



Influence of Partnering Agreements Associated with BIM Adoption on Stakeholder's Behaviour in Construction Mega-Projects

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Abstract:

Construction mega-projects are typically associated with cost overruns and time delays due to conflicts of interest between diverse stakeholders. This research investigates the influence of the partnering approach and the adoption of Design and Build (D-B) contractual agreement on the behaviour of stakeholders on mega-projects. Through a case study, the significant factors that influence stakeholder management are appraised, such as cooperation, developing trust, and a dearth of communication. The research concluded that mutual trust, transparency, leadership, the well-defined scope of work, a clear definition of responsibilities, collaboration, and training are the main success factors of partnering projects. The research also emphasised that Building Information Modelling (BIM) plays a vital role to secure the mentioned key successful factors for partnering. Furthermore, BIM facilitates achieving project objectives with the adoption of D-B contracts. This research contributes to the developing body of knowledge addressing the application of partnering in construction. The outcomes of this research will be beneficial for clients, contractors, project managers, and contract managers when taking into account future execution plans for D-B projects. Forthcoming studies can develop a framework to combine various stakeholders to obtain optimum satisfaction.

Keywords: BIM; Building Information Modelling; Partnering; stakeholders; Design and build; Construction industry; Organisation behaviour

1. Introduction:

Design-Build Institution of America (DBIA) defines “Design-Build as a method of project delivery in which one entity (the Design-Build Entity) forges a single contract with the Owner to provide the architectural, engineering and construction services” (DBIA, 2019). The goals of this study are to identify Critical Success Factors (CSFs) for ‘partnering’ a project through D-B contracts and to investigate the influence of partnering on the behaviour of stakeholders on mega construction projects.

Project delivery systems (PDS) include the traditional method of procurement, where the owner employs a consulting firm to design a project and then grants the construction contract to the main contractor (or constructor) to construct the project following that design (Wu and Barnes 2016). The traditional method is of utmost widespread for small-scale and local projects, whereas the most popular procurement scheme for large-scale, mega-projects are those based on either D-B, or on an Engineering, Procurement, and Construction (EPC) method (Lin and Chen, 2004). D-B contract, the contractor is liable for both the design of the construction project then executing the construction according to contractual specifications (Mashali et al., 2019; Du et al., 2016). EPC contracts, a sole contractor is liable for the entire engineering design, construction, and procurement of a project on a turnkey ground.. Collaborative procurement methods have been gaining impetus in numerous developed countries (Hamzeh et al., 2019; Mashali et al., 2020a).

Mega-projects, in other word mega construction projects, are commonly associated with cost overruns and time delays. Construction mega-projects can be defined as; complex and large-scale ventures which budgeted more than or equal USD 1 billion, including private and public stakeholders (Flyvbjerg, 2014). International Construction Mega-Projects (ICMPs) complexity and the scope of work involves various stakeholders such as international consultants, multinational contractors, joint-ventures, together with several design and construction teams. The Project Management Institute, PMI A. (2017) defines a stakeholder as: “an individual, groups, or organisations who may affect, be affected by, or perceive themselves to be affected by a decision, activity, or outcome of a project.”

ICMPs require interactive coordination for success. However, the construction industry has been usually characterised as fragmented, leading to low performance, and frequently accompanied by adversarial relationships between project stakeholders (Kadefors, 2004; Eriksson, 2010; Eriksson and Laan, 2007). In the traditional project procurement method, a competitive tendering process, where the client’s principal election standard is based on the bid price, is applied to grant the contract, typically to the lowest bidder. This situation results in a lot of pressure on the construction projects’ key stakeholders, such as the contractor, for numerous causes; for instance, the unbalanced risk allocation in contract

provisions. The method in itself establishes a conflict between owner, consultant, and contractor as each stakeholder tries to minimise their risk and maximise their benefits. The competitive and price-driven mechanism was deemed the main cause of project failure (Eriksson, 2010). Conflict of interest among the industry stakeholders typifies the negative sides of industry relationships, such ineffective communication, insufficient co-operation, spreads a “win-lose” behaviour and lack of mutual trust (McAllister, 1995; Larson, 1995; Naoum, 2003). Resulting outcomes are cost overruns, poor quality, less productivity, lack of earned value, substandard workmanship, low satisfaction among stakeholders, schedule delays, and mostly litigations (Chan et al., 2004; Egan, 1998; Larson and Drexler, 1997; Ng et al., 2002; Venselaar et al., 2015). Consequently, alternate delivery organisations have evolved to cater to this need.

A need has arisen to change the negative culture among construction industry partners and to perfect the relationship amongst key stakeholders as an attempt to increase the total performance of the construction industry. Latham (1994) and Egan (1998) in the UK, as well as Institute, C.I., (1991) in the USA addressed many stakeholder conflicts and construction industry issues and endorsed the implementation of additional co-operative operational strategies, stakeholder management methods that integrate the project delivery supply chain and resolution of the conflicts of interest between stakeholders that are primarily contractual type conflicts. Modern methods, such as partnering was presented to confront shortfalls that arise from traditional procurement and to enhance performance (Eriksson, 2010; Bygballe et al., 2010; Bellini et al., 2016). Partnering, sometimes referred to as alliancing, can be defined as “a long-term commitment between two or more organisations to achieve specific business objectives by maximising the effectiveness of each participant’s resources” (Institute, C.I., 1991; Yeung et al., 2007). Partnering has been effectively applied in some other industries before being proposed into the construction industry (Bygballe et al., 2010; Cheung et al., 2003; Dainty et al., 200; Kim et al., 2010).

Therefore, all stakeholders should coordinate with each other to work collaboratively to facilitate a creative and innovative resolution and rethinks to relinquish the outdated methods that are no longer the appropriate ways and Keep up with the latest technologies. Furthermore, this will assist in achieving the projects’ aims and objectives to meet the client and user satisfaction (Ahmed, S., et al., 2018; Elhendawi, A.I.N., 2018). BIM is deemed as an environment that effectively combines all liabilities and endeavours from all project stakeholders through diverse project phases to deliver a functional sophisticate and innovative product replying all parties and project objectives (Elhendawi, A., et al., 2019).

Therefore, this paper investigates the influence of the partnering approach and the adoption of D-B contracts on stakeholders’ behaviours on the mega-projects with studying the impact of using BIM technology.. Thus, the general goal is to investigate the contractual

setting and explore the extent of the impact of partnering procurement delivery, represented by the D-B contract, on construction project stakeholder. A case study in Qatar is chosen to achieve the aim of the research.

2. Literature review:

Partnering in construction has been investigated considerably in the last two decades. Two areas of partnering that are directly relevant to stakeholder management in construction projects are CSFs and the Critical Failure Factors (CFFs) (Hong et al., 2012; Aarseth et al., 2012; Bygballe et al., 2010; Li et al., 2005). Challender et al. (2016) specified a group of factors based on a critical review and employed these critical factors to survey building industry experts in the UK. Black et al. (2000) research revealed that the factors influencing partnering in construction projects are ‘relationship factors’; that is, commitment from senior management, mutual trust, and effective communication. Chan et al. 2004; Chan et al. 2003a; Miller et al., 2000; Bayliss et al., 2004) - related studies in Hong Kong - indicated that the five frequent CSFs were (1) conflict resolution; (2) establishment; (3) obvious definition of responsibilities; (4) regular monitoring of partnering processes; and (5) readiness to share resources among project stakeholders. Brown et al. (2001) introduced additional factors such as (1) training and preparation; (2) equity; (3) defining of stakeholder’s expectations and limitations; (4) development of mutual goals; (5); and (6) leadership. While Hawke (1994) examined factors (reasons) leading to partnering failure in Australia. Key factors identified were: (1) inefficient problem resolution processes; (2) lack of leadership; (3) absence of adequate training; (4) lack of honest and transparent communication between stakeholders; and (5) insufficient commitment to partnership arrangement (Chan et al., 2003b; Chan et al., 2004; Gadde and Dubois, 2010; Wøien et al., 2016).

Adnan et al. (2012). agreed that partnering might not constantly be an accurate resolution to the construction industry’s difficulties as it did not essentially eliminate the conflict of interest between stakeholders at the source. Dulaimi et al. (2010) and Ustadi (2013) documented various factors participating in the failure of public-private partnership projects; the factors were: (1) absence of suitable skills in the consortium; (2) high risk; (3) high participation costs; (4) lack of credibility; (5) poor communication between private partners; (6) demands on management time; and (7) long procurement and negotiation processes.

Bresnen and Marshall (2000b) considered two issues leading to partnering collapse. The first matter was the ‘one-off’ nature of the numerous stakeholders’ relations, such as the client and main contractor relations (Mashali et al. 2020b; Hosseini et al., 2016). The second matter was partners preserving their adversarial position. To achieve optimal

performance, trust, and “long-term” relations between the stakeholders are essential, (Brown et al., 2001; Mashali et al., 2019; Wong et al., 2008). Wolstenholme (2009) found that “distrust” is chronic and longstanding in the construction projects and that trust is hard to set-up between stakeholders, mostly because of adversarial relations and disputes between stakeholders (Wong and Cheung, 2004).

Hawke (1994) censured owners for adopting a “cost-driven” schema and for upholding a “win-lose” position when negotiating with main constructors: both of these actions contradict partnering principles. Wood and Ellis (2005), in his review of the progress, indicated that as the market situation deteriorates, particular owners are guided by their “cost-oriented” advisors to relinquish partnering engagements and return to traditional competitive tendering. Bresnen and Marshall (2000a) pointed out the gap between decisions and intentions at the organisation level and stakeholder’s behaviour at the project level.

Challender et al. (2019) explored the concept of ‘trust’ in construction procurement strategies, it examined to the extent of trust influences, within co-operative working arrangements, on the success of co-operative working practices, covered the effect of “trust-building” approaches has on collaborative working environment and partnerships. Kadefors (2004) also discussed the constitutes best practice and how ‘trust’ in co-operative procurement practices affects the success of construction projects.

Several researchers argued that applying BIM proved benefits which paving the way to successful partnering hereinafter: clash detection, time-saving, improving the quality and reduced rework, increasing efficiency, improving collaboration, coordination and communication, creation and sharing information ability, improving visualisation, reducing the number of requests for information, eliminating claim and law issues, early client involvement, improvement of decision making, enhancing creativity and innovations, overcoming the geographical distance barriers, and helping procurement (Shaban, M.H. and Elhendawi, A., 2018; Elhendawi, A., et al., 2019).

While there is a little literature concerning the influence of partnering on the stakeholders in the construction industry, and only narrow research papers about “Public-Private Partnership” (PPP) projects. While, (Khalifa et al. (2015); Dulaimi et al. (2010); and Alhashemi, (2008)) highlighted that influence was limited but still immature; there is a little research that investigates the influence of partnering on stakeholders in mega construction projects.

3. Research Methodology:

A case study is adopted as a research methodology. This approach allowed the examination of critical topics, understandings, attitudes, and behaviours of various key stakeholders inside the environment of a partnering project. One case study is selected to represent partnering in a mega infrastructure project in Qatar. The challenges in the project are explored, allowing possible developments to be identified for application in a broader built environment. The study involves a questionnaire in which the questions are built on the conclusions of the literature examination and concentrated on accomplishing the objectives of the research (Farrell et al., 2016). The questionnaire is divided into four divisions: the first involves the background, the second is concerned with the contractor's organisation, the third focuses on the implementation phase of the project, and the last division focuses on the interviewees' perception and assessment of the experience in partnering agreements or contracts.

Sample size is important to obtain representative results. The population of this study comprised construction engineering practitioners and academics that work on construction mega-projects. Galvin's equation can be used to find the number of interviews required to have a stated level of confidence (P) that all the relevant themes which are held by proportion (R) of the population will occur within the interview sample (Galvin, 2015) was employed to establish the recommended sample size.

$$n = \frac{\ln(1 - P)}{\ln(1 - R)} \quad \text{Equation (1)}$$

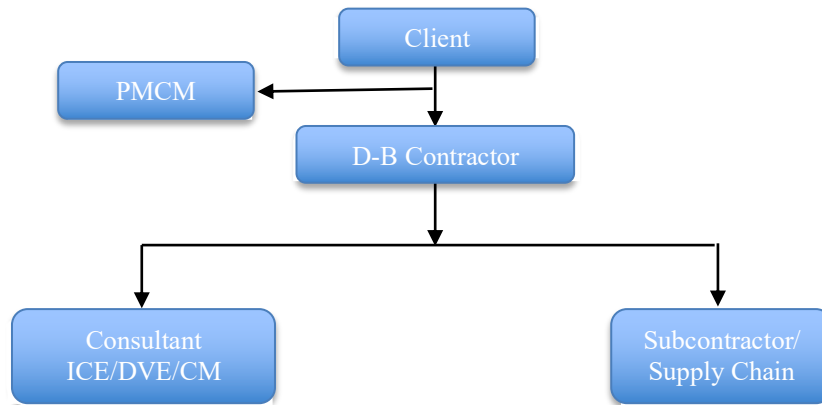
Where n is the recommended number of interviews, P is the confidence factor (> 95%), R is population proportion (10%). Upon calculating Equation 1 using the assumed data ($n = \ln(1 - 0.95)/\ln(1 - .1)$) a sample size of 29 interviewees was determined. To facilitate the analysis of the CSFs, each respondent was asked to rate to what extent he/she agreed/disagreed with each of the main factors influencing partnering, on a five-point Likert scale ranging from 1 to 5, where 5 represents 'Strongly agree', and 1 represents 'Strongly disagree'.

Semi-structured interviews are conducted with a heterogeneous cluster consisted of seventy construction experts from various disciplines in architecture, engineering and construction (AEC) industry, such as the client's project manager, the consultant's project manager, the lead architect, the construction manager, the contract manager, the planning manager, the resident civil engineer, and the engineering manager. The researchers used expert judgment to elect professional stakeholders with experience in diverse sorts of industry disciplines, comprising partnering and representing clients, main contractors, and consultant organisations. Consultations between industry experts and the academic

researcher were carried out to design and frame the structure and format for the interviews. A “pilot” interview was held to acquire advice on the dataset gathering tools, and tease out any deficiencies with the approach it was administered and designed. However, beyond these two criteria, the sample represents partnering procurement through D-B contracts, and the industry experts agreed that the sample case study was large enough to represent all D-B contracts in Qatar since it adopted this type of contractual agreement in numerous FIFA 2022 World Cup™ and QNVs’ 2030 construction mega-projects such as Doha Metro, Lusail LRT, and the New Orbital Highway.

2.1. Case study description

The case study is for an infrastructure mega-project in Qatar. The project comprises more than 37 km of infrastructure works, with an estimated cost of more than USD 6 billion. The planned construction period is five years, divided into multiple design packages and construction phases. The State of Qatar is a leading country in partnering procurement and has a respectable record of delivered projects using DB contracts. A contract was signed between the client and a consortium - led by the main contractor - to “Design and Build” the infrastructure mega-project. The main contractor delivered the resources essential for the appropriate implementation towards the timely completion of the project under study. Contractual relations between the D-B contractual parties is shown in Figure 1.



Legend

PMCM: Project Management Construction Management Contract

D-B Contractor: Design and Build main Contractor

ICE: Independent Checker Engineer

DVE: Design Verification Engineer

CM: Construction Management

Figure 1: The contractual relationship between parties in D-B Contract

The qualitative coding approach was adopted as a sorting basis to categorise the individual words of short phrases and to brief large sections of text (Taylor et al., 2015). Throughout the sorting procedure, coded parts of the text are taken to explain and summarise the raw datasets. Coding and semantic words examples such as “informal engagement”; ‘trust’; “collaboration”; “closer interaction”; “good team working”; “ineffective communication”; “leadership”; “transparent”; “disputes”; “honest”; “obstacles”; “stakeholder”; and “effective communication.” The raw dataset was summarised in tables, CSFs or CFFs are analysed, codes and semantic words are listed, data consistency and discrepancies are observed, and suggestions are presented. Table 1 represents a sample of the data analysed; it is arranged to contextualise the “qualitative data” in an organised and presentable way as a base of the discussion and findings narrative.

4. Results and discussions:

The case study findings provided a summary of how ‘partnering’ is practised in construction mega-projects in Qatar, which was consistent with numerous of the attributes success and failure factors recognised in extant literature. Findings revealed an agreement between the interviewees that D-B contracts improve the performance of project stakeholders and the quality of the work. This was ascribed primarily to the required strict compliance with provisions of the contract and because, in D-B contract, it is in the interest of the main contractor to certify that the quality of work done throughout the construction phase warrants the optimal performance. This ameliorates client satisfaction. It is also agreed that a D-B contract benefits improve the utilisation of resources and maintain certain long-range profits for contract parties. The positive outcomes can also create additional business chances for the main contractor with the client. Participants also reported that the gap between the perceptions of those who have no partnering experience and joined the project; and the behaviour of members that experience the D-B contract at a project level as one of the challenges touching the appropriate execution of ‘partnering’ approaches on construction projects.

Such an issue could be resolved by conducting appropriate inductions and continuous training and education about the variance between traditional arrangements and ‘partnering’ projects, and encouraging the new team members to enjoy the healthier relations with their partners’ equivalents. If this behaviour and knowledge are not adequately transmitted to the project teams and they sustained to react in the typical confrontational behavioural manners of “traditional contracts”, project performance will negatively affect the mutual trust and collaboration between the project stakeholders. Thus, middle and top management should continuously monitor the behaviour of team members and remove any member who is not adaptable to the D-B contract environment or insists on behaving in the confrontational behavioural patterns of traditional contracts.

Table 1. Data to analyse ‘partnering’ associated with ‘BIM’ in Qatar’s construction industry.

Theme/factors analysed	Observation or proposition	Inconsistency	Similarity
Boost ‘trust’ and ‘collaboration’ in ‘partnering’ agreements	<ul style="list-style-type: none"> ▪ Share ethics based on justice, trust, and fairness among partners are primary. ▪ Cognition-based, system-based and affect-based ▪ Trust reciprocation increases its levels between partners. ▪ Social interaction increases the degree and quality of trust among partners. ▪ Some supply chain partners have a potential lack of trust, more strong partners. ▪ Trust and collaboration may be undermined by negative, adversarial cultures and attitudes. 	<ul style="list-style-type: none"> ▪ Trust impacted by organisational contractual position. ▪ Trust created from preceding relations between the contractual parties (especially at top management levels) considered significant. 	<ul style="list-style-type: none"> ▪ Unjust working relationship. ▪ ‘Abuse of power’ negatively impacts the growth of trust. ▪ Human factors, like communication, confidence, commitment, personalities, and teamwork are significant factors for establishing collaboration and trust.
Influence of BIM on ‘collaboration’ in ‘partnering’ arrangements	<ul style="list-style-type: none"> ▪ BIM technology enhances the collaboration between the project’s stakeholders 		<ul style="list-style-type: none"> ▪ BIM adoption enhances collaboration and accordingly improves partnering
Influence of economic prosperity and budget surplus on ‘partnering’ arrangements	<ul style="list-style-type: none"> ▪ Traditional procurement methods based on a cost-driven approach is not seen by clients as the preferred option. ▪ Owners are not seeking to extend partnering arrangements to disadvantage partners in some situations. ▪ Not to resort to traditional procurement approaches. ▪ More involvement of knowledge among contract partners. ▪ Concentrate on investment that is aiming to support partnering. 	<ul style="list-style-type: none"> ▪ Turn to ‘partnering’ arrangements. ▪ Professional development, training, more increased in times of economic prosperity. 	<ul style="list-style-type: none"> ▪ Not reversion to ‘traditional procurement’ approaches in times economic prosperity, national budget surplus. ▪ Pleasant ‘economic climate’ enhancing the partnering. ▪ Economic ‘austerity’ negatively impact partnering
Observed partnering benefits	<ul style="list-style-type: none"> ▪ Collaboration increasing is a significant element to accomplish effective contracts. ▪ The arising need for increasing supply chain integration, and collaboration. ▪ In complex projects, the risks can be specified at the start and managed efficiently. ▪ The benefits of partnering have been over-valued in the present, and the past, so a no balanced view. 	<ul style="list-style-type: none"> ▪ Suspicion of realisable benefits by organisations and individuals. ▪ Experiences in quick payment. ▪ Firms perceived vulnerable to exploitation during partnering practices. 	<ul style="list-style-type: none"> ▪ Better built environment. ▪ Partnering improved teamwork, cooperation, and collaboration.

Management has to change the organisational culture of the client, contractors, consortium, consultant, and subcontractors before entering into the partnership. For example, it has to be agreed to boost the teams by employing staff with experience in ‘partnering’ contracts. Instead, the management applied further flexibility over team decisions and behaviour by increasing their decision-making authority and autonomy, while the management focused on leadership. This tactic, while it assisted to resolve disputes among stakeholders amicably (pacifically) at a managerial level - this is one of the declared partnering CSFs in the case study - it did change team behaviour and enhance relationships at a project level. Moreover, the project managers were contented with their reduced authority and new role compared to traditional contracts.

Interviewees agreed that well-defined Scope of Work (SOW), a sharp split of scope and well-defined responsibilities, eliminated the conflicts and improved collaboration at the project level. Thus, improved the performance of project teams and increased client satisfaction. Interviewees all agreed that the importance of management commitment to ‘partnering’ basis and emphasised the importance of workshops, training, and pre-meetings. Participants also reported that these are ‘partnering’ CSFs aiming to increase their awareness of “partnering,” and educate personnel to maintain appropriate behaviour on a D-B contract. Participants also emphasised the importance of mutual trust among the stakeholders as the main CSFs and its positive impact on the relationship between partners, as shown in Figure 2.

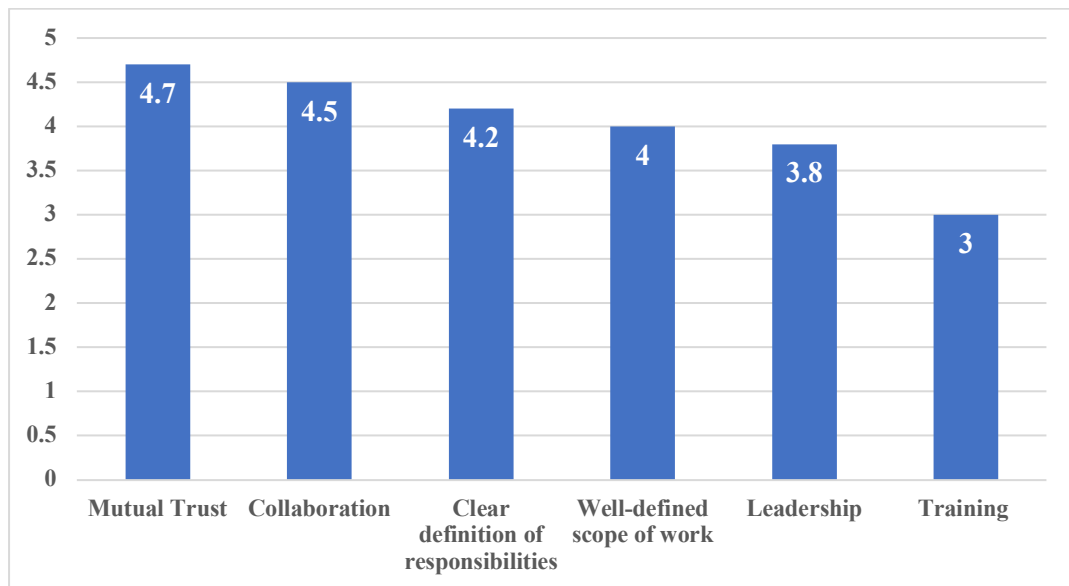


Figure 2: The Main Success Factors of Partnering Projects: Stakeholders influencing

Participants reported that a D-B contract has major differences from traditional projects, which change the nature of the interrelationship and interactions between contract parties. The D-B arrangements turn the client-contractor connection considerably less confrontational. The “mutual interest” of all parties, conjointly the rigorous observing of the activities by several stakeholders, i.e. Project Management and Construction Management (PMCM), Independent Checker Engineer (ICE), Design Verification Engineer (DVE), and lenders and investors, ensures that the works will be fully compliant with standards, contract provisions, and specifications and increase the level of trust and collaboration between all parties.

Interviewees reported that fair risk allocation and risk-sharing between partners was a success factor of partnering. In D-B contracts, clients from public sectors tend to transfer the entire risk to the main contractor (consortium or Joint Venture (JV)). The consortium is then believed in charge of for the appropriate delivery of the D-B agreement in accordance with design, contract provisions, and specifications. The majority of interviewees were of the view that risk on main constructors in D-B contractual agreement could be achieved on account of the long lead time before commencing construction and as the main constructor are engaged early in the investigation and design phases. Hence, D-B contractor should be able to manage and anticipate the vast majority of risks at the onset.

Interviewees claimed that BIM could facilitate mutual trust, transparency, leadership, the well-defined scope of work, clear definition of responsibilities, collaboration, and training which are the main success factors of partnering projects. Therefore, implementing BIM secure successful partnering. This result is lined with what reported in the literature.

In general, this study opinions to offer a potential resolution to deal with the uncertainty and increasing complexity of the construction mega-projects. Indeed, the adoption of ‘partnering’ contractual agreements as a collaborative working relationship, along with the collaboration between contract parties and project stakeholders, have been recommended as approaches for accomplishing higher benefits in construction mega-projects. It arose from the literature study outcomes from the interviews, which was in line with the literature review by Wong et al. (2008) and other researchers; ‘trust’ can be distinguished into three different types: cognition-based, system-based, and affect-based. Cognition-based trust is based on understanding and knowledge of the nature of the ‘partnering’ contractual agreement, while system-based trust is built on performance and faith in the system. Whilst, affect-based trust seems to address the personal emotion and feelings of project stakeholders. Therefore, the project manager must encourage ‘trust’, and ‘collaboration’ and must be able to plan a robust system, care for the stakeholders and team members to reinforce those factors.

Whereas, Qatar is one of the developing countries in the Middle East, so the results of this study are applicable in the Middle East and developing countries. Furthermore, The Architectural, Engineering, and Construction industry in Qatar is included several international organisations from several countries all over the world. Thus, the results of this research can be generalised. The research examined the influence of ‘partnering’ contractual agreement associated with the adoption of modern BIM technology and the nature of the relationship between stakeholders at the planning, design, and construction phases of the construction project and through the entire project life cycle and facility management in construction mega-projects. Furthermore, the research concluded that ‘trust’, ‘collaboration’ and the adoption of BIM technology are key success factors of ‘partnering’ contractual agreement in construction mega-projects. Hence, investigation of the critical success factors through a semi-structured interview by a heterogenous cluster of industry professionals represented the AEC industry that can aid the successful project delivery through ‘partnering’ agreements with consideration of the impact of BIM technology in the built environment. The research outcomes to provide a good starting point for dialogue for clients, contractors, real-estate developers, key project stakeholders, local authorities, decision-makers, and academics. The critical success factors can be considered as a roadmap to contractors, engineering consultants, clients, and authorities in scheming more robust policies and legal guidelines to improve the “traditional” procurement and spread the adoption of ‘partnering’ agreements along with BIM and LC initiatives an on a solid basis for Integrated Project Delivery (IPD). The findings of this research can shape the foundation of benchmarks for synergy and maturity of IPD in construction mega-projects.

5. Conclusion

The construction industry is a domain constantly evolving throughout enhancing the contractual agreements and implementation of creative processes, technologies, and government policies and adopt these in initiatives such as BIM and LC. This research intended to investigate the influence of ‘partnering’ contractual agreement associated with the adoption of modern BIM technology and the nature of the relationship between stakeholders at the planning, design, and construction phases of the construction project and through the entire project life cycle and facility management in construction mega-projects at the environment of the construction industry. From the literature review and particularly from the performed interviews, it arose that a robust relationship occurs. In specific, the literature review and the interviews presented that particular partnering critical success factors, similar to collaboration, mutual trust, and open transparency, are directly related to stakeholder’s behaviours and the successful ‘partnering’ contractual agreement.

The two critical success factors of partnering projects are ‘trust’ and “collaboration.” Partnering generates a fewer stressful and antagonistic operational environment, supporting superior individual performance. It is also important to note that this research studied the influence of ‘partnering’ contractual agreements associated with BIM in Qatar the time of “economic prosperity”, and to note that this influence is strongly associated with the economic environment of the country.

Ultimately, the research also indicated that it is consequently recommended that ‘trust’ and ‘collaboration’ can be created in encouraging environments, where the progressive environment of this cooperative procedure aligns with the long-term vision of incorporated stakeholders. Thus, enhancing stakeholder relationships reduces disputes, eliminates the conflict of interest, and allows sharing of knowledge, healthy interaction between project stakeholders, and improving problem-solving techniques.

Outcomes of the research have contributed and reinforced the current body of knowledge in ‘partnering’, BIM and LC research cross-field by offering key stakeholders in the construction industry the critical success factors and challenges hindering the ultimate adoption of ‘partnering’, BIM and LC principles in a built environment. Generally, the study's outcomes contribute to and develop the goals of BIM and LC approaches and reinforce the LeanBIM synergy.

The current study can be developed in future researches by assessing the barriers, challenges and critical failure factors to the adoption of ‘partnering’ associated with BIM and LC such as abuse of trust, lack of collaboration, lack of transparency and impact of economic austerity in a country by country basis. Likewise, further researches evaluating a piloted case study construction project, expanding the scope of critical success factors identified through this study, and it starts to new potential research development. In specific, additional studies should surpass the boundaries of this research; for instance, a greater sample of interviews, surveys, and quantitative research methodologies should be involved in the and the analysis should also be expanded outside Qatar.

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