

Determination of Contractor Strategies in Delivering Construction Projects in Oman

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Abstract: Contractors are responsible to deliver construction projects as per contract. Past literature highlighted various implications of poor project delivery and as the ones who are responsible to deliver the project, contractors need to plan and strategise to ensure their projects are successfully delivered to the client. This article focuses on identifying the strategies adopted by Omani main contractors to deliver construction projects successfully. Using 48 strategies identified through literature review, a survey has been conducted with 108 main contractors in Oman with top grade level of Oman Chamber of Commerce and Industry (OCCI) to investigate the significant strategies adapted ensuring successful project delivery. The top grade level contractor is on the focus of this research because they are involved as main contractors for construction projects in Oman. Using factor analysis technique, the 48 strategies have been reduced into 28 sub-strategies which are grouped into 7 main strategies. The seven main strategies are: (1) People and subcontractor management, (2) Technology and innovative solutions adoption, (3) Quality, safety and environmental protection, (4) Develop technical capability, monitor and control, (5) Organisational efficiency and financial stability, (6) Legislative compliance and (7) Clients' satisfaction. This research revisits the successful strategy for project delivery and restructures them to suit the practices in Oman. The strategy can be emulated by contractors in the country and perhaps other Middle East countries, as a way to expedite better construction performance.

Keywords: Contractors, Project strategies, Oman, Project delivery, Construction project

INTRODUCTION

The construction industry plays a major role in every country's economic growth (Albino and Berardi, 2012; Hwang, Shan and Lye, 2018). The success of construction projects generates income to project organisations such as the developers, contractors and consultant, as well as contribute to the national growth (Zavadskas et al., 2014). Unsuccessful project delivery, in return may have adverse impact to project organisation's reputation and affect the surrounding community (Oyegoke and Al Kiyumi, 2017). Failure to handover project to client on time with quality and within budget indicates unsuccessful project delivery. Contractors' role is critical in delivering projects successfully as they are responsible to plan and implement the construction work at site. While managing construction project and successful delivery can bring competitive advantage to the contractors, failure of a single project may cause serious damage to the contractors (Lu, Shen and Yam, 2008). A tainted reputation is difficult to overcome and can easily outweigh successful

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past performance. Future work opportunities can be diminished as client may blacklist such contractors. Contractor's failure to achieve contractual obligations can cause contract termination, penalties, loss of profit or litigation with project parties (Oyegoke and Al Kiyumi, 2017). Contractor may be unable to bid for new projects and may be compelled to postpone other projects due to manpower and equipment constraints (Alnuaimi et al., 2010). Thus, it is important for the contractors to strategise in ensuring continuous performance that meet their clients' expectation.

Project success is linked to the resources and management capability of the organisations that implement it (Gudiené et al., 2014). In construction projects, the success of the project delivery rest heavily on the project contractors (Alzahrani and Emsley, 2013). They are the ones responsible to transform the design on papers into actual building. As such, they are expected to incorporate their skills and capability to manage, operate, monitor, control and execute the works with the resources they possessed while ensuring the expectation from the clients and consultants are met and all the regulations are complied with. Adoption of appropriate strategies will not only ensure management of resources but also monitor and control project delivery process.

The Oman construction industry faces issues in project delivery due to the absence of standard construction procedure manual or guidelines (Alnuaimi et al., 2010). Oyegoke and Al Kiyumi (2017) have identified that contractor's lack of experience and insufficient workers provision had cause the delay in Oman large projects. Lack of contractor's experience has led to inappropriate construction planning by them. Contractor's improper materials procurement plan with inaccurate lead time calculation causes material shortage in the Oman construction project delivery (Islam and Khadem, 2013). They fail to make payment for the daily construction expenses due to their financial instability. Most of the time, construction workers and employees are forced to work overtime with inadequate salary resulting in the loss of productivity. Majority of the contractors and their workers are expatriates and exhibit poor understanding of cultural differences (Islam and Khadem, 2013). Most of these workers, including those who became the project supervisors, are unskilled and yet did not receive any proper training. Such incompetent supervisors are responsible for poor planning and poor coordination of construction projects in Oman. Thus, Omani contractors need to strategise to overcome these issues and deliver successful projects. While few studies have been conducted on construction projects in Oman, the contractors' strategies to deliver successful projects have been paid little attention in spite of the research made by Alnuaimi and Al Mohsin (2013), which identified that contractors' poor performance has caused project delay which in turn impacted the national economy.

In view of these issues, this study aims to identify contractors' strategies to deliver successful project in Oman. Through systematic literature review focussing on contractors' strategy and performance in delivering construction projects, a total of 48 strategies have been identified. Questionnaires were developed and tested in a pilot study before sending out to begin the survey. The respondents from the contractor firms were asked to rank the importance of these strategies using a Likert scale during the survey. Factor analysis was conducted to significantly group the strategies. The results are expected to fill the gap in the project success factors research and provide useful information and practical guidance to contractors on the project execution practices.

LITERATURE REVIEW

Omani Construction Industry

Oman is a developing country in which the construction industry is one of the promising sectors that contributes to the country's economy (Project Oman, 2020). As part of the government's strategy to diversify economy away from oil and gas, the construction sector in Oman has been buoyant over the last few years (The World Bank Group, 2019; Townsend, 2017). The construction industry in Oman has registered an average annual growth rate of 9.4% under the Eighth Five Year Development Plan 2010–2015 (CISION, 2017). Continued growth is expected during the period of 2018–2022 with approximately USD180 billion worth of planned or on-going projects in the Ninth Five Year Development Plan 2016–2020 (Malik and Mitchell, 2018). With 675,757 workers in the year 2017 for example, the industry has provided job opportunities for both Omanis and expatriates (Oxford Business Group, 2019). The Oman government uses the industry as a "tool" to lower its unemployment rate. To cater to the growing population, government is spending heavily on social infrastructure including housing, education and health sectors (Alpen Capital, 2015). This is also to attract private investment to the economy. Rapid urbanisation, a fast-growing middle class and housing loans availability at low interest rate are driving Oman's housing sector construction activity (Alpen Capital, 2015). Although the industry has recorded a drop of 5.8% due to the pandemic in 2020 (Al Amri and Marey-Perez, 2020), Mordor Intelligence (2022) forecasts a growth of 6% from 2019 to 2024. The industry is expected to grow in the future as it is pursuing its diversification plan of "Vision 2040".

Roles of Contractor in Construction Project Delivery

Contractor is one of the major players in the project team who is responsible for executing the construction project work until completion and handover to client (Rao, Kumar and Kumar, 2018). They are customer-focused organisations that understand and fulfil the expectations of the client. Contractors are expected to complete the projects within the timeframe provided for in the contract as the delay may lead to penalties (Dvir, Raz and Shenhar, 2003). Therefore, contractors are expected to make an effort to establish a comprehensive and specific schedule before project commencement (Oyegoke and Al Kiyumi, 2017). Aje, Odusami and Ogunsemi (2009) reported that contractor's monitoring and control procedure have an impact on the cost and time performance of the construction project. Contractors are required to plan for materials and procure them based on their usage at the construction site to avoid work stoppage due to material shortage or unavailability (Osawaru et al., 2018). Contractors also responsible for the site logistics and site management (Jaśkowski, Sobotka and Czarnigowska, 2018). Main contractors need to monitor the subcontractors to ensure that they meet the agreed budget, schedules and technical specifications (Bryde and Robinson, 2005). Contractors need to constantly liaise with consultants for the clarification of the project drawings. It is imperative for contractors to maintain harmony with consultants to achieve expectations of both clients and consultants during project delivery (Egemen and Mohamed, 2005). It is the contractor's responsibility to ensure the quality of the projects (Lou, Xu and Wang, 2017) and safety of all personnel at

the work site (Yong and Mustaffa, 2013). One of the major responsibilities of the contractors in recent years is minimising environmental impact of construction activities at site (Alzahrani and Emsley, 2013). Overall, the contractors are not only responsible for the on-site activities including material procurement and environmental protection, but they are also expected to manage site workers, subcontractors and liaise with relevant parties such as consultants, suppliers and local authority.

Construction Project Delivery Strategy

Manley, McFallan and Kajewski (2009) defined strategies as “the planned actions of firms to improve core competencies and facilitate outcome achievement”. They represent a course of actions to fulfil the needs and expectations of stakeholders. The actions that bring success to a firm differ from country to country based on their operating environment, legislative requirements and policies (Yong and Mustaffa, 2012). In the context of construction firms, “strategies” are defined as planned actions to achieve its organisational goals such as to be competitive among other firms (Chew, Yan and Cheah, 2008) or to operate business globally (Choi et al., 2018) or to achieve improved business outcome (Manley, McFallan and Kajewski, 2009) or to manage environmental issues of construction (Fergusson and Langford, 2006), in response to changing market environment. However, these prior studies focused on the strategies at firm level that contributes to the construction firm performance. It is widely acknowledged that contractor firms' capability is critical for successful execution of project. Thus, “construction project delivery strategy” is the plans and actions by the contractor firms to bring them success in construction project delivery within a changing market environment to meet the needs and expectations of the clients.

The study of strategies that contribute to project success is often considered as one of the important ways to deliver projects successfully (Gunduz and Yahya, 2018). These strategies which are related to company's personnel, resources, processes and management, if not taken care properly are likely to result in project failure (Farooque and Farooque, 2009). Shen, Lu and Yam (2006) investigated the key contractor competitiveness indicators for success in different types of projects. They identified that effective quality policy and plan, technology capacity and plan, construction programme, human resources, cost control system, effective organisation operation, plant and equipment resources and relationship with subcontractors and suppliers are critical for all types of projects. Manley, McFallan and Kajewski (2009) investigated 23 business strategies of contractor firms for innovation performance. They identified that employee, technology, knowledge, relationship and marketing strategies are significant for the contractor companies. A study conducted by Yong and Mustaffa (2013) have identified five contractor strategies that contribute to project success in the Malaysian construction industry context. Their findings showed that control of subcontractors works, skilful workers, adequacy of design details and specifications and commitment and involvement to monitor the project progress are crucial for contractors. Al Kuwaiti, Ajmal and Hussain's (2018) study focussed on Abu Dhabi's health care projects; they found that contractor's project management activities, financial capability, effective strategic planning and a competent project manager and multidisciplinary/competent project team are essential for contractors to deliver successful projects. The implications of these studies are normally limited to the countries and the

environment where these studies are conducted. It is important to conduct the investigation referring to the Omani construction industry as the Middle Eastern's social, political, economic and cultural aspects are quite different from another region. The final list of the contractor strategies to deliver successful project as identified from the literatures is presented in Table 1.

Table 1. Contractor projects delivery strategies extracted from literatures

No.	Potential Contractor Strategies	References
1.	Provision of site workers according to the project and industry requirements	Sambasivan and Soon (2007), Alzahrani and Emsley (2013) and Yong and Mustafa (2013)
2.	Provision of good facilities for workers' comfortability	Hwang, Zhu and Ming (2016)
3.	Appoint skilled and competent staff	Al Kuwaiti, Ajmal and Hussain (2018), Gunduz and Yahya (2018), Alzahrani and Emsley (2013) and Pakseresht and Asgari (2012)
4.	Outsourcing for specialised requirement	Trejo et al. (2002)
5.	Practise reward and incentive system	Zhao, Shen and Zuo (2009) and Gunduz and Yahya (2018)
6.	Continuous plan for training and skills development	Al Kuwaiti, Ajmal and Hussain (2018), Gunduz and Yahya (2018) and Tan, Xue and Cheung (2017)
7.	Stimulate good and healthy working culture and environment	Zhao, Shen and Zuo (2009)
8.	Establish clear contractual responsibilities and liabilities with subcontractors	Al Kuwaiti, Ajmal and Hussain (2018), Yong and Mustafa (2013) and Tan, Xue and Cheung (2017)
9.	Determine selection criteria for subcontractor	Sambasivan and Soon (2007) and Pakseresht and Asgari (2012)
10.	Maintaining continuous relationship with subcontractors	Tan, Xue and Cheung (2017), Meng (2012) and Manley, McFallan and Kajewski (2009)
11.	Conduct regular meetings with the consultants	Pakseresht and Asgari (2012)
12.	Develop trust and satisfaction on work progress	Meng (2012) and Wong, Cheung and Ho (2005)
13.	Advocate all the contractual terms to demonstrate professionalism	Alzahrani and Emsley (2013) and Hwang and Lim (2013)
14.	Fulfilling client's requirement	Al Kuwaiti, Ajmal and Hussain (2018) and Alzahrani and Emsley (2013)

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Table 1. (Continued)

No.	Potential Contractor Strategies	References
15.	Develop information technology (IT) and technology capability	Shen, Lu and Yam (2006)
16.	Invest in new software and system	Alzahrani and Emsley (2013), Wang et al. (2014) and Fang et al. (2016)
17.	Optimise automation and robotics	Davies and Harty (2013)
18.	Apply new technology, product or process	Shen et al. (2018) and Davies and Harty (2013)
19.	Appoint experienced technical staff	Isik et al. (2009) and Aje (2012)
20.	Select appropriate construction methods	Isik et al. (2009) and Aje (2012)
21.	Adherence to construction work schedule	Gunduz and Yahya (2018), Alzahrani and Emsley (2013) and Kim, Walewski and Cho (2016)
22.	Consistency in project monitoring procedure	Al Kuwaiti, Ajmal and Hussain (2018), Yang, Yu and Zhu (2020) and Yong and Mustafa (2013)
23.	Apply effective cost and budgeting control	Alzahrani and Emsley (2013), Hwang and Lim (2013), Yang, Yu and Zhu (2020) and Tan, Xue and Cheung (2017)
24.	Mitigation of delays and conflicts	Yong and Mustafa (2013)
25.	Conduct risk management analysis	Hwang and Lim (2013), Pakseresht and Asgari (2012) and Al Kuwaiti, Ajmal and Hussain (2018)
26.	Provide competent site supervising team	Hwang and Lim (2013) and Yong and Mustafa (2013)
27.	Apply maintenance and operating procedure for handling construction plant and equipment	Sambasivan and Soon (2007), Alzahrani and Emsley (2013) and Doloi, Iyer and Sawhney (2011)
28.	Implement materials procurement plan	Sambasivan and Soon (2007)
29.	Implement logistic and supply chain management	Al Kuwaiti, Ajmal and Hussain (2018)
30.	Implement environmental protection policy	Acheamfour et al. (2020) and Alzahrani and Emsley (2013)
31.	Implement waste management plan	Alzahrani and Emsley (2013)
32.	Implement pollution control	Wang, Dulaimi and Aguria (2004)

(Continued on next page)

Table 1. (Continued)

No.	Potential Contractor Strategies	References
33.	Implement health and safety plan	Al Kuwaiti, Ajmal and Hussain (2018), Tan, Xue and Cheung (2017), Alzahrani and Emsley (2013) and Manu et al. (2018)
34.	Provide health and safety supervisor on site	Manu et al. (2018)
35.	Enclose construction site from public	Dąbrowski (2015)
36.	Implement IT system for construction site security	Fang et al. (2016)
37.	Provide quality improvement through quality assurance and quality control programmes	Yong and Mustaffa (2013), Alzahrani and Emsley (2013) and Al Kuwaiti, Ajmal and Hussain (2018)
38.	Establish clear organisational structure and delegate authority	Gunasekera and Chong (2018)
39.	Minimise bureaucracy	Islam and Khadem (2013)
40.	Improve company image through membership of trade or specialist associations	Alzahrani and Emsley (2013)
41.	Submit required plans to authority for approval	Windapo and Cattell (2010)
42.	Comply to required rules, regulations and legislation	Islam and Khadem (2013) and Windapo and Cattell (2010)
43.	Optimise technology as way to establish effective communication system	Al Kuwaiti, Ajmal and Hussain (2018), Gunduz and Yahya (2018) and Alzahrani and Emsley (2013)
44.	Manage information using proper documentation plan and technology	Fortune and White (2006)
45.	Adequate fund is arranged throughout the project	Al Kuwaiti, Ajmal and Hussain (2018), Gunduz and Yahya (2018), Alzahrani and Emsley (2013) and Hwang and Lim (2013)
46.	Minimise reliance on client's payment	Iyer, Kumar and Singh (2020) and Alzahrani and Emsley (2013)
47.	Forecast cash flow using software packages	Alzahrani and Emsley (2013) and Hwang and Lim (2013)
48.	Invest in insurance policy to manage construction risks	Odeyinka (2000)

RESEARCH METHODOLOGY

Using systematic literature review, a total of 72 project delivery strategies have been identified. Similar meaning strategies are then grouped and those that only appear once are removed to ensure consistency in the strategy elements, which left with only 48 strategies. A questionnaire was developed using these strategies and was piloted among three contractors in the Oman construction industry and two Omani construction academicians to ensure the relevancy and the adequacy of the questions. The feedback was generally helpful and indicated that the survey instrument was likely to work as planned. Some very minor changes, such as rephrasing questions to ensure clarity were made to the survey questionnaire after the pilot study.

Questionnaires were then randomly distributed to 512 contractors registered under top grades such as "International", "Excellent" and "Grade 1" in Oman Chamber of Commerce and Industry (OCCI). This survey approached the respondents with management position in the firm. The survey was conducted from 2nd November to 2nd December 2020 through e-mail distribution of questionnaire. The respondents were asked to rate the importance of each strategies using a six-point Likert scale where ranking of 1 was "Not important" and 6 was "Extremely important". By using the Likert scale, it required for the respondents to make a statement rather than directing their response towards the mid-point choice, suggesting a neutral opinion. Despite reminders sent after the first e-mail, only 108 usable responses were received representing a response rate of 21%. Past studies on the contractors have shown that the number of responses between 100 to 110 is acceptable (Doloi, 2013; Kog and Yaman, 2016).

The demographic information of the respondents and their company, which include work designation, educational qualification, place of work, years of working experience, company registration at OCCI, years of company establishment and the number of projects completed by the company are shown in Table 2.

Table 2. Demographic information of the respondents

Characteristics	Number	%
Work Designation		
Top management personnel	20	18.5
Middle management personnel	88	81.5
Educational Qualification		
Diploma	3	2.8
Bachelor's degree	55	50.9
Master's degree	42	38.9
Professional certification	4	3.7
Other	4	3.7
Place of Work		
Company office	53	49.1
Construction project site	55	51.9

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Table 2. (Continued)

Characteristics	Number	%
Working Experience		
5 years to 10 years	10	9.3
11 years to 15 years	27	25.0
16 years to 20 years	22	20.4
More than 20 years	49	45.4
Company Registration Level at OCCI		
International	8	7.4
Excellent or Grade 1 with international operation	17	15.7
Excellent	74	68.5
Grade 1	9	8.3
Company Establishment		
Less than 5 years	2	1.9
5 years to 10 years	12	11.1
11 years to 15 years	19	17.6
16 years to 20 years	4	3.7
More than 20 years	71	65.7
Number of Projects Completed		
Less than 5	3	2.8
5 to 10	7	6.5
11 to 15	5	4.6
16 to 20	2	1.9
More than 20	91	84.3

The respondents are either from the top or middle management personnel. Majority of the respondents have either bachelor or master's degree which accounts for 50.9% and 38.9%, respectively. About 2.8% of them are diploma holder, another 3.7% have professional certification and the remaining 3.7% have acquired other relevant qualifications within their area of expertise such as professional body memberships. Almost half of the respondents (50.9%) work at the project site and the other half (49.1%) are based at the company office. Majority of the respondents (45.4%) have extensive working experience in construction projects (more than 20 years). Another 20.4% of them have 16 years to 20 years of experience, 25% of them have 11 years to 15 years of experience and the rest 9.3% have worked at least 5 years to 10 years. All respondents' companies are registered with OCCI, at the top three registration level ("International", "Excellent" and "Grade 1"). Majority of the contractor firms (65.7%) have been established for more than 20 years. Only two of the firms (1.9%) have been established for less than 5 years. About 84.3% of the firms have completed more than 20 projects while only 2.8% of firms have completed less than 5 projects. The data gathered was analysed using SPSS 25.0.

FINDINGS

The aim of this study is to group the variables and identify the significant strategies of contractor firms to deliver successful projects. The survey data of 48 strategies were subjected to factor analysis. The results are presented in Tables 3 to 5 and Figure 1. Initially, the data were tested for their reliability. The analysis results revealed that the overall degree of inter-correlation among the variables is observed to be sufficient as the correlation matrix revealed coefficients of above 0.3 and below 0.9. This range of coefficient is recommended by Field (2018). The Kaiser-Meyer-Olkin (KMO) value (0.863) and Bartlett's test of sphericity ($p = 0.000$) in Table 3 also confirmed that the data were appropriate for factor analysis (Kaiser and Rice, 1974). Cronbach's alpha of 0.968 shows an excellent internal consistency reliability of the items used.

Table 3. KMO, Bartlett's test and Cronbach's alpha

KMO measure of sampling adequacy	0.863
Bartlett's test of sphericity	
Approx. chi-square	4,475.434
df	1,128.000
Sig.	0.000
Cronbach's alpha	0.968

Factor Extraction and Interpretation

The principal component analysis (PCA) revealed seven components with eigenvalue greater than one, accounting for 74% of the variance. The factors grouping after varimax rotation is shown in Table 4. Items with loading exceeding 0.50 were only retained to interpret the factors as they are accepted to have enough relation to be grouped under a factor (Kazaz, Er and Ozdemir, 2014). Based on the highest loading items of each factor and common theme of the variables, the seven factors dubbed as strategies are labelled (as shown in Table 4) and the scree plot is shown in Figure 1.

Table 4. Strategies to deliver conventional construction projects

Description of Strategies	Factor Loading	% of Variance Explained
1. People and subcontractor management		15.5
Appoint skilled and competent staff	0.689	
Outsourcing for specialised requirement	0.700	
Continuous plan for training and skills development	0.801	
Stimulate good and healthy working culture and environment	0.748	

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Table 4. (Continued)

Description of Strategies	Factor Loading	% of Variance Explained
Establish clear contractual responsibilities and liabilities with subcontractors	0.724	
Determine selection criteria for subcontractor	0.666	
Maintaining continuous relationship with subcontractors	0.573	
2. Technology and innovative solutions adoption		13.8
Develop IT and technology capability	0.765	
Invest in new software and system	0.854	
Optimise automation and robotics	0.815	
Apply new technology, product or process	0.723	
Implement IT system for construction site security	0.752	
3. Quality, safety and environmental protection		12.9
Implement environmental protection policy	0.844	
Implement waste management plan	0.851	
Implement pollution control	0.833	
Provide health and safety supervisor on site	0.634	
Provide quality improvement through quality assurance	0.565	
4. Develop technical capability, monitor and control		10.6
Appoint experienced technical staff	0.717	
Select appropriate construction methods	0.746	
Apply effective cost and budgeting control	0.723	
Mitigation of delays and conflicts	0.644	
5. Organisational efficiency and financial stability		8.3
Conduct risk management analysis	0.615	
Improve company image through membership of trade or specialist associations	0.786	
Minimise reliance on client's payment	0.696	
Forecast cash flow using software packages	0.548	

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Table 4. (Continued)

Description of Strategies	Factor Loading	% of Variance Explained
6. Legislative compliance		7.0
Submit required plans to authority for approval	0.891	
Comply with required rules, regulations and legislation	0.882	
7. Clients' satisfaction		5.6
Advocate all the contractual terms to demonstrate professionalism	0.765	
Fulfilling client's requirement	0.726	

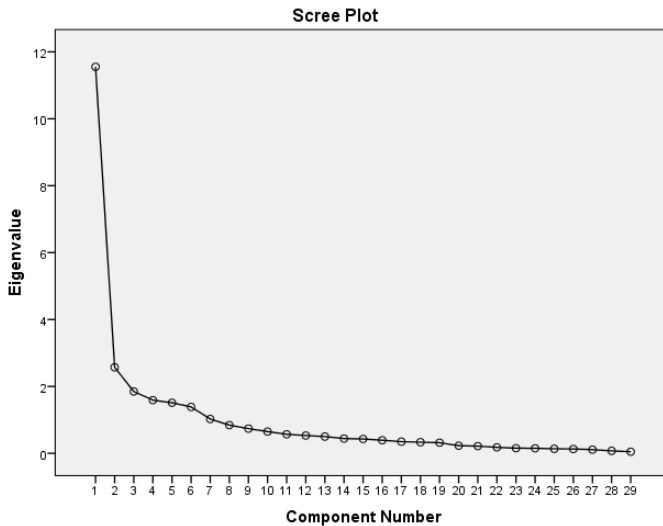


Figure 1. Scree plot

A total of 29 sub-strategies retained are grouped into seven main strategies. Based on Table 4, the following summarised the main seven strategies identified in the study. Strategy 1 consists of seven sub-strategies, i.e., "Appoint skilled and competent staff", "Outsourcing for specialised requirement", "Continuous plan for training and skills development", "Stimulate good and healthy working culture and environment", "Establish clear contractual responsibilities and liabilities with subcontractors", "Determine selection criteria for subcontractor" and "Maintaining continuous relationship with subcontractors". Strategy 2 comprises of five sub-strategies, i.e., "Develop IT and technology capability", "Invest in new software and system", "Optimise automation and robotics", "Apply new technology, product or process" and "Implement IT system for construction site security". Strategy 3 comprises of five sub-strategies, i.e., "Implement environmental protection policy",

"Implement pollution control", "Provide health and safety supervisor on site" and "Provide quality improvement through quality assurance". Strategy 4 comprises of four sub-strategies, i.e., "Appoint experienced technical staff", "Select appropriate construction methods", "Apply effective cost and budgeting control" and "Mitigation of delays and conflicts". Strategy 5 comprises of four sub-strategies, i.e., "Conduct risk management analysis", "Improve company image through membership of trade or specialist associations", "Minimise reliance on client's payment" and "Forecast cash flow using software packages". Strategy 6 comprises of two sub-strategies, i.e., "Submit required plans to authority for approval" and "Comply with required rules, regulations and legislation". Strategy 7 comprises of two sub-strategies, i.e., "Advocate all the contractual terms to demonstrate professionalism" and "Fulfilling client's requirement".

Reliability and Validity

The reliability of the main-strategy dimensions was assessed with Cronbach alpha values. Composite reliability (CR) and average variance extracted (AVE) values indicate the validity of the strategy dimensions. The reliability and validity values are presented in Table 5. According to Bagozzi and Yi (1988), CR must be above 0.6 and AVE must be above 0.5 to establish convergent validity. The correlation of strategies should be lower than square root of AVE to demonstrate the discriminant validity (Hair et al., 2018). All CR scores are above 0.70 and all AVEs are above 0.50 except for the Strategy 5 (AVE = 0.45). The square root of the AVE of all seven strategies greater than the levels of correlations involving that strategy confirms discriminant validity of all seven strategies. There is no issue to consider Strategy 5 with AVE slightly below 0.5 while it exhibits discriminant validity (Sekar, Viswanathan and Sambasivan, 2018).

Table 5. Cronbach's alpha and correlation matrix

Strategies	Cronbach's Alpha	CR	AVE	1	2	3	4	5	6	7
1	0.893	0.87	0.50	0.707						
2	0.906	0.88	0.61	0.453	0.781					
3	0.917	0.86	0.57	0.612	0.555	0.755				
4	0.858	0.80	0.50	0.585	0.520	0.562	0.707			
5	0.736	0.76	0.45	0.454	0.457	0.378	0.471	0.671		
6	0.918	0.88	0.78	0.432	0.232	0.367	0.427	0.255	0.883	
7	0.676	0.71	0.55	0.415	0.432	0.434	0.432	0.424	0.375	0.741

DISCUSSION

The literature review has identified a total of 48 strategies for contractors to deliver construction projects. The data collected from Omani contractors were subjected to factor analysis to identify the main and the sub-strategies. A total of seven main strategies were identified significant for Omani contractors to deliver successful projects.

Strategy 1: People and Subcontractor Management

This survey has identified "People and subcontractor management" as the most important strategy with 15.5% of the total variance. People are important resource in any construction project. As such, their skills, competencies and capability shall affect the performance of the projects. Lu, Shen and Yam (2008) stated that contractors require competent people with strong knowledge and skills to execute project successfully. Under this first strategy, there are seven sub-strategies which can be divided into two main elements – in-house expertise and subcontractors' relations. With regards to in-house expertise, the main contractors are aware of the need to appoint skilled and competent staff and where possible, outsource for specialised needs (Reichstein, Salter and Gann, 2008; Wilkinson, Johnstone and Townsend, 2012). Training has also been identified as one of the sub-strategies, as supported by Al Kuwaiti, Ajmal and Hussain (2018), who indicated the necessity of training for skill development and to enable better achievement of project goals. In construction projects, main contractors enter a contract with many subcontractors. Main contractors are responsible to manage the subcontractors, apart from their own staff. According to Yong and Mustafa (2012), while competent subcontractors support the contractor to complete the project on time, inexperienced subcontractor can put the project at risk. Therefore, careful selection of the subcontractors is needed for ensuring successful project delivery. This survey also acknowledged the need to maintain continuous relationship with the subcontractors and to ensure the responsibility and liabilities of the subcontractors are clearly defined. This finding supports the statement by Tan, Xue and Cheung (2017), which indicated that main contractors' competitiveness can be improved through their long-term business relationship with subcontractors. The importance of promoting good and healthy working environment in a project has also been identified as one of the sub-strategies. Zhao, Shen and Zuo (2009) stated that good and healthy working culture helps to develop loyalty of staff as it brings safe work environment for them.

Strategy 2: Technology and Innovative Solutions Adoption

The results also showed that "Technology and innovative solutions adoption" is another significant strategy with 13.8% of the total variance. Large and challenging projects are dealt with adaptation to new technologies and innovative methods of construction. Contractors are required to acquire appropriate technologies and develop capability for their implementation. While Zhao, Shen and Zuo (2009) reported that advanced technologies' adoption by Chinese contractors increased their capability to tackle complex projects in the international market, Islam and

Khadem (2013) identified that low level of technology available in Omani market caused project delay. Contractor's investment in the new software and system would help site personnel's unnecessary visits to the firm office. This is supported by Fanning et al. (2015) who stated that application of software packages such as Building Information Modelling in projects results in decreased project schedule due to low request for information. In addition, automation with robotics is also a strategy identified in this study. According to Kurien et al. (2018), the use of automation with robotics in construction projects increases productivity and reduces the risk for workers who work in hazardous environment. Kim et al. (2015) also reported that automation with robotics can help managers to identify the quality issues and manage them quickly and accurately. This survey identified the need to apply modern construction technology, product and process to reduce rework and improve productivity. Contractors who apply new technology and process achieve enhanced work efficiency and better quality of finished product (Agenbag and Amoah, 2021). In agreement with previous studies by Fang et al. (2016), the survey results reveal that latest IT systems for site security helps decision makers to locate workers and materials to improve project execution productivity.

Strategy 3: Quality, Safety and Environmental Protection

The third important strategy is "Quality, safety and environmental protection" with 12.9% of the total variance. This strategy has five sub-strategies related to three key areas such as quality assurance, health and safety of workers and environmental protection. In this study, quality assurance has been identified as an important sub-strategy. Contractors ensure the quality of project through the workmanship quality and conformance to specifications. Alzahrani and Emsley's (2013) research showed that contractors' investment in quality policy is important to deliver quality project. Implementation of an effective quality assurance programme can ensure smooth handing over of construction project to client (Al Kuwaiti, Ajmal and Hussain, 2018). Secondly, the survey results show that health and safety has paramount importance in construction site. It is the contractor's responsibility to ensure health and safety of all workers by providing health and safety supervisor on site. The importance of safety and health for project success have been reported by Sekar, Viswanathan and Sambasivan (2018), where safety is the criteria additional to time, cost and quality. Acheamfour, Kissi and Adjei-Kumi (2019) also acknowledged that contractors are required to be safety and health conscious as it improves quality of work and productivity. The third key area related to the environmental protection indicates that environmental consideration has significance in project success. This aspect started to gain significance in project success attainment due to their life cycle benefits (Acheamfour et al., 2020). Environmental protection has now become a global construction industry challenge. According to Alzahrani and Emsley (2013), construction processes without considerations of environmental hazards and degradation consequently lead to many environmental problems such as pollution and global warming. The survey results demonstrate that waste management plan implementation is an important sub-strategy. The study conducted by Azeem et al. (2020) had similar findings. They indicated that contractors implement various on-site techniques for waste reduction to achieve better project performance (Azeem et al., 2020). Environmental protection policy implementation is another

sub-strategy that is supported by Alzahrani and Emsley (2013), as they highlighted that the policy implementation ensures environmental regulations compliance. The study shows that implementation of pollution control by contractors is an essential sub-strategy. This finding is consistent with Chen, Ong and Hsu (2016), who asserted that pollution prevention helps contractors in cost reduction.

Strategy 4: Develop Technical Capability, Monitor and Control

The results also showed that "Develop technical capability, monitor and control" is a significant strategy of contractors with 10.6% of the total variance. Contractor's technical competence to perform specialised work is one of the most important factors for successful project delivery. Several past studies concurred that high technical capabilities of a contractor indicate his abilities to deliver the project with quality on time and within budget (Acheamfour et al., 2020; Aje, 2012). This study indicates that selection of appropriate construction methods is an important sub-strategy. The research by Tsai et al. (2013) showed that appropriate construction method selection is critical to contractors to manage delivery of modern complex construction projects. Contractor's regular monitoring and accurate change control process during the implementation of the planned activities helps project delivery. This is acknowledged by Davies and Harty (2013) as consistent project monitoring helps managers to make decisions on corrective measures and reschedule the construction programme to ensure the project delivery as planned. Another sub-strategy is to apply effective cost and budgeting control. Previous study by Lu, Shen and Yam (2008) has addressed the importance of cost controlling. Another research by Yong and Mustaffa (2013) showed that poor monitoring and control will lead to project delay and cost overrun. This research also indicates that mitigation of delays and conflicts is also an important sub-strategy. Conflicts in construction project delivery process do not only delay the project but also affect the quality (Ariffin and Sutrisna, 2010). Previous study by Sambasivan and Soon (2007) revealed the need to minimise delays as it leads to cost overrun and disputes during project delivery.

Strategy 5: Organisational Efficiency and Financial Stability

This research highlights the "Organisational efficiency and financial stability" as another main strategy with 8.3% variance. This strategy consists of four sub-strategies that are divided into two elements, as organisational efficiency and financial stability. For organisational efficiency, the survey showed that contractors must identify potential sources of risks and take the necessary steps to manage those risks. Past research has reported that risk identification and management is crucial for contractors to meet the time, cost and quality targets (Hwang and Lim, 2013). Another sub-strategy is to improve company image through membership of trade or specialist associations. Contractor's reputation is usually derived from their past performance. However, it is necessary for contractors to improve reputation through membership in trade or specialist associations (Alzahrani and Emsley, 2013). Reputation gives an indication regarding the contractor's ability to perform in the projects (Kog and Yaman, 2016) though it is subjective. Under financial stability, minimal reliance on client payment is highlighted as an important sub-strategy. In their research, Sambasivan and Soon (2007) found that contractors must

ensure their sound financial resources for project delivery while Hartmann (2006) stated that poor financial resources can cause delay and quality issues. Another sub-strategy is cash flow forecast using software packages that is supported by Alzahrani and Emsley (2013), as a poor cash flow forecasting is the major reason for the construction contractor's failures in project delivery.

Strategy 6: Legislative Compliance

In any construction industry in the world, compliance to legislations and law is prudent and necessary. It is what ensures the durability, stability and safety of the buildings and its occupants. Thus, it is unsurprising that Omani contractors also view that "Legislative compliance" is another main strategy to deliver the conventional projects which accounted for 7% of the total variance. Standards and regulatory controls are essential for the construction as these construction activities play major role in environmental health, economy and social welfare. Under this strategy, submission of required plans to authority for approval is one of the sub-strategies. Past research by Islam and Khadem (2013) showed that contractors' submission of drawings and plans to the respective authorities to obtain their approval to proceed, determined their productivity which in turn helped project delivery. Another sub-strategy is to comply with required rules, regulations and legislation of the country. It is mandatory for the contractors to comply with the established technical standards and requirements of the country to ensure health, safety, environmental protection, social welfare and economic stability. According to Windapo and Cattell (2010), compliance to the rules and regulations of the country would ensure smooth handing over of the project.

Strategy 7: Clients' Satisfaction

The final main strategy identified from the survey is "Clients' satisfaction" with 5.6% of the total variance. The main responsibility of the contractor is to deliver construction project according to the clients' requirements. One of the two important sub-strategies is advocate all the contractual terms to demonstrate professionalism. This is acknowledged by Alzahrani and Emsley (2013) that winning trust of the client through professionalism and adherence to contractual terms increases possibility of successful project delivery. Hwang and Lim (2013) reported that failure to manage the contractual obligations causes project delay due to conflicts. One more sub-strategy is fulfilling clients' requirements to ensure project delivery. Contractor must fulfil various requirements of client including compliance to the client's schedule, budget and quality. Dikmen and Birgönül (2003) also asserted that contractors need to maximise client's satisfaction by fulfilling their requirements.

CONCLUSIONS

The aim of this study is to identify and group the significant strategies of contractor firms to deliver successful projects in Oman. A detailed literature review identified a total of 48 contractor strategies. These strategies were analysed by employing factor analysis approach. A total of seven main strategies and 29 sub-strategies adopted by the Omani main contractors to deliver projects have been identified.

The seven strategies are: (1) People and subcontractor management (seven sub-strategies); (2) Technology and innovative solutions adoption (five sub-strategies); (3) Quality, safety and environmental protection (five sub-strategies); (4) Develop technical capability, monitor and control (four sub-strategies); (5) Organisational efficiency and financial stability (four sub-strategies); (6) Legislative compliance (two sub-strategies); and (7) Clients' satisfaction (two sub-strategies).

This research unveiled the delivery strategy that has benefited the main contractors. As the main contractors, they are the decision makers in ensuring projects are executed properly and in timely manner. Due to complexity at site, they need to ensure every aspect of project delivery is catered for efficiently. Thus, having holistic strategies would be advantageous throughout the whole project execution. In Oman, the conventional construction still dominates the industry, however, the government is moving towards more modern and sustainable construction. This instigates changes to the current practice. By establishing strategies that have been successfully applied, more contractors can emulate the practices to increase the project performance. These strategies can also be adapted to answer the government's call for better construction industry. This research is currently focused on the main contractor with top grade level of OCCI working on conventional projects only. This also indicates that the projects they are involved with are considered as large projects. Lower grade or smaller projects may adopt similar strategies or they may have different strategies to cater for smaller project budgets. More mega projects and green certifiable projects are also taking hold in Oman. Although the delivery strategy adopted by the conventional projects are most likely appropriate for mega or green projects, there could be additional or newer aspects that the contractor need to be aware off to ensure successful delivery. Thus, this opens avenue for further research on delivery strategy to cater for the more challenging construction projects.

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