

Are Construction Clients Ready to Lead the Lean Initiative?

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Abstract

Research Question: What are the current competencies of construction clients that can facilitate the implementation of lean projects? How evolved are these competencies for clients to assume their crucial role in such a process?

Purpose: The client plays a vital role in driving and setting the project framework thus greatly influencing the successful implementation of lean. However, this issue has not been given due attention in the literature. This study aims at identifying the status of the characteristics, behaviors and practices of Middle Eastern construction clients.

Research Method: A thorough literature review to identify the lean competencies of clients, the categorizing of the most relevant factors related to the role and impact of clients, and the analysis of the data collected through an online data collection survey.

Findings: Results reveal that clients are regarded as knowledgeable and involved. However, they seem to persist in taking unilateral decisions, to focus on short-term financial goals while neglecting the importance of enforcing collaboration measures.

Limitations: The assessment of construction client's competencies was done from the perspective of designers and contractors instead of that of clients.

Implications: This study paves the road for future studies to further dwell into the critical role of construction clients in promoting the successful implementation of lean.

Value for practitioners: Gives insight into the behavior and lean-enabling competencies of clients to designers and contractors desiring to work with clients in emerging countries.

Keywords: Clients, Lean construction, Middle East, Collaboration, Value

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Introduction

For years, lean thinking has been successfully applied in the construction industry bringing improvements to both the planning and execution of projects. Womack and Jones (1996) emphasized value as the primary principle of lean thinking and defined it as the first of the five steps of lean implementation. Value is directly correlated with client requirements making the client's role central to the success or failure of any project, particularly a construction project. Clients are responsible for driving and setting the framework of the process throughout all phases of the project, and their needs must be set and accurately understood to maximize value and minimize waste.

Traditionally, value revolved mainly around achieving the best interest of the client and complying to his requirements of time, cost, and quality (Ward, Curtis, and Chapman 1991). This concept of value evolved over time to include the needs and interests of different stakeholders participating in the project (Haddadi et al. 2016). In fact, the success of the project is mostly guaranteed when alignment and agreement of values between stakeholders is realized. However, the concept of value is not static, instead it evolves and changes over time, especially as new stakeholders are introduced into the lifecycle of a project progressively (Emmitt, Sander, and Christoffersen 2005). Khalife and Hamzeh (2019) propose a multi-attribute integration framework to map the main aspects influencing the perception, generation and enhancement of value. They suggest that a key factor related to the project setup that can impact value perception is the organization structure. Under this broad title lies the type of relationship between stakeholders, their responsibilities, level of commitment, their inclination to compromise, and the power that they possess and utilize (Khalife and Hamzeh 2019). However, even within this dynamic and complex structure, the client remains the main player. The client, having the ultimate power, holds the responsibility of clearly defining the roles and authority of all involved stakeholders. This should be approached collaboratively and wisely in order to reach the ultimate value potential for the project.

Although the role of clients remains central, the current literature does not widely discuss the issue of clients and emphasizes instead on implementing lean principles and tools within design companies or contracting firms. Therefore, while Lean Construction is becoming more and more popular with construction companies, client-side organizations are not catching up at the same pace (Dlouhy et al. 2017). Additionally, the client is often mistaken to be a single-entity, while in fact this client is usually a representative of different values, interests and time perspectives (Bertelsen and Emmitt 2005). This can be particularly problematic for Architectural and Engineering (AE) firms and General Contractors (GC) since the nature, behaviour, and the level of knowledge of the client can highly impact the flow and success of the project.

Client role, competencies and impact on the project

Tzortzopoulos et al. (2006) summarized the activities that clients should perform to lead a successful project. These activities include: choosing the suitable participants for each project, comprehensive understanding of the construction process in order to set reasonable timescales and milestones, well coordination and cooperation with different stakeholders

throughout the project while clearly defining roles and responsibilities, adopting a sound decision-making process, being aware of project constraints, and commitment to the project.

An example of a knowledgeable client who has succeeded in managing and producing successful projects in terms of quality, cost, time, and safety is Sutter Health, a health care provider in California. Their approach to lean implementation is based on “The Five Big ideas” which aim at generating the highest value for all stakeholders. The organization selects the project team based on quality evaluation, promotes a collaborative design environment, makes sure that all key stakeholders are involved early on and during all the phases of the project, and encourages innovation and employee empowerment. This is achieved using lean-enabling tools such as Integrated Project Delivery (IPD), The Last Planner System, Building Information Modeling (BIM), and Target Value Design. Moreover, their contracts distribute both risks and rewards between stakeholders to align interests and unify goals (Lichtig 2005, Sinclair 2012).

With problems ranging from late project delivery to frequent change orders and high numbers of claims and legislations, the San Diego Community College District (SDCCD) were inspired by the Sutter Health experience to implement lean to improve the delivery of their projects. To this end, this public service provider in California implemented the following changes: (1) shifted from design-bid-build towards design-build project delivery, (2) imposed the use of BIM for both design and construction, (3) started adopting Target Value Design, (4) nominated the design engineers and consultants along with the trade contractors at proposal time in order to guarantee early collaboration, and (5) started using set-based design and choosing by advantage for various cost decisions (Umstot, Fauchier, and Alves 2014). To measure the benefits of adopting these lean initiatives in SDCCD, the following key owner metrics were evaluated: change order rates, schedule performance, project target value design, sustainability, value generation, and annual maintenance costs. The most significant findings revealed that the implementation of these initiatives resulted in a decrease in the amount of issued change orders which in turn led to important cost savings. Moreover, there was an abundant increase in the number of projects that met the target budget, accompanied with an increase in the number of projects that surpassed LEED silver certification (Umstot, Fauchier, and Alves 2014).

Other client organizations are attempting to follow the lean path but still have a long way to go. For example, the status of 8 client organizations implementing lean in Germany was analyzed to specify their lean maturity. The results show that only one of the 8 companies reaches a maturity level of “Lean Organized” (i.e. accepting lean principles and implementing them regularly) while the others are still at more primitive levels (Dlouhy et al. 2017). Bolpagni, Burdi, and Ciribini (2017) also studied the level of maturity of the integration of lean construction and BIM in a client organization in Massachusetts. The authors concluded that an internal change in client organizations is empirical, where traditional procurement practices as well as traditional contracts should be modified in order to support BIM and lean.

Moreover, reasons for delays and cost overruns in construction projects have been divided in the literature to those that are directly related to client actions and characteristics, and those that are related to the actions of other stakeholders. Samarghandi et al. (2016) found that the probability of occurrence of delays due to owner defects ranked before those related to the contractor and the consultant. Similarly, in a study about delay causes in Egyptian

construction projects, owner related causes were ranked “Very High” relative to their frequency of occurrence, while those of the contractor ranked “High” and of the consultant ranked “Low” (Marzouk and El-Rasas 2014). However, Sutter Health have proved that wise and knowledgeable owners can mitigate the factors that hinder the project success. Owners can even control factors that are not directly related to them through effective management of the relationship between stakeholders.

Middle East status quo

The Middle East (ME) region, consisting of the Gulf Cooperation Council (GCC), North Africa and a few countries in Asia, is presently witnessing an upsurge in the construction industry (Fahy 2017). According to a report by Harris (2013), 117 major construction projects with a total cost of 1 trillion US dollars are currently ongoing in the region and planned for completion by 2030. However, this growth is accompanied with various cultural and technical barriers that can hinder successful project completion and ultimately lean implementation in the region. These barriers are observed at both AEC and client organizations and they include, but are not limited to: cultural aspects, governing project delivery methods as well as knowledge and implementation of latest industry technologies.

To begin with, the ME region exhibits several cultural traits that can negatively impact any construction project. For instance, in a study on global leadership, the ME cluster was one of the cultural clusters that scored low in terms of pertinent attributes such as team orientation, uncertainty avoidance and future orientation (Javidan et al. 2006). Another relevant cultural aspect is that of inertia where the Middle Eastern society, similar to other comparable societies, is found to be hesitant of change (Littrell and Bertsch 2013). Moreover, corruption was observed in the Lebanese construction industry, a representative part of the ME industry (Rizk et al. 2018).

As for governing delivery methods, the majority of projects in the region still adopt the traditional project delivery method instead of IPD (Rached et al. 2014). The latter encourages driving value and eliminating waste through collaboration and mutual trust of the different stakeholders (AIA 2007). Although there are signs of lean implementation (Hamzeh et al. 2016) traditional delivery methods are the most prevalent.

In terms of latest industry knowhow, an investigation conducted on the implementation of BIM in the ME showed that only 20% of the AEC firms in the region are currently using or in the process of adopting BIM technology (Gerges et al. 2017). Moreover, people only perceive it as an “advanced AutoCAD tool” and are thus not fully utilizing the capabilities of this tool in increasing efficiency and promoting collaboration in early project phases.

Objectives and paper organization

Since the key to the success on any project lies in the hands of clients, their role remains crucial in both initiating and promoting lean construction throughout the life cycle of the project. The literature, however, lacks studies related to client organizations in the construction industry especially in the context of the ME. This study therefore sets out to evaluate the current status of Middle Eastern clients’ characteristics, practices, and activities throughout the phases of a construction project. The aim is to assess how close the client

competencies are to facilitating the implementation of lean construction in the ME with respect to different project participants, namely designers and contactors. This paper begins with the research methodology adopted in this study followed by the key findings and the corresponding analysis. Finally, study limitations, conclusions and future work recommendations are presented.

Methodology

In order to gain further insight into the issue of lean-enabling client competencies, an online survey was conducted among AE consulting firms as well as contracting companies operating in the ME region. The aim was to assess how clients performed on specific projects and how their behavior affected the overall project performance in light of lean values. Since questioning clients about their own conduct would lead to a natural positive bias, it was decided to carry out this assessment from the more objective perspective of the expert engineers (over 10 years of experience) who worked at length with them on behalf of their respective AE or contracting firms. Furthermore, as the role of the client is most critical in large, complex and multidisciplinary projects, the firms selected were chosen with a relatively large volume of work to ensure their projects are medium to large-scale.

To achieve the objectives of this study, a thorough literature review was first conducted in order to identify the possible lean competencies of clients. Based on the findings and the authors' own experience in the field, the most relevant factors related to client role and impact were divided into 2 separate groups. The first group contains 4 categories of aspects that are directly related to clients (their own characteristics and traits). These categories are: Knowledge & Involvement, Requirements & Transparency, Decision Making, and Value. The second group is related to the actions and characteristics of other stakeholders but that the client can impact and successfully manage: Collaboration & Relationships. Table 1 shows a detailed description of the categorization.

Next, specific questions related to each aspect in the table were prepared followed by the formulation of the survey which consists of two main sections. The first part of the questionnaire includes demographic as well as general questions to gain more background information about the projects, the Architecture Engineering Construction (AEC) firms and the client organizations. General questions are related to the organizational structure of the AEC firms, the client type, the project size as well as project award and delivery method and the like. As for the second part of the questionnaire, it includes the prepared questions related to the expert engineers' perceptions of the client competencies and their impact on the project performance. The respondents were asked to select a specific recent project (less than five years) they worked on and to answer a number of questions related to the way the client approached and dealt with various aspects of the project. Based on their replies, it was ascertained how closely the client practices were aligned with lean principles. In total, the survey was comprised of 28 questions of which 26 were closed and 2 were open-ended. The closed questions included 6 matrix questions and were all recorded in the five-point Likert scale to ensure accurate mapping.

Table 1 Client-Related & Stakeholders-Related Aspects Tackled in the Survey

Stakeholders- Related	Client-Related	
Collaboration and Relationships	Value	Requirements and Transparency
<ul style="list-style-type: none"> ■Promoting/Encouraging collaborative meetings between stakeholders, the integration of design and the consideration of alternatives through involving different stakeholders, especially contractors, in early phases of the project. ■Level of control exercised by the owner in handling and managing the relationships between stakeholders. 	<ul style="list-style-type: none"> ■Importance of certain factors with respect to the client including: short-term incurred cost, quality of the project, end user satisfaction, sustainability and LEED, the impact of the project on society, and considering innovative approaches ■Learning from unsuccessful decisions and continuous improvement These questions will give insight on what owners perceive to be valuable in a project. 	<ul style="list-style-type: none"> ■Clarity of the scope of work as provided by the client ■Reasonability of deadlines and requirements ■Openness to suggestions and consistency with required standards These questions will give insight on how clients perceive the complexity of projects and whether they are willing to collaboratively shape their requirements.
<ul style="list-style-type: none"> ■Sutter Health approach to Lean Project Delivery is based on the Five Big Ideas, including “Collaborate, really collaborate”(Lichtig 2005). Collaboration should take place between all key stakeholders and through all phases including design and planning, not just execution, to achieve “constructible, maintainable, and affordable design”(Lichtig 2005). ■Lean Principle 11: “Respect your extended network of partners and suppliers by challenging them and helping them improve”(Liker 2005). 	<ul style="list-style-type: none"> ■Lean construction revolves around maximizing the value for the client (Koskela et al. 2002). ■Integrated Project Delivery method shifts the bulk of the effort towards the design phase as opposed to being in the construction phase in traditional delivery methods, which implies additional cost to the client in earlier stages of the project (AIA 2007). ■Lean Principles: 1) “Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals”& 14) “Become a learning organization through relentless reflection and continuous improvement”(Liker 2005). 	<p>Lean Principle 13: “Make decisions slowly by consensus, thoroughly considering all options; implement decisions rapidly”(Liker 2005).</p> <p>Some of the most important causes of delays related to owners in construction projects are the unrealistic durations provided by the owner as well as the insufficient time provided in order to study whether his requirements are feasible (Marzouk and El-Rasas 2014).</p> <ul style="list-style-type: none"> ■Lean Principle 12: “Go and see for yourself to thoroughly understand the situation”(Liker 2005) ■Study on owner characteristics that affect project delivery by Liu et al. (2014): among the 14 factors in literature, the top 3 are responsibility, owner’s experience with similar projects, and owner’s willingness to be involved.
Key Aspects	Description	Lean Principles/Lean Tools/Related References
Knowledge and Involvement	<ul style="list-style-type: none"> ■Level of knowledge and experience of clients ■Level and kind of involvement in the project These questions will give insight on the wisdom, know-how, commitment and responsibility of clients towards the project. 	



An online structured cross-sectional survey was adopted to enable easy access to respondents. To select the respondents, purposive non-probability critical sampling was adopted based on the researchers' "knowledge of the population and the objectives of the research" (Wilson 2014). Moreover, to facilitate the search for qualified participants, snowball sampling was used whereby the survey was initiated with a few people who were then asked to recommend others with similar profiles (Wilson 2014). The final sample size of this study was 47 respondents. It is also noteworthy that the questionnaire was developed to suit the Middle Eastern construction industry. For instance, general terminology was used to prevent possible confusion among respondents unfamiliar with lean related jargon. In a final note, the protection and confidentiality of respondents was ensured through an informed consent form and by keeping their identities anonymous.

Results and discussions

Respondents, their firms and selected projects

In total, approximately 250 surveys were sent out and 47 valid replies were received which corresponds to an approximate return rate of 19% where 68% of the respondents belong to AE design firms while the rest worked for GC firms. The expert engineers and architects surveyed were all active in the field for more than 10 years with 41% having 15 to 20 years of experience and 28% having more than 20 years. Participants were experts in one of the main AEC fields with 96% being either architects, civil engineers, mechanical engineers, electrical engineers or construction/site managers.

As for the organizational structure of the AEC firms, 72% were department-based while only 19% had a project-based structure and the rest were hybrids. It is noted that the most common structure observed, the department-based, is the type that least promotes an effective implementation of lean since the foremost loyalty of the teams remains to their departments rather than to the project as a whole.

The projects chosen by the respondents were all located in the ME and belonged to various construction sectors including commercial, institutional, residential, heavy civil, infrastructure and industrial. They were medium to large-scale jobs with total costs exceeding 4 million USD, of which 55% had a budget 50 to 500 million USD while 13% had a cost exceeding 500 million USD.

Figure 1 shows the delivery method of the chosen projects chosen while Figure 2 assesses knowledge and experience in lean and IPD.

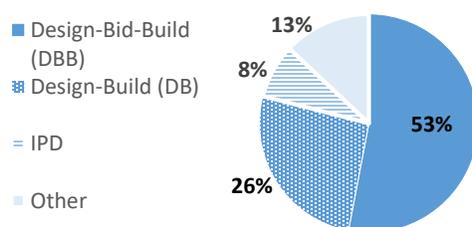


Figure 1: Project delivery methods of selected projects

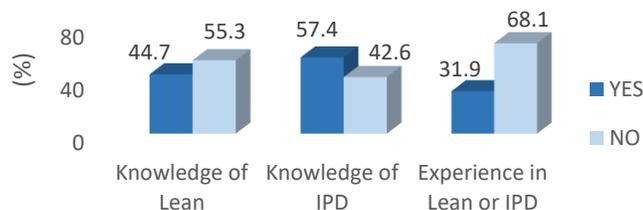


Figure 2: Respondents knowledge and experience in lean and IPD in ME

The illustrated results show that the traditional delivery methods such as the Design-Bid-Build (DBB) and the Design-Build (DB) remain the most widely adopted at 53% and 26% respectively. This validates previous studies conducted on the governing project delivery methods in the ME, which are mentioned in the Middle East Status Quo section of this paper. Moreover, more people declared having knowledge of IPD than knowledge of lean. This indicates that some of the respondents are not aware that IPD is based on lean principles or have confused IPD with Integrated Design Projects (IDP).

Owners and their representatives

The clients selected by the participants were either from the private sector as developers (68%) or contractors (17%), or from the public sector (15%). The client representatives were mostly from the client organization (55%), e.g. an engineer or the owner himself, or from a PM firm appointed by the client (45%).

Owner related factors

Knowledge and involvement

The respondents were asked to rank the various factors related to the knowledge and involvement of the client in the project on a five-point Likert scale, ranging from Strongly Agree (S.A.) to Strongly Disagree (S.D.).

Results in Figure 3 show that the respondents mostly agreed that the client was informed and knowledgeable. A natural outcome is the ability of the client/client representative to provide a clear scope of work to stakeholders and be actively involved in his project which is confirmed in the same figure where the three metrics followed a similar trend. When the results are divided between those of AEs and GCs, it can be observed from figures 4, 5, and 6 that the client was generally viewed as more informed and involved by the GCs than by the AEs especially for the case of the scope of work where 94% of GCs agreed it was clear as compared to a 75% agreement by AEs.

One of the most crucial roles required from AE firms is assisting the client to learn and develop his requirements and to translate his purposes into values and then into clearly defined specifications. This process is necessary to ensure that the client gets what he wants but it is highly iterative. This would explain why more GCs than AEs saw that the scope of work provided by the client was clear since by the time a project reaches the construction phase it would have relatively matured.

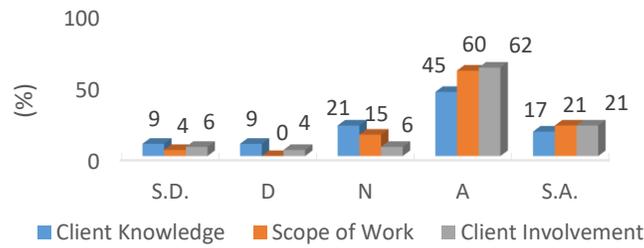


Figure 3: Summary of the three client metrics shown in figures 4, 5 & 6

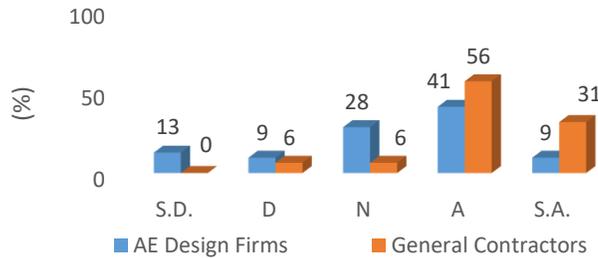


Figure 4: Client was informed and knowledgeable about similar projects

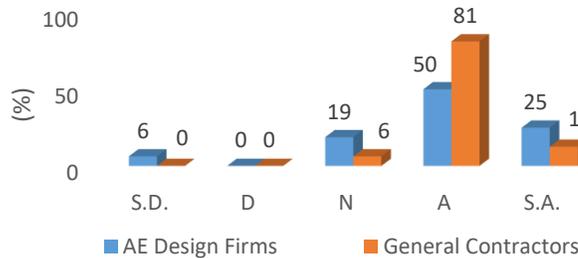


Figure 5: Scope of work required from AEC as specified by client was clear

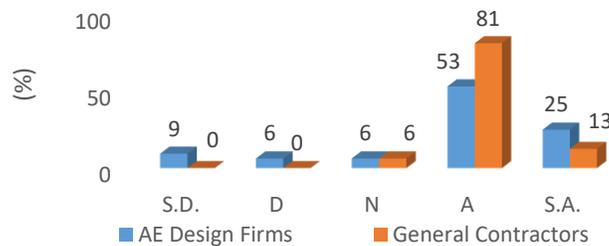


Figure 6: The client/client rep. was actively involved in all project phases

Requirements and Transparency

As a natural result of being knowledgeable and involved, clients are found to be consistent with their standards and open to suggestions, as shown in Figure 7. However, only 47% of the respondents viewed client requirements, although clear, as being reasonable and a lower 35% saw the deadlines set by the clients as achievable. This is in line with previous findings that important causes of owner delays are the unrealistic durations they set for their projects as well as the insufficient time provided for AECs to study the feasibility of owner requirements

(Marzouk and El-Rasas 2014). It is rather contradicting, nevertheless, that the client is knowledgeable and open to suggestions but still imposes unrealistic requirements and timelines on the project team. A client who understands the design and construction process and is willing to accept the opinions of the professionals working on the project should be able to set realistic requirements collaboratively with the remaining stakeholders.

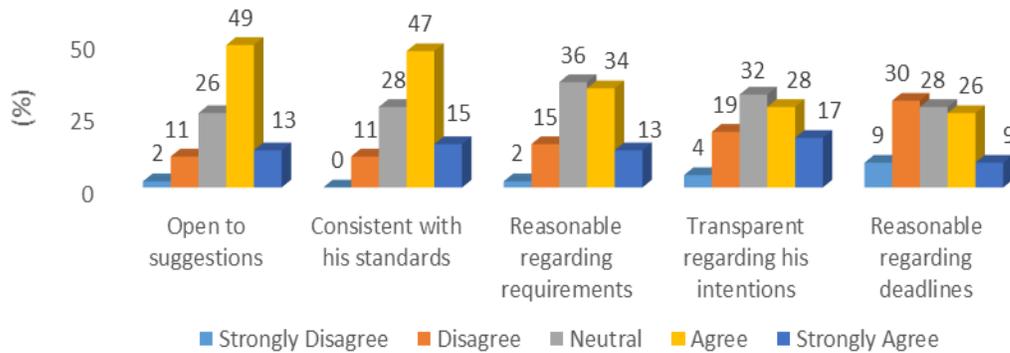


Figure 7: The attitudes and behaviour of clients as seen by AEC

Furthermore, only few respondents viewed clients as being transparent regarding their intentions, a cornerstone in building long term relationships based on mutual trust and respect.

Decision making

In total, 51% of respondents viewed the client as being responsive while 34% believed he was prone to issue frequent and unreasonable variation orders as shown in Figure 8. Whether the client issues approvals and takes critical decisions in a timely manner bares a direct impact on the project schedule. Given that the client is the party most affected by unwarranted delays, it is surprising to see such numbers. However, a closer look at the results reveals that among the 29 respondents who said the client was well informed, 62% indicated the latter was responsive in taking decisions. Thus, informed clients are more comfortable and better equipped to take timely decisions probably since they understand well the implications on the progress of the project.

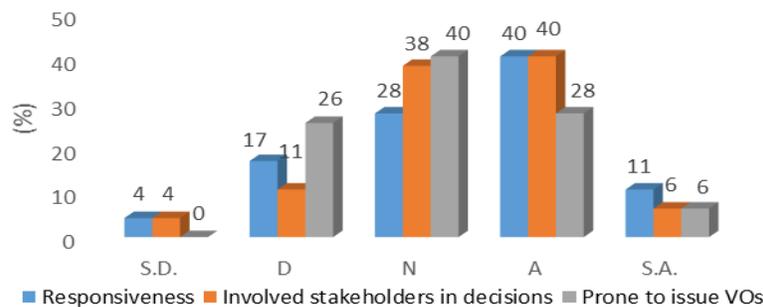


Figure 8: The clients decision-making skills

Moreover, even though involving stakeholders in major decisions related to them would benefit the project as a whole, only 46% of participants agreed that clients actually do that.

Value

Results listed in Table 2 show that clients consider the project quality and end user satisfaction to be important which is in line with lean principles. However, the remaining factors reveal that some values of ME clients are not aligned with those of lean. Giving high importance to short term costs does not comply with lean principles. Similarly, neglecting the importance of innovative approaches and actively learning from errors are contrary to lean principle 14 relating to relentless reflection and continuous improvement (Liker 2005).

Table 2: Value as seen by AEC firms

Factors ranked according to their importance to the Client	Mean rate (/5)
Quality of the project	4.26
End user satisfaction	4.09
Short-term incurred costs	4.02
Building long-term relationships with stakeholders based on trust	3.36
Considering innovative approaches	3.30
Learning from design/construction errors and unsuccessful decisions for continuous improvement	3.28
Impact of the project on society	3.15
Sustainability and LEED design	3.02

Stakeholders related factors managed by the client

Collaboration and relationships

Few respondents agreed that clients were clear advocates of collaboration measures, as shown in Figure 9.

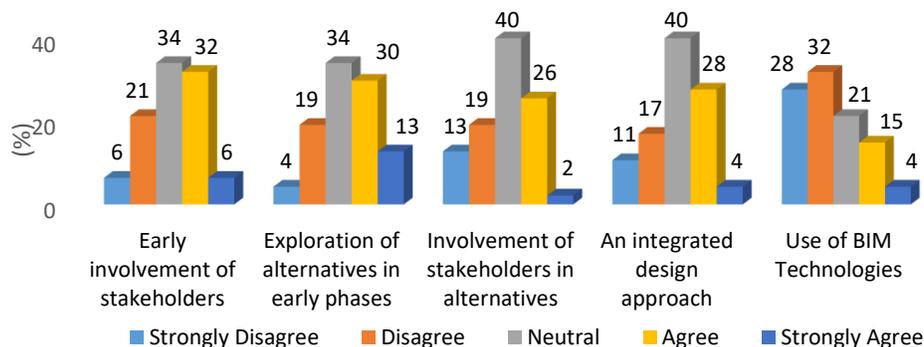


Figure 9: The promotion of collaboration by clients

Moreover, when asked if and when collaboration meetings were called for by the client, 66% of respondents acknowledged having participated in some kind of collaborative meetings during construction. Furthermore, Figure 10 shows that more respondents were involved in such meetings in the detailed design phases than in the earlier project stages such as Project Definition. This confirms that collaboration meetings, if held, were usually at later phases of the project, which is common in traditional delivery methods. This is in line with Dettman and Bayer (2012), who state that “Traditional contractual and project management systems

establish vertical silos of parties and management structures... Their [the people] communication and decision making tend to be vertical—up and down each silo’s chain of command, and then over and up/down to another organizational silo”. Therefore, although collaboration attempts were made, they cannot reach their full potential since the loyalty of parties remains to their own firms rather than to the project as a whole.

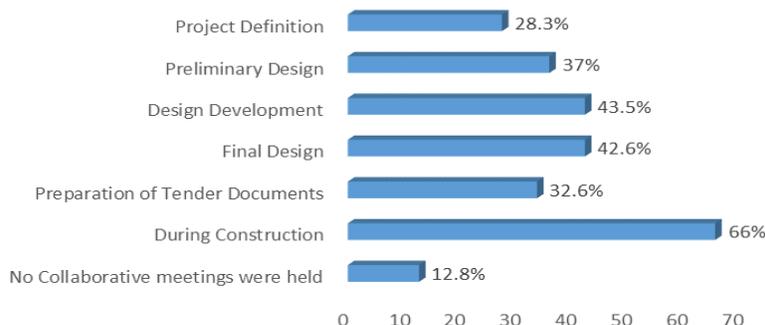


Figure 10: Collaborative meetings

It is encouraging to see though that some of the ME clients, as shown in Figure 11, seem to endorse, at least to some extent lean principle 11 of respecting and challenging your partners. Still, clients need to take a step further to achieve the desired results of long-term relationships away from the adversarial and claim/dispute-oriented relations that now govern traditional project delivery approaches widely adopted in the ME.

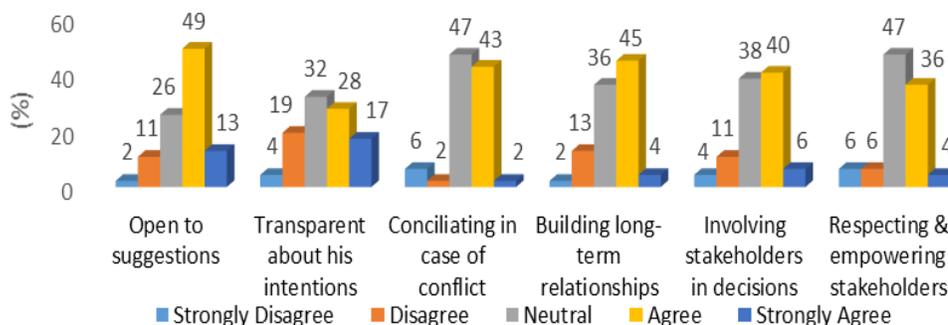


Figure 11: Client and stakeholders relationships

Open-ended questions

The respondents were further given the opportunity to discuss issues they believe bear relevance to this study. To this end, two open-ended questions were put forward to them. In the first question, they were asked whether there were any other client traits or behaviors that would hinder or facilitate the successful completion of an AEC project. Whereas in the second question, they were called to share their comments and suggestions related to this study. Their responses provided additional insights into the perceptions and concerns of AECs with respect to the client impact on project success.

In their replies, respondents either identified client characteristics not tackled in the survey or chose to emphasize those they believed to be critical for the proper completion of

their projects. It is worth noting, that although most AECs surveyed were unfamiliar with lean principles they valued many client traits and behaviors which are promoted by lean as shown in Table 3. There is, therefore, a real need for the proper implementation of lean in the region to ensure project success as well as the development of long-term relations between clients and their AECs built on mutual trust and respect.

Another important concern that AECs discussed is the influence of politics on client decisions and actions. Respondents suggested that this often results in interruptions in the work flow, in numerous variation orders, in sudden changes in the goals, or overall direction of the project.

Table 3 Client traits and behaviors valued by AECs

Client traits and behaviors valued by AECs	Lean principles and related tools
Objectivity and equitability. Trusting in their consultants. Building a transparent and efficient relation between all involved parties.	Lean principle 11: “Respect your extended network of partners and suppliers by challenging them and helping them improve” (Liker 2005).
Involving early on supporting trades which affect main trades.	Integrated design; IPD; minimize negative iterations.
Taking the right decision in a timely manner.	Sound decision-making systems; Choosing By Advantages (CBA); lean principle 13: “Make decisions slowly by consensus, thoroughly considering all options; implement rapidly” (Liker 2005).
Avoiding the causes of variation orders.	Root cause analysis; the 5 why’s; set based concurrent engineering to identify the best alternative early on.
Giving priority to long-term goals and willingness to invest time and financial resources to reach these goals.	Lean principle 1: “Base your management decisions on a long-term philosophy, even at the expense of short-term financial goals” (Liker 2005).
Moving away from the traditional selection of the lowest bidder which would jeopardize the project quality.	IPD; careful selection of AECs and other stakeholders at project onset based on their qualifications, previous experience and lean competencies; maximize value and project quality.
Being more involved in the construction process.	Lean principle 12: “Go and see for yourself to thoroughly understand the situation” (Liker 2005).
Settling payments on time.	Ensure that the project cost is within the client’s budget through Target Value Design (TVD); open book philosophy; shared risks and rewards.

Furthermore, one of the respondents also discussed the impact that the level of experience and sophistication of the client has on the progress of the design and construction

processes. It is proposed that when this level is low, the reliance of clients on the expertise and knowledge of their designers should be high throughout all project phases and the ratio of changes initiated by them should be low. This would promote the spirit of innovation among the architects and other designers and, thus, enable them to better achieve the client intent. On the other hand, clients with a high level of experience in the construction industry can provide clearer requirements to designers and a smoother project take-off. However, the knowledge of clients can lead to numerous design change requests. The AECs, therefore, play an important advisory role to clients and must be proactive in educating them. This will allow clients to work collaboratively with their consultants to serve the best interest of the project.

Finally, one respondent suggested that although AECs are investing time and money to train in lean-enabling initiatives such as BIM, clients are shying away from such endeavors. They seldom request the adoption of such initiatives although their consultants are often capable and willing of going lean.

Limitations

The bidding practices and appointment criteria commonly used by the client are key factors that provide insight on client ethics and perception of value. However, since AEs and contractors theoretically cannot know these issues about the client organizations, these questions were not addressed. Moreover, like any study involving assessment of human behavior, there is always bias in the results obtained.

Conclusions and Recommendations

Overall, the results revealed that clients in the ME were regarded positively by AECs as being knowledgeable, well informed and actively involved in their projects. However, it appears most owners persist on taking unilateral decisions instead of involving stakeholders and enforcing a team decision making process. Moreover, a number of current client practices were not in line with lean principles such as focusing on short-term financial goals instead of a long-term philosophy. Innovation, set-based design and continuous learning did not score high on their value scale. Also, clients were often not seen as actively enforcing collaboration measures such as early involvement of stakeholders, adoption of an integrated design and use of BIM.

From the findings of this study, it may be concluded that, in general, clients are either unaware of lean construction or do not have a deep understanding of its underlying principles. Some of the undeniable benefits of adopting lean in the ME construction industry include gaining better control over projects, maximizing value, reducing waste and successfully completing the project both on time and below target cost. Claims, disputes and adversarial relationships can be replaced by long-term relationships with stakeholders based on mutual respect and trust. However, clients and AECs must undertake radical changes to their way of thinking, traditional methods and organizational structures to achieve that. Before embarking on this journey, both the owners and AECs should be educated about lean concepts, tools and language. This training should further help parties to overcome cultural barriers such as resistance to change, in-group collectivism and a focus on short-term goals.

The authors hope that this assessment of the client lean-enabling competencies provides a basis for future research into this critical area which has not been documented to the extent it merits. An interesting point to consider is the standards to which the AECs evaluated their clients. It would be only natural for them to rank the selected client with respect to others they previously worked with. So, had the AECs been familiar with clients who fully embrace and practice lean principles, such as Sutter Health, would they have rated their clients differently?

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