the construction SMEs can create and transfer knowledge and new technologies. This is consistent with the resource dependency theory (Barringer and Harrison, 2000), which suggests that entrepreneurs use their social relations to get the resources they need to support their businesses (Jenssen, 2001).

Technology. The primary reason construction SMEs continue to face growth challenges in developing countries is their technological capabilities or lack thereof despite significant support from governments. Construction SMEs are still hindered by their lack of technological implementation, despite great technological advancements globally. Without the technology, the construction SMEs find it difficult to neither compete nor grow (Arinaitwe, 2006). Technology is now part and parcel of the day-to-day operations of literally all businesses throughout the world. Construction SMEs in developing countries are still lagging in terms of technology. These enterprises in all developing countries should respond to technological changes to establish alternative ways of sustaining their competitive advantages. Many authors have confirmed the importance of technology in the growth, development and success of construction SMEs (Silva et al., 2016; Davis, 2017; Lamprou and Vagiona, 2018).

HSE. In recent years, cultural change in the successful management of health and safety at work has highlighted new challenges for construction SMEs. Construction SMEs in developing countries face a lack of effective sector independent health & safety solutions. SMEs are particularly difficult for the HSE to engage. Business issues such as cash flow, sales, staffing, and production are even more critical for SMEs than for larger ones – and health and safety are often given a very low priority (McKinney, 2002). As construction SMEs, if we are to improve the health and safety of most of our organisations, it is important to consider the most effective mechanisms to influence organisational behaviour. The construction SMEs presents special challenges in the identification of effective means of positively influencing behaviour. The literature needs a user-focused approach emphasised with particular reference to the direct economic benefits to the SME (Lansdown et al., 2007). Various agents have been presented in the literature (Elattar, 2009; Silva et al., 2016) as potential factors that may be exploited, such as (*i*) Emphasis on environmental protection and effective use of national resources; (*ii*) Emphasis on the clean, novel, and renewable energies; and (*iii*) Creation of HSE management system for systematic development of projects.

Human resource management. Human resource development is seen as the main tool for SMEs development, especially in the developing countries where access to other assets (i.e., financial) lacks and is yet not in the best condition (Pike et al., 2010). Furthermore, SMEs in developing countries have enormous potential for organisational development and larger social improvements; Though these enterprises are not exploiting their human resource purposefully (Ahmeti, 2015). Construction SMEs face many obstacles and are not achieving their maximum potentials due to incompetency in applying contemporary and substantiated human resource practices due to the lack of experience and low awareness of human resource development. Therefore, significant initiatives have to be implemented in order to improve the foundations of organisational efficiencies to attain the maximum construction SMEs performance.

Dynamic capabilities. Sexton and Barret's (2003) view of the challenges and characteristics of SMEs are similar to the findings of Rothwell and Zegveld (1982), where they stated that construction SMEs are faced with the challenge of lack of dynamic capabilities. According to the CIDB (2011), research and development investment in the developing countries (for example Malaysian construction industry) ranges from negligible to non-existent. The main motivation for Construction SMEs in developing countries is survival, followed by stability and development. In

fact, their main focus is project delivery instead of the corporate development of the business (Sexton and Barret, 2003). Therefore, in order to cover the challenge, it is critical to pay attention to strategic issues, such as (*i*) Providing strategies and directions for achieving desirable scenarios in the development of construction projects; (*ii*) Evaluation of the outside environment in order to develop new ideas; and (*iii*) Identification of environmental opportunities and threats.

The results of the current study are akin to the findings reported in previous studies. For instance, Taye et al. (2018) identified some key CSFs in projects, such as the clear outlook for the project, design team's experience, contractor's experience, availability of skilled personnel, access to sufficient financial resources, the existence of precise payment mechanisms, lack of delays in financial payments of the project, sufficient design time, and contractor's interest in delivering quality work. Also, Lamprou and Vagiona (2018) highlighted some CSFs in construction enterprises to include factors such as communication with project manager, scheduling the project implementation, budget and costs, quality and performance and customer satisfaction and having a clear goal and outlook, planning for project implementation, support of senior managers, communication methods with project stakeholders and between project members, sufficient budget, and project size and complexity.

Moreover, Silva et al. (2016) also related success to factors such as cost, time, quality, security, and cash flow management of the project, and in the long-term with environmental performance, customer satisfaction, employee satisfaction, learning, advancement, and development of new knowledge and specialities and use of novel technologies. Similar results were reported by Ramlee et al. (2016) as CSFs of construction SMEs. Other CSFs emphasised by Asad Mir and Pennington (2014) included performance management of the project, critical project performance criteria, project staff, project life cycle, project leadership, project stakeholders, and project strategies and policies regarding project success. These factors were also emphasised by Samiaah et al. (2011), Elattar (2009), and Chan and Chan (2004). Davis (2014) also emphasised aspects such as communication, cooperation, consultation, time, and reaching project and strategic goals as critical for the success of companies.

The construction industry in the current era is faced with fierce competition and the presence of large and multinational companies. Under such conditions, competition in the industry goes beyond a single country's boundaries, creating competitive pressure for those active in this field.

Developing countries such as the Middle East have access to relative actual and potential advantages and can become more involved in this field and make good use of business and investment opportunities. Therefore, identification, evaluation, and analysis of success factors for SMEs are among the priorities of this industry.

Identifying and implementing these success factors can lead to better success of enterprises, while ignoring them can lead to defeat and failure. As revealed from the results of the current study, the success of small and medium-sized construction companies is not solely dependent on time, cost, and quality criteria and goals but instead includes a wide range of areas and factors such as project management, financial management, competitive advantage, organisational management, technology, HSE, human resource management, and dynamic capabilities. In general, each of these factors can be effective and useful in developing suitable strategies along with the needs of SMEs, and construction SMEs can emphasise these factors to improve their competence and key resources and follow a shorter path to success. These companies can also use other successful enterprises in the same industry as their guideline.

4.3 Recommendations for construction SMEs and stakeholders

It is recommended that project management procedures be defined in advance to improve construction SMEs' success in developing countries. A structured starting definition and project implementation dramatically increases the chances of project success and, consequently, the success of construction companies. In order to achieve better success, project managers should clearly define project aims for the members of the project team so that members can have a clear understanding regarding these goals and aims and know how to implement necessary plans and operations. This can help improve the commitment of employees toward systematic management methods.

Operational activities such as defining work areas, specifying project limits, precise definition of project aims, and identifying stakeholders and prioritising their needs, forming project teams based on competence and specialisation can be effective in this regard. Furthermore, it is also necessary to determine organisational missions and development strategies. Theoretical and practical training for human resources to improve personal skills, especially with regards to communication, site management, supply management, project management, and other aspects of construction

SMEs, are important. On the other hand, attracting investments and financing from international financial institutions must also be considered. It is suggested that managers in construction SMEs use the best possible business strategies, including competitive and advanced strategies, to achieve better profits, sales, and return of investment. This is important since, without determined strategies, development and performance improvement would be impossible, especially in ever-changing environments which include intrinsic uncertainties.

The use of novel technologies is one strategy that can effectively create a competitive advantage for construction SMEs. In this regard, the use of databases, decision-support systems, remote conferences, and information systems can be effective. It is recommended for managers of construction SMEs to improve their management, innovation, technological, marketing, entrepreneurship capabilities, and strategic flexibility as much as possible through the creation of research and development units. Constant improvement of safety management systems and following regulatory requirements and HSE guidelines is also essential in all construction activities. Companies active in the construction industry must also use dynamic capabilities that improve their skills and analyse their environment to identify and exploit new business opportunities.

5. Conclusions

The current study was undertaken to identify and rank CSFs for managing construction SMEs in developing countries of the Middle East. To this end, CSFs were extracted from the extant literature and were evaluated using three Delphi rounds. Finally, 63 CSFs were identified from the extant literature. The researcher-made questionnaire based on the 63 identified CSFs were categorised under eight CSFs categories: project management, financial management, competitive advantage, organisational management, technology, HSE, human resource management, and dynamic capabilities.

The validity and reliability of the questionnaire survey were confirmed. The questionnaire was then distributed among experts in the field. The statistical population included experts, engineers, consultants, and contractors active in the construction industry – from which, based on the Cochrane formula, an unknown population size, 118 individuals were selected using purposive and convenience sampling among experts in the field of construction in Iran. The collated data were analysed using SPSS software. The findings indicated that CSFs for managing construction

SMEs in developing countries of the Middle East in all areas have higher than average status and that all identified factors can be considered significant CSFs for construction SMEs in developing countries of the Middle East. Furthermore, the top five CSFs categories are technology, human resource management, dynamic capabilities, organisational management, and HSE. The study also provided strategic blueprints and recommendations for construction SMEs and stakeholders to enhance the efficiency of their firms, project success, and competitive advantage in the construction industry.

Practical research implications. The study provides stakeholders in the construction industry with a shortlist of key areas to focus towards enhance the managerial and operational efficiency of their construction firms/SMEs and achieving the organisational goals. The study can also guide top management of construction SMEs in formulating necessary business models and policies to fast-track and enhance the firm competitive edge in the construction industry. Organisations and stakeholders can use the identified ranking of the CSFs categories to benchmark the progress and achievements of their SMEs against predetermined objectives. The findings also provide empirical support for construction stakeholders in tackling issues limiting the development of construction SMEs, particularly in Iran.

The study findings bring to the fore the importance and the need for construction SMEs to incorporate technology in their processes and practices. Generally, as seen in the extant literature and practice, most SMEs are always slow in adopting new technologies due to their size and low firm's budget. However, the study's findings further stressed the importance of the technological aspect in managing construction SMEs. The study also reported that a synergy between the implementation of technology and the availability of supporting organisation structure and staff capabilities are critical to the success and long-term viability of construction SMEs.

Theoretical implications. In terms of theoretical implications, this study contributes to the management of construction SMEs in Iran by considering the effective factors for the success of these companies from a quantitative perspective, which has not been done before this study to the best of the authors' knowledge. This work advances that knowledge and expertise is the main factor allowing construction SMEs to improve their effectiveness and productivity. Construction companies must use new technologies, dynamic capabilities, human resources, and organisation management to improve their success in future projects.

Limitation of the study. The data for the study was obtained in Iran, which could limit the application of the findings beyond the Iranian context. However, the findings could be extrapolated for application by construction SMEs and stakeholders in other developing countries.

Given the above, future research can help generalise the proposed results by undertaking similar studies in other countries and regions using the same CSFs items or expanding them. Furthermore, it would also be valuable to compare findings from different construction companies according to the level of development of their base country to determine any similarities and differences. Also, some future research directions for deepening the identified CSFs can include determining the specific operational or managerial capabilities allowing construction SMEs to work internationally. Other areas of future studies could be determining the effect of technological development to improve the chances of success in construction SMEs and determining the impact of possible managerial strategies for construction SMEs. Future studies should also consider interviewing the managers of construction companies regarding their strategies for exporting engineering services to other countries.

References

Achanga, P., Shehab, E., Roy, R. and Nelder, G. (2006). Critical success factors for lean implementation within SMEs. *Journal of Manufacturing Technology Management*, *17*(4), 460-471.

Afolabi, A., Ibem, E., Aduwo, E., Tunji-Olayeni, P., and Oluwunmi, O. (2019). Critical success factors (CSFs) for e-Procurement adoption in the Nigerian construction industry. *Buildings*, *9*(2), 47.

Ahmeti, F. (2015). Human resource management and practices in SMEs in developing countries: Practices in Kosovo. *European Scientific Journal*, *11*(7).

Albert, M., Balve, P. and Spang, K. (2017). Evaluation of project success: a structured literature review. *International Journal of Managing Projects in Business*, 10(4), 796-821. https://doi.org/10.1108/IJMPB-01-2017-0004

Alias, Z., Zawawi, E. M. A., Yusof, K., & Aris, N. M. (2014). Determining critical success factors of project management practice: A conceptual framework. *Procedia-Social and Behavioral Sciences*, *153*, 61-69.

Alvarenga, J.C., Branco, R.R., Guedes, A.L.A., Soares, C.A.P. and Silva, W.d.S.e. (2020). The project manager core competencies to project success. *International Journal of Managing Projects in Business*, *13*(2), 277-292. https://doi.org/10.1108/IJMPB-12-2018-0274

Alzubi, K. M., Alkhateeb, A. M., & Hiyassat, M. A. (2020). Factors affecting the job satisfaction of construction engineers: evidence from Jordan. *International Journal of Construction Management*, 1-19. https://doi.org/10.1080/15623599.2020.1867945

Arinaitwe, J. K. (2006). Factors constraining the growth and survival of small scale businesses – developing country analysis. *Journal of American Academy of Business*, *8*(2): 16-178.

Asad Mir, F. and Pinnington, A. (2014). Exploring the value of project management: Linking Project Management Performance and Project Success. *International Journal of Project Management*, *32*(2), 202-217.

Badi, S., Ochieng, E., Nasaj, M., & Papadaki, M. (2021). Technological, organisational and environmental determinants of smart contracts adoption: UK construction sector viewpoint. *Construction Management and Economics*, 39(1), 36-54. https://doi.org/10.1080/01446193.2020.1819549

Banihashemi, S., Hosseini, M.R., Golizadeh, H., and Sankaran, S. (2017). Critical success factors (CSFs) for integration of sustainability into construction project management practices in developing countries. *International Journal of Project Management*, *35*(6), 1103-1119.

Barringer, B.R & Harrison, J.S. (2000). Walking a tightrope: creating value through interorganisatioanl relationships, *Journal of Management*, *26*(3), 367-403.

Bartlett, C. and Beamish, P. (2013). *Translation management: Text, Cases & Readings in Cross-border Management*. 7th Edition, Publisher: Mc-Graw-Hill, 752p.

Beck, T., Demirguc – Kunt, A., Leaven, L & Maximovic, V. (2006). The determinants of financing obstacles. *Journal of International Money and Finance*, *25*(6), 932-952.

Bhamu, J. and Sangwan, K.S. (2014). Lean manufacturing: literature review and research issues. *International Journal of Operations and Production Management*, *34*(7), 876-940.

Bhide, A. (1994). How entrepreneurs craft strategies that work, *Havard Business Review*, *72*(2), 150-161.

Bourne, L. and Walker, D.H.T. (2004). Advancing project management in learning organisations. *The Learning Organization*, *11*(3), 226-243.

Carneiro, A. (2000). How does knowledge management influence innovation and competitiveness? *Journal of Knowledge Management*, *4*(2), 87-98. https://doi.org/10.1108/13673270010372242

Chaganti, R & Chaganti, R. (1983). A profile of profitable and not - so - profitable small businesses. *Journal of Small Business Management*, *21*(3), 43-51.

Chan, A.P.C. and Chan, A.P.L. (2004). Key performance indicators for measuring construction success. *Benchmarking: An International Journal*, *11*(2), 203-221.

Construction Industry Development Board (CIDB). (2011). Construction Quarterly Statistical Bulletin: Third Quarter 2011. Kuala Lumpur: CIDB.

Cresswell, J. W. (2009). Research design, quantitative and qualitative approaches, London: Sage Publications.

Creswell, J.W., Clarck, V.L.P., Gutmann, M.L., Hanson, W.E. (2003). Advanced mixed methods research designs. In: Tashakkori, A., Teddlie, C. (Eds.), Handbook on Mixed Methods in the Behavioral and Social Sciences. Sage, Thousand Oaks, CA.

Dainty, A., Leiringer, R., Fernie, S., and Harty, C. (2017). BIM and the small construction firm: a critical perspective. *Building Research and Information*. *45*(6), 696-709, https://doi.org/10.1080/09613218.2017.1293940

Danneels, E. (2011). Trying to become a different type of company: Dynamic capability at Smith Corona. *Strategic Management Journal*, *32*(1), 1-31.

Davig, W & Brown, S (1993). Incremental decision making in small manufacturing businesses, *Journal of Small Business Management*, *30*(2), 53-60.

Davis, K. (2014). Different stakeholder groups and their perceptions of project success. *International Journal of Project Management*, *32*(2), 189-201.

Davis, K. (2017). An empirical investigation into different stakeholder groups perception of project success. *International Journal of Project Management*, *35*(4), 604-617.

Dess, G & Robinson, R. (1984). Measuring organisational performance in the absence of objective measures: the case of privately held firms and conglomerate business units. *Strategic Management Journal*, *5*(3), 265-273.

de Wit, A. (1986). Measuring project success: an illusion. Proc., Project Management Institute, Montreal, Canada, 1986, 69-79.

Dombrowski, U., Crespo, I. and Zahn, T. (2010). Adaptive configuration of a lean production system in small and medium-sized enterprises. *Production Engineering*, *4*(4), 341-348.

Eisenhardt, K.M. and Martin, J.A. (2000). Dynamic capabilities: what are they? *Strategic Management Journal*, *21*(10-11), 1105-1121.

Elattar, S.M.S. (2009). Towards developing an improved methodology for evaluating performance and achieving success in construction projects. *Scientific Research and Essay*, *4*(6), 549–554.

Enjolras, M., Camargo, M., and Schmitt, C. (2019). Are High-Tech Companies More Competitive Than Others? An Empirical Study of Innovative and Exporting French SMEs. *Technology Innovation Management Review*, *9*(1).

Fang, N., Yuli, Z & Hongzhi, X (2009). Acquisition of resources, formal organisation and entrepreneurial orientation of new ventures. *Journal of Chinese Entrepreneurship*, *1*(1), 40-52.

Furry, A.W., Dewi, L., and Suhendri, S. (2017). The challenges of implementing building information modeling in small-medium enterprises architecture firms in Indonesia. Paper presented at the *19th International Conference of Architecture, Interior Design, and Construction Management*, London, available at: https://www.researchgate.net/publication/315652420_The_Challenges_of_Implementing_Building_Information_Modeling_in_Small-Medium_Enterprises_Architecture_Firms_in_Indonesia

Gemino, A., Horner Reich, B. and Serrador, P.M. (2021). Agile, traditional, and hybrid approaches to project success: is hybrid a poor second choice?. *Project Management Journal*, *52*(2), pp.161-175.

Ghobadian, A. and Gallear, D. (1996). Total quality management in SMEs. *Omega*. *24*(1), 83-106.

Ghosh, B., Liang, T., Meng, T & Chan, B. (2001). The key success factors, distinctive capabilities and strategic thrusts of top SMEs in Singapore. *Journal of Business Research*, *51*(3), 209-221.

Gudienė, N., Banaitis, A., Podvezko, V., and Banaitienė, N. (2014). Identification and evaluation of the critical success factors for construction projects in Lithuania: AHP approach. *Journal of Civil Engineering and Management*, *20*(3), 350-359.

Harris, F., McCaffer, R., Baldwin, A. and Edum-Fotwe, F. (2021). *Modern construction management*. John Wiley & Sons.

Honig, S. (2004). Entrepreneurship education: towards a model of contingency – based business planning. *Academy of Management Learning and Education*, *3*(3), 1-16.

Hoyle, R.H. (2012). Handbook of Structural Equation Modeling. The Guilford Press, New York.

Hung, R.Y.Y., Yang, B., Lien, B.Y.H., McLean, G.N., and Kuo, Y.M. (2010). Dynamic capability: Impact of process alignment and organisational learning culture on performance. *Journal of World Business*, *45*(3), 285-294.

Jadhav, J.R., Mantha, S.S. and Rane, S.B. (2014). Exploring barriers in lean implementation. *International Journal of Lean Six Sigma*, *5*(2), 122-148.

Jenssen, J.I. (2001). Social networks, resources and entrepreneurship. *The International Journal of Entrepreneurship and Innovation*, *2*(2), 103-109.

Jiang, W., Zhao, X. and Ni, J. (2017). The impact of transformational leadership on employee sustainable performance: The mediating role of organisational citizenship behavior. *Sustainability*, *9*(9), 1567.

Jocumsen, G (2004). How do small business managers make strategic marketing decisions. *European Journal of Marketing*, *38*(5), 659-674.

Juhari, M.L. and Arifin, K. (2020). Validating measurement structure of materials and equipment factors model in the MRT construction industry using confirmatory factor analysis. *Safety Science*, *131*, p.104905.

Khoshfetrat, R., Sarvari, H., Chan, D.W.M., and Rakhshanifar, M. (2020). Critical risk factors for implementing building information modelling (BIM): a Delphi-based survey. *International Journal of Construction Management*, 1-10. https://doi.org/10.1080/15623599.2020.1788759

Khosravi, F. and Baradaran, S. (2019). Factors Affecting Project Success in Perlite Construction Company. *14th International Conference on Project Management*, Tehran, Ariana Research Group. https://civilica.com/doc/843651

Khosravi, M., Sarvari, H., Chan, D.W.M., Cristofaro, M., and Chen, Z. (2020). Determining and assessing the risks of commercial and recreational complex building projects in developing

countries: a survey of experts in Iran. *Journal of Facilities Management*, *18*(3), 259-282. https://doi.org/10.1108/JFM-02-2020-0010

Kim, T.K. (2015). T test as a parametric statistic. *Korean journal of anesthesiology*, *68*(6), 540.

Kline, P. (1993). An Easy Guide to Factor Analysis. 1st Edition. Publisher: Routledge, 208 P.

Kline, R. B. (2010). Principles and practice of structural equation modeling (3rd ed.). New York, New York: Guilford Press.

Kothari, C.R. (2004). Research methodology: Methods and techniques. New Age International.

KOSGEB, Republic of Turkey Small and Medium Enterprises Development Organization. (2012). Enhancing the Competitiveness of SMEs in Turkey Country Report, KOSGEB, p.3.

Kristiansen, S., Furuholt, B & Wahid, F. (2003). Internet café entrepreneurs: pioneers in information dissemination in Indonesia. *The International Journal of Entrepreneurship and Innovation*, *4*(4), 251-263.

Kryscynski, D., Coff, R., and Campbell, B. (2021). Charting a path between firm-specific incentives and human capital-based competitive advantage. *Strategic Management Journal*, *42*(2), 386-412.

Lam, T.T., Mahdjoubi, L., and Mason, J. (2017). A framework to assist in the analysis of risks and rewards of adopting BIM for SMEs in the UK. *Journal of Civil Engineering and Management*, *23*(6), 740-752. https://doi.org/10.3846/13923730.2017.1281840

Lamprou, A. and Vagiona, D. (2018). Success Criteria and Critical Success Factors in Project Success: A Literature Review. *International Journal of Real Estate and Land Planning*, *1*(2018), 276-284.

Lansdown, T. C., Deighan, C., & Brotherton, C. (2007). Health and safety in the small to medium-sized enterprise. Psychosocial opportunities for intervention. *Health and Safety Executive*, London.

Lawshe, C.H., 1975. A quantitative approach to content validity. *Personnel psychology*, *28*(4), 563-575.

Li, T. H. Y., Ng, S. T., & Skitmore, M. (2013). Evaluating stakeholder satisfaction during public participation in major infrastructure and construction projects: a fuzzy approach. *Automation in Construction, 29, 123-135.*

Li, Y., Song, H., Sang, P., Chen, P.H. and Liu, X. (2019). Review of Critical Success Factors (CSFs) for green building projects. *Building and Environment*, *158*, 82-191.

Lim, C.S. and Mohammed, M.Z. (1999). Criteria of project success: an exploratory reexamination. *International Journal of Project Management*, *17*(4), 243-248.

Lin, C (1998). Success factors of small and medium sized enterprises in Taiwan: An analysis of cases. *Journal of Small Business Management*, *36*(4), 43-56.

Lin, Y., and Wu, L.Y. (2014). Exploring the role of dynamic capabilities in firm performance under the resource-based view framework. *Journal of Business Research*, *67*(3), 407-413.

Ling, L. and Xiping, Z. (2006). Enhancing competitive edge through knowledge management in implementing ERP systems. *Systems Research and Behavioral Science*, *23*(2006), 129-140.

Lu, W. and Shen, L. (2008). Critical Success Factors for Competitiveness of Contractors: China Study. *Journal of Construction Engineering and Management*, *134*(12), 972-982.

Luo, L., He, Q., Xie, J., Yang, D. and Wu, G. (2017). Investigating the relationship between project complexity and success in complex construction projects. *Journal of Management in Engineering*, *33*(2), p.04016036.

MacFarland, T.W. and Yates, J.M. (2016). Friedman twoway analysis of variance (anova) by ranks. In *Introduction to Nonparametric Statistics for the Biological Sciences Using R* (pp. 213-247). Springer, Cham.

Madsen, E.L. (2010*). A Dynamic Capability Framework: Generic Types of Dynamic Capabilities and their Relationship to Entrepreneurship Strategic Reconfigurations Building Dynamic Capabilities in Rapid Innovation-based Industries*. Cheltenham, UK: Edward Elgar Publishing, Inc.

McKinney, P. (2002). Expanding HSE's ability to communicate with small firms: A targeted approach. *Prepared by AEA Technology plc for the Health and Safety Executive*, *6/7*(420/2002), 744 -766

Momeni, M., Faal Qayyumi A. (2017). Statistical analysis using SPSS. Ketab No. Tehran. 312 p. (In Persian).

Netland, T.H. (2015). Critical success factors for implementing lean production: the effect of contingencies. *International Journal of Production Research*, *5*(48), 2433-2448.

Ng, S.T.T., Wong, J.M.W.C., Chiang, Y.H., and Lam, P.T.I. (2018). Improving the competitive advantages of construction firms in developed countries. Proceedings of the Institution of Civil Engineers - Municipal Engineer, *171*(4), 234-244.

Nguyen, L.D., Ogunlana, S.O., and Lan, D.T.X. (2004). A study on project success factors in large construction projects in Vietnam. *Engineering, Construction and Architectural Management*, *11*(6), 404-413.

Noorzai, E. and Golabchi, M. (2020). Selecting a proper construction system in small and medium mass housing projects, considering success criteria and construction volume and height. *Journal of Engineering, Design, and Technology*, *18*(4), 883-903. https://doi.org/10.1108/JEDT-09-2019-0227

Nyoni, T., & Bonga, W. G. (2018). Anatomy of the small & medium enterprises (SMEs) critical success factors (CSFs) in Zimbabwe: Introducing the 3E model. *Dynamic Research Journals' Journal of Business & Management (DRJ-JBM)*, *1*(2), 01-18.

Olatunji, S. O., Olawumi, T. O., & Aje, I. O. (2017). Rethinking Partnering among Quantity-Surveying Firms in Nigeria. *Journal of Construction Engineering and Management, 143(11), 1–12*. https://doi.org/10.1061/(ASCE)CO.1943-7862.0001394

Olatunji, S. O., Olawumi, T. O., and Odeyinka, H. A. (2016). Nigeria's Public Procurement Law-Puissant Issues and Projected Amendments. *Public Policy and Administration Research, 6*(6), 73–85.

Olawumi T.O., and Chan, D.W.M. (2018). Identifying and prioritising the benefits of integrating BIM and sustainability practices in construction projects: a Delphi survey of international experts. *Sustainable Cities and Societies*, *40*, 16–27.

Olawumi, T. O., and Chan, D. W. M. (2019). Critical Success Factors of Implementing Building Information Modelling and Sustainability Practices in Construction Projects: A Delphi Survey. *Sustainable Development, 27*(4), 587–602. https://doi.org/10.1002/sd.1925

Olawumi, T. O., and Chan, D. W. M. (2020). Concomitant Impediments to the implementation of Smart Sustainable Practices in the Built Environment. *Sustainable Production and Consumption, 21*(January), 239–251. https://doi.org/10.1016/j.spc.2019.09.001

Olawumi, T. O., and Chan, D.W.M. (2018). Critical Success Factors (CSFs) for Amplifying the Integration of BIM and Sustainability Principles in Construction Projects: A Delphi Study. In *Proceedings of the RICS COBRA Conference*. 23-25 April 2018, London: RICS, United Kingdom. Retrieved from http://bit.ly/39WcqRO

Olawumi, T. O., & Chan, D. W. M. (2021). Developing project evaluation models for smart sustainable practices implementation in construction projects: a comparative study between Nigeria and Hong Kong. *Engineering, Construction and Architectural Management*, 31 pages. https://doi.org/10.1108/ECAM-11-2020-0906

Onwuegbuzie, A. J. and Combs, J. P. (2010). Emergent data analysis techniques in mixed methods research: A synthesis. In A. Tashakkori & C. Teddlie Eds, Sage Handbook of mixed methods in social and behavioral research 2nd edition, 397-430. Thousand Oaks, CA: Sage.

Oyelaran-Oyeyinka, B. (2007). SME: Issues, challenges, and prospects. Presented at the International Conference on Financial System Strategy (FSS) 2020. Organised by the Central Bank of Nigeria, Abuja from 18th to 20th June 2007.

Pike, A., Rodríguez-Pose, A., & Tomaney, J. (Eds.). (2010). Handbook of local and regional development. Routledge.

Pinto, J.K., and Covin, J.G. (1989). Critical factors in project implementation: a comparison of construction and R&D projects. *Technovation*, *9*(1), 49-62.

Poirier, E., Staub-French, S. and Forgues, D. (2015). Embedded contexts of innovation: BIM adoption and implementation for a specialty contracting SME. *Construction Innovation*, *15*, 42-65, https://doi.org/10.1108/CI-01-2014-0013

Ramlee, N. Tammy, N.J., Raja Mohd Noor, R.N.H., Ainun Musir, A., Abdul Karim, N., Chan, H.B., Mohd Nasir, S.R. (2016). Critical Success Factors for Construction Project. *International Conference on Advanced Science, Engineering and Technology (ICASET)*.

Raul, S. (2009). Capital Structure decisions: Research in Estonian non-financial companies. *Baltic Journal of Management*, *3*(1), 55-70.

Redman, T. and Wilkinson, A. (2006). *Contemporary Human Resource Management*, British Library Cataloguing in Publication Data, 2nd Ed.

Reijonen, H & Komppula, R. (2007). Perception for success and its effect on small firm performance. *Journal of Small Business and Enterprise Development*, *14*(4), 689- 701.

Rengamani, J., 2018. Achieving project success for construction professionals to categorise significant project management innovations and expertise. *International Journal of Supply Chain Management*, 7(3), pp.196-198.

Rothwell, R. and Zegveld, W. (1982). Innovation and the Small and Medium Sized Firm: Their Role in Employment and in Economic Change. London: Frances Printer.

Rymaszewska, A.D. (2014). The challenges of lean manufacturing implementation in SMEs. *Benchmarking: An International Journal*, *21*(6), 987-1002.

Saka, A.B. and Chan, D.W.M. (2020). Adoption and implementation of building information modelling (BIM) in small and medium-sized enterprises (SMEs): a review and conceptualisation. *Engineering, Construction, and Architectural Management*, Vol. ahead-of-print No. ahead-of-print. https://doi.org/10.1108/ECAM-06-2019-0332

Samiaah, M., Al-Tmeemy, H.M., Abdul-Rahman, H., and Harun, Z. (2011). Future criteria for success of building projects in Malaysia. *International Journal of Project Management*, *29*(2011), 337-348.

Sanvido, V., Grobler, F., Parfitt, K., Guvenis, M., and Coyle, M. (1992). Critical success factors for construction projects. *Journal of Construction Engineering and Management*, *118*(1), 94-111.

Sarvari, H., Cristofaro, M., Chan, D. W. M., Noor, N. M., and Amini, M. (2020a). Completing abandoned public facility projects by the private sector: results of a Delphi survey in the Iranian Water and Wastewater Company. *Journal of Facilities Management*, *18*(5), 547-566. https://doi.org/10.1108/JFM-07-2020-0046

Sarvari, H., Nassereddine, H., Chan, D. W. M., Amirkhani, M. and Noor, N. M. (2020b). Determining and Assessing the Legal Barriers to Transfer of Unfinished Public Sector Construction Projects to Private Sector in Iran. *Construction Innovation,* In Press. https://doi.org/10.1108/CI-07-2020-0112

Sarvari, H., Rakhshanifar, M., Tamošaitienė, J., Chan, D. W. M. and Beer, M. (2019). A Risk Based Approach to Evaluating the Impacts of Zayanderood Drought on Sustainable Development Indicators of Riverside Urban in Isfahan-Iran. *Sustainability*, *11*(23), 6797. https://doi.org/10.3390/su11236797

Schermelleh-Engel, K., Moosbrugger, H., Müller, H. (2003). Evaluating the fit of structural equation models: tests of significance and descriptive goodness-of-fit measures. *Methods of psychological research online*, *8*(2), 23-74.

Schilke, O. (2014). On the contingent value of dynamic capabilities for competitive advantage: The nonlinear moderating effect of environmental dynamism. *Strategic Management Journal*, *35*(2), 179-203.

Schmidt, R.C. (1997). Managing Delphi surveys using nonparametric statistical techniques. *Decision Sciences*, 28(3), 763-774.

Şener, S., Savrul, M., and Aydın, O. (2014). Structure of small and medium-sized enterprises in Turkey and global competitiveness strategies. *Procedia-Social and Behavioral Sciences*, *150*, 212-221.

Sexton, M. and Barrett, P. (2003). Appropriate innovation in small construction firms. Construction Management and Economics, *21*(6), 623-633.

Shan, M., Liu, W.Q., Hwang, B.G., and Lye, J.M. (2020). Critical success factors for small contractors to conduct green building construction projects in Singapore: identification and comparison with large contractors. *Environmental Science and Pollution Research*, *27*(8), 8310-8322.

Shelton, J., Martek, I., and Chen, C. (2016). Implementation of innovative technologies in small-scale construction firms: five Australian case studies. *Engineering Construction and Architectural Management*, *23*, 177-191, https://doi.org/10.1108/ECAM-01-2015-0006

Shurrab, J., Hussain, M. and Khan, M. (2019). Green and sustainable practices in the construction industry: A confirmatory factor analysis approach. Engineering, *Construction and Architectural Management*, *26*(6), 1063-1086. https://doi.org/10.1108/ECAM-02-2018-0056

Silva, G.A.S.K., Warnakulasuriya, B.N.F. and Arachchige, B.J.H. (2016). Criteria for Construction Project Success: A Literature Review. University of Sri Jayewardenepura, Sri Lanka, *13th International Conference on Business Management* (ICBM) 2016.

SMEinfo. (2019). Official National SME definition", available at: https://smeinfo.com.my/official-national-sme-definition (accessed 10 October 2018).

Stanitsas, M., Kirytopoulos, K. and Leopoulos, V., 2020. Integrating sustainability indicators into project management: The case of construction industry. Journal of Cleaner Production, p.123774.

Swierczek, F & Ha, T. (2003). Entrepreneurial orientation, uncertainty avoidance and firm performance: an analysis of Thai and Vietnamese SMEs. *International Journal of Entrepreneurship and Innovation*, *4*(1), 46-58.

Tayeh, B.A., Al Hallaq, K., Salah Alaloul, W., and Reyad Kuhail, A. (2018). Factors Affecting the Success of Construction Projects in Gaza Strip. *The Open Civil Engineering Journal*, *12*(2018), 301-315.

Teece, D.J., Pisano, G. and Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, *18*(7), 509-533.

Thneibat, M.M. and Al-Shattarat, B. (2021). Critical success factors for value management techniques in construction projects: case in Jordan. *International Journal of Construction Management*, pp.1-22.

USITC. (2010). *Small and medium-sized enterprises: characteristics and performance*. United States International Trade Commission, Investigation No. 332-510, USITC Publication 4189.

Verhees, F & Meulenberg, K. (2004). Market orientation, innovativeness, product innovation and performance in small firms. *Journal of Small Business Management*, *42*(2), 134-154.

Vickers, A.J. (2005). Parametric versus non-parametric statistics in the analysis of randomised trials with non-normally distributed data. *BMC medical research methodology*, *5*(1), 1-12.

Westeeveld, E. (2003). The Project Excellence Model: linking success criteria and critical success factors. *International Journal of Project Management*, *21*(2003), 411-418.

World Economic Forum. (2016). *Shaping the Future of Construction A Breakthrough in Mindset and Technology. World Economic Forum (WEF).* Geneva. Retrieved from https://www.bcgperspectives.com/Images/Shaping_the_Future_of_Construction_may_2016.pdf

Yeung, J.F.Y., Chan, A.P.C., Chan, D.W.M., and Li, L.K. (2007). Development of a partnering performance index (PPI) for construction projects in Hong Kong: a Delphi study. *Construction Management and Economics, 25*(12), 1219-1237.

Zacharakis, A., Meyer, D & De Castro, J.C (1999). Differing perceptions of new venture failure: A matched exploratory study of venture capitalists and entrepreneurs. *Journal of Small Business Management*, *37*(3), 1-14.

Zainon, N., Skitmore, M. and Mohd-Rahim, F.A. (2020). Critical success factors in implementing flexible IT infrastructure in the Malaysian construction industry. *International Journal of Construction Management*, 1-12.

Zubair, S., Kabir, R. and Huang, X. (2020). Does the financial crisis change the effect of financing on investment? Evidence from private SMEs. *Journal of Business Research*, *110*, 456-463.

Zuo, J., Zhao, X., Nguyen, Q.B.M., Ma, T. and Gao, S. (2018). Soft skills of construction project management professionals and project success factors: A structural equation model. *Engineering, Construction and Architectural Management*, *25*(3), 425-442. https://doi.org/10.1108/ECAM-01-2016-0016