AMERICAN UNIVERSITY OF BEIRUT

INVESTIGATING THE DYNAMIC POTENTIAL OF THE PROJECT BRIEF

by
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AN ABSTRACT OF THE THESIS OF

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The construction industry regularly suffers from delays, cost overruns and less delivered value leading eventually to clients' and end users' dissatisfaction. Failure to meet the project's basic objectives is highly attributed to poor management practices that are traced back to the very earliest stages of the project development. At project takeoff, the project brief is of utmost importance; it is where critical decisions are made and the most value is generated. Project brief is the project's cornerstone that expresses the basic intentions of the client and the source of information that flows throughout the design process.

This research is concerned with the briefing process inefficiencies that are a major factor hindering the development of the design and a main source of re-design, re-work, re-scope and claims. This is due to the lack of clarity in the client needs and objectives and the little attention given to assess the client and stakeholders' requirements. Other problems emerging also during the design process along with frequent changes in client's requirements are also considered a main reason of the brief improper evolution.

To this end, the purpose of this research is to investigate the dynamic potential of the project brief taking into account its completeness as per design stages and the development drivers that determine its level of flexibility. Through highlighting input from (a) the literature, (b) surveyed projects and (c) unstructured interviews, as the foundation for the overall methodology used, this research succeeded in developing a brief framework that sets and aligns explicitly and precisely the project's requirements at design stages' gateways. This framework combines both fixed and dynamic brief views and helps in properly managing and controlling the brief evolution based on different development factors. Finally, this research empowers our comprehension of the dynamic brief nature by improving the decision-making process and ensuring a constant flow of information throughout the design process.

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CHAPTER 1

INTRODUCTION

1.1 Background

"By failing to prepare, you are preparing to fail" (Benjamin Franklin). In the construction industry, this means if all project participants failed to work collaboratively in well understanding the client needs and the project requirements at early stages, then, failure is expected. Nowadays, construction practitioners' have tendency to rush the early stages of projects and fails to realize the importance of the start point in the project life cycle. The project brief, at its infancy, shall be observed as the first approach of clients to clearly identify their needs, objectives and vision of the facility to be constructed.

Typically, the project brief must be prepared by the client and later circulated to the design firms as part of the documentation for the offer solicitation process (Ryd, 2004). A sufficient time should be allocated to avoid a poor definition of the brief (Yu, Shen, Kelly, & Hunter, 2006). A good quality of the project brief helps avoid delays and allows for an efficient development of the design, leading to achieving client satisfaction (Windapo & Cloete, 2017).

During the post-award stage, the architect is responsible for developing the brief to include value proposition. Briefing is the process by which most project value is generated. It is the start point of the design, it also controls the design throughout the project process (El Reifi, Emmitt, & Ruikar, 2013). A successful briefing process is achieved by ensuring and maintaining proper and intensive communication between the

design team and the client, and with active involvement of different stakeholders and users (El Reifi et al., 2013; Rao, Onkar, & Mathew, 2017).

Briefing is a core process in the management of the construction industry. It is the process of the brief formulation and development of the client's requirements and project objectives into a physical product.

Briefing is a creative process with the aim of achieving the user's expectations, by supporting the client, design and construction teams (Blyth & Worthington, 2002). Briefing is also a dynamic and iterative process, as client's requirements cannot be fully defined at the outset of the project. It is the process where a generation of innovative solutions is required in order to launch design development that supports client value generation (Whelton & Ballard, 2002).

Lack of briefing is considered as one of the seven types of wastes identified in the construction design management process at early design stages (Reifi & Emmitt, 2011). Briefing/project definition is classified as well-defined problem and ill-structured or wicked problem (Whelton & Ballard, 2002). It has become a highly complex task being part of the client's organization and project's complexity (Kelly, MacPherson, & Male, 1992).

Traditionally, managers tend to freeze the design at early stages, to stay align with the press of time and the limited budget, ignoring the potential consequences in prohibiting the opportunity for value generation and causing rework in case of decisions' conflicts between different specialists (Koskela, Howell, Ballard, & Tommelein, 2002). Despite this fact, the technological, financial, social and political risks decrease when a more time is allowed to the design team to explore a set of

solution along with adequate verification and testing of concepts (Whelton & Ballard, 2002).

This dynamic nature of the project brief helps in allowing both the design team and client's understanding to evolve and allows the development of innovative and accurate design, which eventually contradicts with the "fallacy of a 100% brief". On the other hand, some consider that this dynamic nature, causing continuous changes in the project, has a high destructive impact on the morale of the design team (El. Reifi & Emmitt, 2013). However, the debate against the nature of the brief ,whether fixed or dynamic, forms a large part of the inefficiency in the briefing process (El Reifi et al., 2013)

To better understand this conundrum, it is necessary to investigate the project brief nature. Thus, it is essential to assess the need for a dynamic project brief in order to adapt to different developing factors that may serve well the interests of the project.

1.2 Problem Statement

Inefficiencies in the project brief are a major factor in hindering the development of the design, due to the lack of clarity in the client needs and objectives. Problems surface when designers proceed with the design development while ignoring the vagueness of the brief's content at early stages. Other problems result when factors unaccounted for escalate and when changes in the client's demands continue to be communicated throughout the design process, causing wastages in design time and resources' usage and detrimentally affecting the quality of the project deliverables.

This raise a question as to whether the project brief can be frozen at the outset of the project, or it can be dynamic and, if so, to which extent?

1.3 Research Objective

This study focuses on achieving better project performance by managing and controlling the briefing process since early stages. The objective of this study is to develop a project brief framework that can manage the evolution of the project brief throughout the design process. For that, this research is concerned in investigating the dynamic potential of the brief taking into account: (a) Formulating the project brief components along with an explicit and precise representation of the requirements according to their active role in each design stage; (b) monitoring the external development drivers responsible of the brief evolution which contribute in managing and controlling the level of flexibility/complexity of the brief throughout the design process.

1.4 Methodology

The methodology to be followed in this research involves:

1. Surveying the relevant literature concerning the definition of the project brief, the brief role in generating value, the adopted briefing process methods, the shortcomings in the briefing practices currently in use and the previous studies highlighting on improving the efficiency of the project brief;
2. Conducting a survey on different types of building projects undertaken in the same international design firm along with unstructured interviews with practitioners to examine the different brief formats and types, identify their relative components and analyse their completeness and quality in terms of requirements' availability, relevance and clarity at the moment the client submits a request for proposal to tender for design.

3. Investigating the techniques and methods used in surveyed projects for processing the client's and project's requirements throughout the pre-award and post-award stages.
4. Discussing the factors affecting the brief quality and determining the responsible on judging this issue early during the offer solicitation stage and later after launching the design;
5. Presenting the components of a complete brief with thorough explanations of all project's requirements along with their active role in each design stage.
6. Analyzing and studying the evolution of the brief components by identifying their development factors based on changes occurred throughout the design stages of the surveyed projects;
7. Monitoring the impact of dynamic changes occurred during the design for surveyed projects along with their causes, their relative stages of occurrence and preventive measures;
8. Investigating the literature and common practices' by introducing their perception of the brief nature whether frozen or dynamic;
9. Identifying the brief flexibility by specifying and aligning the requirements that shall be frozen, according to their active role, at gateways to stages;
10. Drawing conclusions as to the importance of having a well-defined brief structure allowing for a systematic representation of the requirements at each design stage and providing guidelines that can better serve its potential evolution.

1.5 Research Contribution

The contribution of this research will be of benefits to the construction industry, considering the fact that the project brief plays an essential role in the success of projects. The outcome of this study will provide practitioners with a better understanding of the brief components. It will also allow construction professionals to better assess the completeness and the quality of the project brief early during the tendering phase and throughout the design process.

This study is also instrumental in assisting construction professionals in categorizing and prioritizing the requirements relative to each design stage gateway and controlling the brief development factors along with recommended proactive measures to avoid the improper evolution of the project brief.

This research will also help clients in better writing the project brief by incorporating all the necessary information to avoid any potential re-scope, re-design, re-work and claims causing serious implications in achieving the client's and project's objectives defined in terms of time, cost, quality and function.

CHAPTER 2

LITERATURE REVIEW

2.1 Preamble

Projects today are classified as complex, uncertain and quick (Shenhar & Laufer, 1995). Frequent changes in client's requirements, involvement of multidisciplinary inputs, variation in the market demand, advancement in technology and the pressure for speed are major factors of complexity, uncertainty, and pace in projects (Koskela, Howell, Ballard, & Tommelein, 2002). This dynamic environment requires a qualified team that can understand the client requirements and needs and ensures users' satisfaction. Therefore, it is important to highlight on the importance of early phase project planning in helping to reduce uncertainty and improve quality. Here comes the importance of the thoroughness of the brief and the quality of its interpretation that gives a project a strong start (De Jager, Abbott, & Parsons, 2009).

2.2 The Project Brief

Once a developer or an investor foresees an opportunity for a construction project, an idea is generated and the process for the development of the idea is initiated. Being a part of the pre-project planning phase, this process includes translating the idea into a statement of needs which is considered as the first attempt to describe the project's requirements. To assure that the project worth to be developed into a real product, a feasibility study is developed as means of a market and economic study to check if the project is merited and it is a winning business case. In case the feasibility study determined that the client's objectives and needs can be met, a decision to build is

made, and the project brief is respectively written (Whelton, Ballard, & Tommelein, 2003).

In most projects, writers seek the advice of external consultants, discuss the project objectives with facility managers and interview the end users while developing the brief (Bogers, van Meel, & van der Voordt, 2008).

2.2.1 *Definition*

The project brief is the start point of a design project (Rao, Onkar, & Mathew, 2017). It is a formal document or statement that sets out clearly the client's requirements (CIB 1997). The project brief is regarded as the medium of communicating and expressing the needs and requirements of the client and the objectives of the project from the client to the consultant in the early design process either formally or informally (Bogers et al., 2008; Kamara, Anumba, & Evbuomwan, 1999).

2.2.2 *Verbal and Written briefs*

The medium of communicating the brief from the client to the consultant varies between verbal and written. Verbal communication is common, but it is undesirable since it increases the level of misunderstanding among different participants and creates conflicts in later stages. Whereas, written communication is always recommended based on a standard format that includes the client's general and specific requirements (Yu, Shen, & Chan, 2005).

2.2.3 *Brief Components*

The project brief may have several components, Yu et al. (2005) indicated that the client's statement of needs, quality of works, cost plan, overall programme and time constraint and client's objective and mission are the five main elements to be included in the brief. Environmental issue, health and safety issue, value engineering of design and life cycle costing analysis may also be included in the briefing process.

2.2.4 *Brief Purpose*

De Jager et al. (2009) admits that defining the scope of work, complying design with strategic planning objectives, ensuring master planning and establishing a roadmap for the professional team to proceed with the design are the most pivotal roles for the brief document.

To that effect, the purpose of the project brief document is to set a concrete direction for the design team to develop the strategic plans into right design solutions that avoid re-work, re-design and re-scope.

2.2.5 *Dynamic vs. Frozen*

There are basically two extreme approaches related to construction project briefing. One approach considers the brief as an entity that should be frozen after a critical period and another approach considers the brief as a live and dynamic document that evolves iteratively throughout the design stages (Ann, Shen, Kelly, & Hunter, 2007). De Jager et al. (2009) argues that since clients in private sectors discourage rework in design, they are cautious to their raised requirements and extremely aware about their return on investment, so they lean towards a finite brief. On the other hand,

briefs in public sector are more flexible highlighting on accountability to always reach the right solutions even at the expenses of redesign.

2.3 Value Proposition

The client needs are their desired value and the brief is the place where client's value is defined. Whelton and Ballard (2002) states that the project definition is the phase that allows the development of the maximum customer's value.

(Shewhart, 1931) considered value as highly related to the level of quality that satisfies human wants which in turn are not constant even for the same person. Thiry (1997) indicates that the value concept is subjective and has different meanings for different people. For instance, a consumer may consider it as "best buy", a manufacturer as "the lowest cost" and the designer as "highest functionality". However, value for the client could be related to cost, time, function, sustainability or aesthetics, while value for the consultant may be time, profit, repeat business or reputation (den Otter, Emmitt, & Achammer, 2011).

In construction industry, it is important to manage the various nature of value and the three-dimensional value of different clients or stakeholders, end users and the project team (den Otter et al., 2011). For that, the value is defined as the ratio of function to cost (Kelly, 2007):

$$Value = Function / Cost$$

Hence, the value to the client is to maintain a good balance between improving functionality and reducing while in achieving the client's requirements and enhancing the performance of the project (Othman, Hassan, & Pasquire, 2005).

Koskela et al. (2002) focuses on the importance of value management by selecting the right process, during conceptualization of production, which creates value for the client measured in terms of fulfilling and meeting his requirements in the best possible manner. Othman (2005) introduced also the Value and Risk Management Protocol (VRMP) that allows to achieve client satisfaction, adds value and manages associated risks through the participation of all parties in clearly defining the client's requirements and taking informed decision at early stages.

After all, the designer has an important role in reframing innovative projects based on valued frames captured over projects within the designer's practice as a professional meta-activity (Paton & Dorst, 2011).

2.4 The Client

2.4.1 *Client Types*

Most studies agreed that clients are classified as experienced and inexperienced. Hillebrandt (1984) represented clients as to continuing clients and one-off clients and also distinguished between private and public-sector clients. These 2 types are respectively aligned with primary and secondary clients (Nahapiet & Nahapiet, 1985). Latham (1994) categorized the clients in four groups: well informed, knowledgeable but not modern in their approach, feeling their way in new administrative arrangements and know nothing about the construction industry. Clients are also classified as per the level of sophistication. These include sophisticated clients such as developers or large public authorities having knowledge in the building process and naïve clients knowing little nothing of building (Higgin & Jessop, 2013). Green (1996) argued that clients can be experienced or inexperienced depending upon the type of the project.

For all type of clients, it is the responsibility of the design team to educate and advise the client to help in reframing the brief to match the project objectives.

2.4.2 *Client Complexity*

"A common cause of complaint by the industry is that the client does not know its own mind." (Latham, 1994). Clients create a barrier for the improvement of the briefing process as the frequent changes in their requirements have detrimental consequences for cost and programme (Latham, 1994; Yu, Shen, & Chan, 2005). On the other hand, it is not logical that clients fix all their requirements at early stages. Furthermore, not all clients have experience and can exercise professional judgment. To minimize changes, it is necessary to recognize the style and culture of the client organization (Yu et al., 2005), and to investigate about the adequacy of organizational structures and design and planning processes in solving wicked problems (Whelton & Ballard, 2002). Green (1996) analysis of client organizational metaphors suggested different approaches for the construction professionals to well understand the sociotechnical complexity of the client. Bertelsen and Emmitt (2005) identified the client as more complex than the construction production system. They added also that designers/contractors must serve the interest of the owners, the users and society regarded as three distinct client groups during the project execution.

2.4.3 *Client Satisfaction*

Considering client satisfaction as a source of competitive advantage, Hanan and Karp (1989) stated that: "Customer satisfaction is the ultimate objective of every

business: not to supply, not to sell, not to service, but to satisfy the needs that drive customers to do business."

The briefing process is the basis of achieving client satisfaction considering its important role in eliciting and communicating clients' requirements to the design and construction teams (Othman, 2005).

2.5 Briefing Process Practices

Briefing is the process of the brief formulation and development by means of capturing a clear, unambiguous and explicit performance specification of a project expressed in a solution neutral format (J. M. Kamara, Anumba, & Evbuomwan, 2001). Briefing is an evolutionary process that starts at the point the decision to build is made by the client. This is where the initial client's and project requirements are gradually captured and translated into effect in terms of technical specifications for design purposes (Barrett, 1999) ;(Kamara et al., 1999). Successful delivery of construction projects and clients' satisfaction is highly related to the efficiency of the briefing process (Yu, Shen, Kelly, & Hunter, 2008).

All studies focused on the importance of the early phases in forming and arriving at ideas and concepts in design based on the given information in the design brief. Early design stages are responsible for delays in projects, budget overruns and less value delivered to the client (den Otter, Emmitt, & Achammer, 2011). Whelton, Ballard, and Tommelein (2003) stated that 80% of a product can be defined at early phases where the necessary expertise is required in making strategic decisions to inform the process.

A combination of methods is used iteratively and non-linearly to develop the brief (De Jager et al., 2009). This includes:

2.5.1 *UK briefing*

The RIBA plan of work 2013 limited the briefing process to three stages identified as establishing first the need for the project by means of validating the business case, secondly preparing the strategic brief that include basic information for the consultant to proceed with the design and the third phase developing the strategic brief into design and detailed proposals.

2.5.2 *U.S. Architectural programming*

In the USA, Architectural programming is the first, and perhaps the most important, stage of the design process where all stakeholders' values are identified, project goals are communicated, facts about the project are displayed and facility needs are made explicit (Hershberger, 2015).

2.5.3 *Australian Project definition*

Whelton et al. (2003) defined the briefing process as the project definition that entails the preparation of project proposal, project initiation, design, and appraisal to develop the project needs into a tangible product. The project definition is regarded as a cyclic learning process that determines the iterative nature of purpose development, criteria transformation, concept generation and evaluation. The project definition performed through the production of strategic information and the development of project implementation solutions, lead to an increase of successful projects realization.

2.5.4 *French Design charrette*

The design Charrette is also another inexpensive and effective approach of the briefing process defined as two or more-day intensive design workshop held at the end of the brief formulation under the direction of a value engineer with the focus of understanding the client's requirements. All project participants must attend with the aim of rationalizing, discussing and examining the client's brief to identify the functions of key elements and develop design ideas in a creative way (Roggema, 2014; Shen, Li, Chung, & Hui, 2004).

2.5.5 *IT Application in Developing the Brief*

The complexity and iterative nature of the briefing process called also for the use of information technology applications regarded as client's requirement processing methods. This include Quality function deployment QFD (J. Kamara, Anumba, & Evbuomwan, 1999), ClientPro (J. Kamara & Anumba, 2001), CoBrITE (Rezgui, Bouchlaghem, & Austin, 2003), function analysis system technique FAST and functional performance specification FPS (Q. Shen, Li, Chung, & Hui, 2004), Visual Value Clarification VVC (Wandahl, 2004), case-based reasoning CBR (Luo, Shen, & Fan, 2010), user pre-occupancy evaluation UPOEM (W. Shen, Zhang, Shen, & Fernando, 2013). These IT applications aid in eliciting, clarifying, identifying, representing, analyzing and prioritizing client's requirements, translating them into the solution specification and finally validating through testing.

2.6 Brief Definition as Problem Solving

Briefing is about problem formulation, problem solving and change management (Blyth & Worthington, 2002). The process of arriving at the project brief is regarded as solving design problems to get creative design solutions. Uncertainty, Involvement of many stakeholders along with different client's requirements and project's objectives direct us to the complexity nature in the project definition process that resembles to solving a wicked problem. Therefore, two distinct design problems were identified: well-defined and ill-structured problems. Whereas the former have clear goals and appropriate means to reach solution, the latter is not well-defined and have unknowns related to the outset of the problem, the process actions and project objectives (Rittel & Webber, 1973; Simon, 1973; Whelton & Ballard, 2002). These 2 problem's distinctions are respectively associated to well-defined and vague brief types.

Many studies focused on the methods that designers may adopt in solving design problems. This include *solution focused design strategy* consisting of *solutions based on primary generators* where Architects/designers showed Conventional-Based Design thinking based on past projects or philosophy to explore one early central idea in defining the brief, and *solution generated by changing problem frames* through exploring many alternatives to learn more about the problem nature by adopting Situational-Based Design thinking to involve users in developing design brief and Strategy-based Design thinking where designers strategically examined the brief together with the client (Rao et al., 2017).

To that effect, the client doesn't not offer a solution to the problem, he rather outlines the problem in form of project brief, whether vague or clear, with the intention

to work collaboratively with the design team to explore different possible solutions forming a roadmap for the design task (Reifi & Emmitt, 2011).

2.7 Development of the Brief

"Brief development" is defined as a "detailed, gradual unfolding, growth, progress or change either by modification, omission or addition to the brief document contents that will affect the final product and hence affect the achievement of the client objectives, needs and satisfaction"(Othman, Hassan, & Pasquire, 2004). Obtaining client's requirements, transferring information within the firm, and translating client's requirements into a facility are three separate interrelated processes taking placing during the development of the brief (London, Chen, & Bavinton, 2005).

Eliciting needs and wants, uncovering latent needs, validating the necessity of the need, and verifying if the need can be translated into a design solution are the essential goals of project purpose development being part of the project definition (Whelton et al., 2003).

Latham (1994) and J. M. Kamara et al. (2001) proposed eight stages for the brief development: (1) strategic analysis, (2) client analysis, (3) facilities analysis, (4) statement of needs, (5) confirmation of needs, (6) functional brief,(7) concept design, and (8) scheme design. However, G. Q. Shen and Chung (2006) and De Jager, Abbott, and Parsons (2009) determined that briefing comprises three stages: (1) statement of needs,(2) concept design and (3) scheme design. The Royal Institute of British Architects (RIBA) Plan of Work 2013 limited the development of the brief to three phases: (1) Strategic Brief, (2) Preparation and Brief, and Concept Design that includes submitting design and detailed proposals.

Othman et al. (2004) identified thirty brief developing drivers in construction projects that can cause the brief to change and develop throughout the project life cycle. These include inappropriate communication, clarity and understanding, inaccurate feasibility studies, ineffective role of value engineering, inadequate provision of information, misrepresentation of project users, lack of coordination and accuracy in the construction documents, unforeseen conditions, changes in regulations and market demand, advancement in technology, ignoring quality and sustainability, inefficient management of cost and time and lack of design expertise. For that, they proposed a Dynamic Brief Development (DBD) concept that supports the brief process to extend along the project life cycle.

Considering that briefing is an integrated part of the entire construction process, Ryd (2004) examined the development of the construction briefing and elaborated on its development factors which arise when planners, designers and contractors studied the brief, on site, during inspection, upon involvement of technical specialists, when clients/ users changed their demands. Othman et al. (2005) study also revealed that change rates occurred during construction increases due to changes in stakeholders' requirements, uncoordinated constructions documents, incompleteness of the brief at this stage, lack of consideration of environmental issues and unforeseen conditions.

However, it is to be noted that necessary changes result in a better product measured in terms of more value to the client and maybe in less value for the construction or design (Reifi & Emmitt, 2011).

To that effect, the importance of managing and controlling the brief during design process is necessary. This will help to proactively encounter the late changes and

modifications that may occur during construction phase that have a negative impact on the construction industry causing dispute and litigation (Othman et al., 2004).

Therefore, understanding the correlation between the development factors will help the client organizations select the right brief, the qualified design firm, the "best-value" not the lower bidder contracting criteria and the effective delivery method for the project.

2.8 Current Briefing Processes Deficiencies

Multiple studies explored the problematic issues related to the current briefing practices patterned to the traditional procurement methods.

Barrett and Stanley (1999) identified 20 reasons for briefing failures such as lack of client's experience, unclear project objectives, and changes raised during construction. They also added that most changes are often related to human factors. Another research indicates that absence of a formal briefing procedure, ineffective horizontal integration between involved parties, inadequate support of IT and lack of traceability of design decisions are considered as deficiencies in the brief evolution (J. Kamara et al., 1999). G. Q. Shen and Chung (2006) indicates that current practices are subject to constraints, such as lacking in client's requirement identification, inadequate contribution of the client, absence of stakeholders' involvement and, mostly lacking in time allocated to the briefing process.

Based on exploratory study in Hong Kong, United Kingdom and United states, professionals identified the client representation, regarded as appropriate representation of all stakeholders to address client's needs and to prevent misinterpretation in the brief, as the most significant variable in the briefing. (Yu, Shen, Kelly, & Hunter, 2008).

The absence of a formal education of professionals in briefing and the lack of general accepted procedures to carry out the process present also basic challenges to the construction delivery process (El Reifi et al., 2013).

Poor specification of client needs and requirements and poor integration of design disciplines and decisions in the early design phases lead to a quick synthesis of the spatial and functions of the building ignoring other important design criteria related to sustainability, constructability and lifecycle requirements that impact mainly the project performance (Pikas, Koskela, Dave, & Liias, 2015).

2.9 Brief Critical success factors

Thirty-seven critical success factors relating to the critical success factors of the briefing process were identified and classified in five main categories (Yu, Shen, Kelly, & Hunter, 2006). These include:

- Project-related factors entailing project goals and objectives and project budget and program of work that should be defined at early stages.
- Human-related factors depending on the client's and brief writers level of experience, the designer skills and the users' clear requirements.
- Process-related factors responsible of managing and controlling the process by developing a brief framework, allowing adequate time for brief definition, conducting workshops with stakeholders and good facilitation.
- Input-related factors including eight sections related to stakeholder management, Conflict management, knowledge management and change management, team and team dynamics, decision making, communication and post-occupancy evaluation

- Output-related factors related to the quality of the brief measured in terms of well-defined briefing documents and agreement of brief by all participants.

"Open and effective communication", "clear and precise briefing documents", "clear intention and objectives of the client", "clear project goal and objective" and "thorough understanding of client requirements" are ranked as the top five brief critical success factors.

2.10 Recommendation for an Efficient Briefing Process

Current briefing processes have led to calls for its improvement. Barrett and Stanley (1999) suggested to empower clients to make decision within the team, manage the project dynamics, involve users, adopt information and visualization techniques and team building in order to manage the most briefing process inefficiencies for which they consider related to organizational and human factors.

Whelton and Ballard (2002) developed a double loop learning to seek for the governing variables associated to solving the wicked problem during the planning of the project definition. These include determining the basic problem input represented in client purpose, team assumptions, stakeholder needs and project constraints. To that effect, Whelton and Ballard (2002) recommended forming a team of group management skills that need to think critically and collectively to achieve a shared understanding and structuring a process for reflection and learning to better identify the governing variables regarding problem-solutions. Smith, Wyatt, and Jackson (2003) presented a strategic needs analysis SNA as an approach allowing clients to identify their strategic needs to empower the strategic decision-making process during the early stages of the project and thus improve the effectiveness of the briefing process.

Bogers, van Meel, and van der Voordt (2008) recommended to enhance the level communication between the client and the architect at early phases to improve briefing process, through giving the architects the opportunity to comment on the brief, check its consistency and completeness, clarify the priorities of the project and the status of the requirements, focus on the unique and specific requirements of the project, include qualitative and quantitative requirements.

Yu et al. (2008) stated that practicing industry professionals can prepare their own guidelines for the briefing process based on a comprehensive framework of the variables that have an impact on construction project briefing. den Otter et al. (2011) stated that integrating project processes and client briefing is obviously needed. Paton and Dorst (2011) believe that due to the highly iterative exploration of the design, the co-evolution of the problem and solution spaces based on early involvement of the consultant with the client helps in achieving a successful reframing for the brief.

El Reifi et al. (2013) suggested to develop a process that builds a shared understanding of value, and the way to deliver it through design development allows clients to express their conscious and hidden values in consistent and repeatable ways. However, methods or initiatives developed to improve the briefing process cannot succeed without honest client, support, commitment and interest (Smith et al., 2003).

Although many studies referred to the brief by discussing the deficiencies in the current briefing processes, proposing requirement processing methods, examining the critical success factors, and giving improvement recommendation, they mostly agreed that in response to the current ad-hoc briefing processes, developing a comprehensive framework that defines the nature of the brief whether fixed or dynamic and the degree of its completeness and flexibility is of high importance.

CHAPTER 3

BRIEF COMPONENTS AND QUALITY-ILLUSTARTION THROUGH CASE STUDIES

3.1 Preamble

This chapter examines the different brief formats and types, identifies their relative components and analyses their completeness and quality in terms of client and project requirements' availability, relevance and clarity at the moment the client submits a request for proposal to tender for design. Thorough explanations of each requirement along with their active role in design are also presented. Techniques and methods used for processing the project's requirements are presented throughout all project design stages. Factors affecting the brief's quality are also discussed. The adopted methodology focuses on surveying different types of building projects. The surveyed projects include documented personnel's experience and involvement of an international well-recognized design firm.

3.2 Formats and Types of the Brief

Considering the significant role of the brief in expressing client's objectives and project's requirements, it is important to define the different project brief formats and types and track the process of dealing with each format during the pre-award stage. The client brief is communicated through "Verbal" or "Written" formats. Written briefs are classified as well-developed, concise and unclear types depending on the level of information included in the brief. In addition, they are also distinguished as unconstrained and constrained written briefs.

3.2.1 *Verbal Briefs*

Clients usually communicate their needs to a selected design firm in means of a verbal brief through a short statement. The way the client conveys his intention to build a new construction facility is done through a phone call or during a social gathering.

The amount of information included in the verbal brief is limited. Therefore, the consultant must write back the client to verify his request in engaging the consultant in the project design services. This should also include the consultant's understanding of the client needs and project requirements. No work is initiated until a written approval is provided by the client to clarify the consultant concerns and provide additional requirements necessary to proceed with next steps. This informal process is, in most cases, based on an established long-term relationship between the client and the consultant. The pre-award stage is shortened, and no formal bidding procedure is issued to select the winner consultant.

For verbal briefs, the consultant plays a vital role in assisting the client writing and developing the project brief along which the latter is gradually learning about his needs and requirements. Therefore, a senior project manager with clearly defined powers of decision-making should be assigned for this critical mission.

3.2.2 *Written Briefs*

Written briefs are part of formal documents the design firms may receive in the request for proposal "RFP" documents to tender for design or they can apply for in case the invitation to tender is announced in a newspaper advertisement.

The written brief must comprise significant information stating the client's objectives and project's requirements which are expressed in forms of well-developed,

concise or unclear briefs. Whereas a well-developed written brief includes all the necessary requirements for the designer to proceed forward, the concise written brief neglects some important information and the unclear brief fails to include many required information counting on the designer to pursue.

Written briefs are further distinguished as unconstrained and constrained briefs. Unconstrained briefs are defined as to include sufficient information about the necessary project requirements for the designer to proceed forward. It is being argued that this type of briefs may spur innovation and allow for more creation during conceptualization (solution-neutral). On the other hand, constrained briefs stand for clearer information, reinforcing the designer with the right insights to execute on the client's objectives. However, constrained briefs were found to impose constraints on both client and consultant. These constraints stand against any deviation the client may make from his original requirements, and at the same time may limit the designer's creativity.

Since the complete information is not always available in case of written briefs, there is always a need for communication between both client and designer. This is regarded as a combination between written and verbal briefs, to reach an ideal brief.

3.3 Formal and Informal Methods of Award

It is important to track how the proposal sector deals with written and verbal brief formats. This is respectively regarded as formal and informal processes and illustrated in Figure 1. Both processes are to be followed in order to prepare and submit both technical and financial proposals. Technical proposal shall mainly include the company's background information and details for key personnel and their relevant

experience; the method statement identifying the main issues, risks and concerns on this project; the project description as per the designer's understanding; the methodology/scope of work for the design stages; work break down structure and time schedule. Space programming for typical floors and volumetric concepts may also be required as means of additional documents requested and compensated by the client. Financial proposal addresses the fees for design services, design inclusions and exclusions.

The project brief is one of the basic tender documents that a design firm built on, to identify the client's requirements and specify the project design fees. This necessitates examining the available information received from the client to decide on the amount of work expected along with the required time and resources necessary to achieve the intended design services.

No work is allowed before clarifying the ambiguities in tender documents; therefore, it is worth highlighting on three prerequisite steps the consultant must consider as part of the pre-tender activities before moving forward. This includes: (1) identifying the completeness of the available requirements (2) sending queries to the client to provide additional information and to clarify ambiguities in given requirements or, (3) making assumptions in case both first and second steps are exhausted. The client shall distribute responses on all raised queries among all tender participants.

The proposal team leader and the assigned architect (senior project manager position) are mainly involved in the above-mentioned activities. They are also responsible in judging the completeness of the brief at this stage. For complex projects, designers from other departments (structural, mechanical, electrical...) may have also a valuable input (Latham, 1994). However, an experienced, independent facilitator may also be

appointed by the client to take the leadership role during this process (Bowen, Pearl, & Edwards, 1999)

After submitting both technical and financial proposals, and only in case of formal process, the offer is subject to the client's analysis for further approval/rejection. The client is considered in breach of the tendering contract in case he awarded the contract to a tenderer that misinterpreted the stated requirements. Therefore, the client must provide bidders with clear and unambiguous requirements to avoid any potential confusion (Craig, 1999). Bidders should also ensure a full compliance with the client's requirements in order to consider the bid as a conforming tender and to avoid its rejection (Sidwell, Budiawan, & Ma, 2001). However, during post-award stage, there must be no limitations on designers to elaborate more in detailing their proposals and developing the project's requirements in coordination with the client (Sidwell, Budiawan et al. 2001).

Tender lessons are to be captured by the consultant in case the project was not awarded. If awarded, and for both informal and formal processes, negotiations in terms of the consultant's fees, payment terms and programme of work between both parties are carried out before signing the contract. Being the case, a kick-off-meeting shall be scheduled to agree on the overall project's requirements and objectives along with a summary of assumptions made in planning and submittals' dates necessary to meet project design.

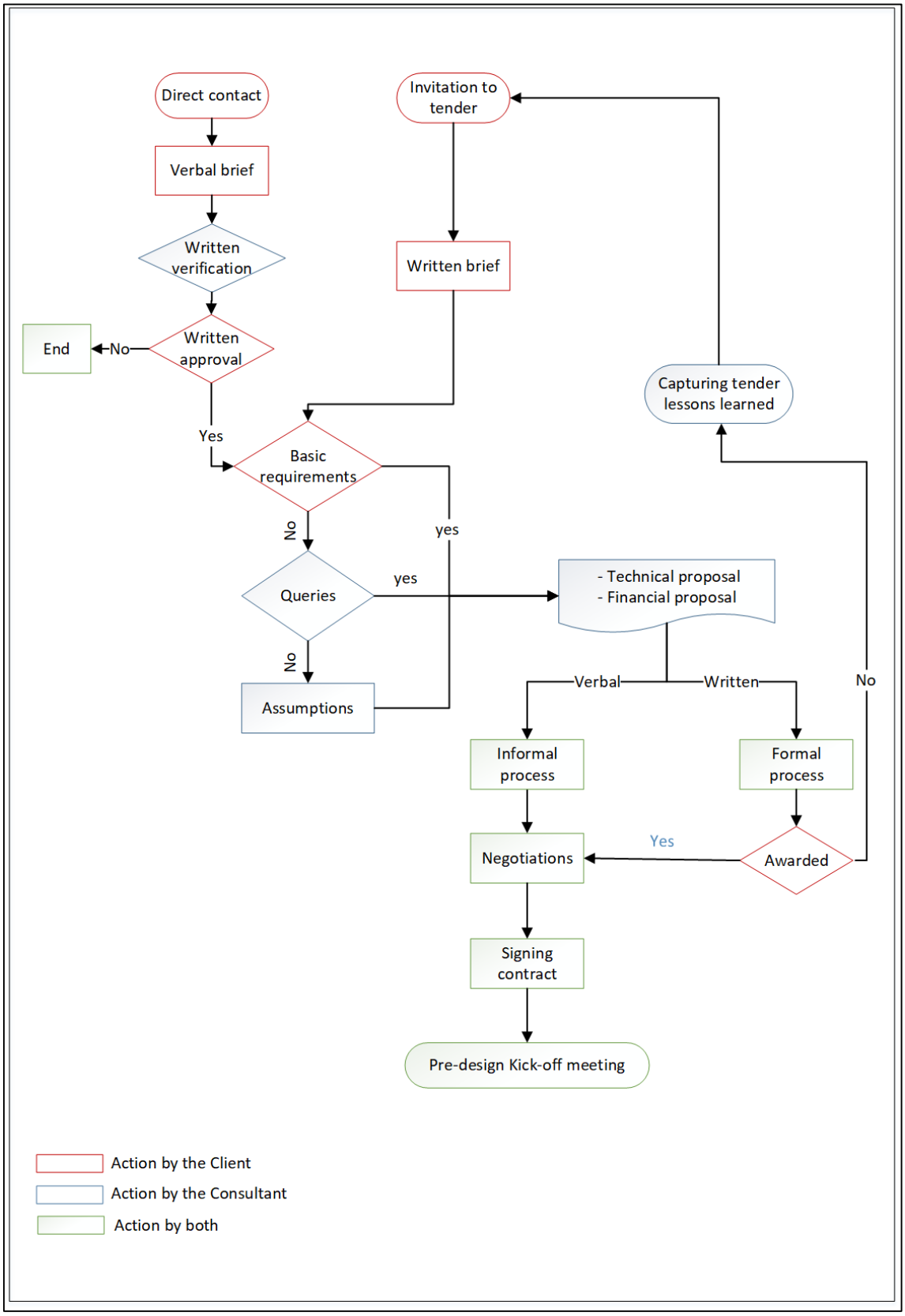


Figure 1–Pre-award Stage: Formal and Informal Methods of Award

3.4 Case Studies

The case studies consist of detailed investigation and analysis of thirteen surveyed projects' briefs. Our study includes tracking the different changes occurred in client requirements and other emerged external changes taking place throughout the design process. The surveyed projects vary from residential, offices, healthcare, educational, commercial, retail and historical types distributed over the Middle East region. These projects consist also of different types of clients, authorities' regulations, and respectively various approaches adopted for formulating the project brief and translating it into a tangible product throughout the project life cycle. The main objective of selecting a variety of project types is to expose the readers to the various encountered brief formats and types and the different combination of factors affecting its quality. Appendix A shows templates for different brief's formats corresponding for some selected projects.

The following summarizes a description of the surveyed projects, identification and analysis of their corresponding briefs' formats, types and components, the formulation of their relative briefs, the initiation of the project, the major changes in the client's requirements and other external changes taking place throughout the design process. Causes of changes along with their corresponding stages of occurrence are to be discussed in detail in the next chapter.

3.4.1 *Project P1:*

The P1 project is a high-end residential building characterized by its vertical village concept. The principal project components are: Five basements housing common services, storage areas and parking spaces, lower ground floor offering an upscale retail

stores, Ground floor characterized by a spacious private entrance lobby, and 25 floors including 132 apartments that address the product-mixed of simplexes, duplexes and sky villas, in addition to various ancillary spaces and facilities that may complement and service the residential component. The project total built up area BUA is 105,000sq.m., and the construction cost estimate is around $165M.

With reference to Appendix-A - “Design Brief-Request for proposal documents-Project P1”, one can notice the large amount of information included in P1 written brief. The design brief was received via e-mail from a professional real estate developer as part of the request for proposal documents. It included the total built up area, the detailed space programme for each floor and the objective or use of the building. The development brief that specifies the development rights (floor space and land use) along with the topographic survey and geotechnical investigation report that were also provided by the client. Feasibility and market studies were also conducted. As part of authorities’ requirements set according to project’s site location and zoning, an International Architect must be involved to provide development programme as part of the pre-concept stage. The local architect, being the technical eye of the owner, must review the International Architect programme through workshops by providing him with the local taste of potential users and by making sure that the design is within the local common practice of construction. Both international and local architects submitted both technical and financial proposals according to the scope of work specified in the tender documents.

As the design process progresses, the project requirements for project P1 evolved to include fourteen (14) variation orders evaluated as 50% of the original design fees. Joining the two plots, changing the seismic zoning, adding new structural scope of

work, adding car parks at basement 7, deleting basement 4, dropping LEED certificate, changing the heating and cooling mechanical systems, introducing new preliminary design stage, introducing of value engineering at different stages, re-introducing basement 4, adding storage area and extending basement 6, and major changes related to apartments distribution and layout all summarize the changes occurred throughout the design process. It is worth mentioning also a major change occurred during construction related to the modification of the structural slab from bubble to U-boot system.

Recognizing that this type of briefs is considered as well developed, it belongs to the constrained briefs' category. An example of such is that the client provided detailed information about the requirements related to the floors' space programme:

"Master bedroom (15%-20% larger than the regular bedrooms) with private master bath and walk-in closet,

Bedrooms (22-28 sq. meters) with a private bathroom each,

To provide a residential product-mix of 2, 3 and 4+ bedrooms apartments "

Instead of the above, a suitable statement disclosing that the master bedroom should be larger than the regular bedroom and specifying the lower or upper bounds of the room area could have serve better the client's requirements. The space programme could also allow for more types of apartments.

This additional detailed information restricted both client and designer, as it limited the designer innovation and lowered his creativity. At the same time, it added constraints to the client binding him to consider his request. Therefore, deviations from the project pre-set requirements was translated in terms of variation orders' frequency.

As a result, while writing the brief, it is always preferable to keep a certain level of flexibility by elaborating more on objectives than constraints

3.4.2 *Project P2:*

The P2 Project is a state-of-art skyscraper that embodies luxurious living, integrates innovative technology and is environmentally friendly. Its thirty stories accommodate offices as well as residential. The parking spaces are distributed in three basement levels. The project also includes many facilities such as swimming pool and health club found on the upper floors. The total BUA is around 68,100 sq.m., and the project construction cost is about $66M.

The project was initially awarded based on a tender competition during 2004. The original requirements were sent by email in form of an invitation letter to tender for design and supervision. The brief included mainly the title and type of the project intended to be built, its location, the lot area, the zoning, the maximum allowed height, the total BUA and the apartment's distribution (Appendix A - "Invitation letter template-Project P2"). As part of the pre-award stage submittal and in order to determine the design fees, the Architect investigated further on Authorities' regulations and developed a space programme for one basement, ground floor, gym floor and typical floors along with one perspective view as part of the technical proposal. The space programme included also the areas of apartments, balconies and common lobbies for the selected floors. Technical and financial proposals were submitted accordingly along with a document showing five floors' space programme and the building perspective.

The consultant had designed this tower and delivered the complete design package to the client in 2005, but the project was not constructed since it exceeded the construction budget. In 2014, the client, after changing the project's requirements, requested a complete re-design for the building. Accordingly, a meeting was held

between the client and the designer to agree on the new requirements to decrease the number of floors from 40 to 30 floors. No major changes are to be mentioned during the design process since the project was reinitiated based on the previously submitted design.

The original project brief did not include any details related to the space programme especially that this project embodies residential and office's functions. The project manager who prepared the development programme associated the original brief's lack of information to the non-seriousness of the client in constructing the project. This was mainly attributed to the lack of funds to construct the project at that time.

3.4.3 *Project P3:*

As per tender documents, the project is described as a four-story university building that provides educational supporting services to the students. It includes student service support center, registration and admission departments, etc. The building is composed of one basement, ground floor and two upper floors with gender segregated entrances for male and female students. The total BUA is around 27,500 sq.m., and the construction cost estimate is about $50M.

The brief (Appendix A – "Scope of work-Project Description-Request for proposal documents-Project P3") is considered as a well-developed written brief submitted by a governmental developer. Under the scope of work section in the tendering documents, the brief described the project requirements in terms of capacities for the university's department with respect to the number of people that may occupy

each function of the building. The proposal documents were submitted after studying the authorities' regulations.

Upon award of the tender, the client required the design team to attend a "Project brief meeting" to discuss the project vision and consideration in respect of the requirements on all aspects. The consultant was required also to prepare the pre-concept drawings for the floor plans and two volumetric views to discuss during the meeting based on the available requirements.

At the start of the concept stage during the kick-off meeting, one major claim was initiated to address an increase of the total BUA from 27,000 to 50,000sq.m. In less than one month, the client asked also for a revised space programme where the total BUA was increased further to 60,000 to end up after implementing all requirements with 75,500sq.m. This change necessitates the relocation of the land reserved for the project to a new land with larger area and an increase in construction cost to be $230M. Consequently, the design fees were doubled and an extension of time to undertake the corresponding revised design was granted.

The drastic evolution of the P3 brief occurred once the university users were involved. A survey was conducted by the university enquiring the students and staff needs in the whole campus.

In fact, this governmental institute tried to find the right solution at early stages to reflect its responsibility and accountability towards the society at the expenses of a larger university service building.

3.4.4 *Project P4:*

P4 is an office building for the headquarter of a leading bank. The total site area for the project is 2,669 sq.m, the building is composed of seven basement floors for parking space & MEP services, ground floor for reception area and nine floors of offices spaces with an above ground built up area of 14,500 sq.m. The building will include an auditorium that can seat about 250 people. The project construction cost is about $40M.

Same for P1, an international architect developed the programme with the support of a local architect for getting approval on the concept design. Since the client required an auditorium that takes a space of two basements, an additional three basements were needed to accommodate for car parking. Consequently 15% variation order was initiated.

With reference to Appendix A – "Request for proposal documents-Project P4", one can notice that P4 brief is well-developed and unconstrained since it focused more on the project objectives and didn't consider many limitations on the space programme requirements which allow for more innovation in designing the project. The fact that the developer of the project is the owner of the bank, sheds a light on the importance of the aesthetic aspect of the building in the client opinion and gives the designer the authority to decide on functional requirements.

> *"The design will need to be guided not only by functional, technical and economic requirements, but also by aesthetic and symbolic considerations. Façade design to project an image of strength, transparency, and dynamism which is the perception of the Bank in the market."*

3.4.5 *Project P5:*

P5 is a mixed-use complex building developed into two independent office and hotel towers. The project includes four basement floors dedicated for housing the required car parking and MEP services, ground and mezzanine floors offering a common lobby functions and separate drop-off areas, eight floors including hotel and offices functions, the upper floors are dedicated to a health club facility and specialty restaurant serving the project itself. The net BUA is 90,000 sq.m., and the construction cost estimate is $100M.

The project brief was based on a short statement received by e-mail from a special client including attachments covering the developer brief, the feasibility study and the site set-backs (Appendix A – "Request for proposal document-Project P5"). These documents along with authorities' regulations and hotel specification "4-star classification" were later explored by the Architect. For office and retail components, the client followed the development recommendation specifying the total built-up area for the offices and retails. For the four-star hotel and serviced apartments, the client followed the feasibility study recommendation identifying the guest rooms and serviced apartment's configuration. Technical and financial proposals were submitted based on the selected options.

Following to the consultant's appointment, four alternatives including volumetric concept design options were prepared and submitted to the client as which one was selected. Based on the client request, the design team prepared new alternatives to include a 14 floors option with the client's consent that it violates the aviation height limit. The selected concept was rejected by the municipality.

Throughout the design process, major changes were initiated due changes in authorities' regulations, late involvement of the hotel operator, adding new basement, modification of the façade skin by the client after submitting a building model and a detrimental change taking place after flipping the building 180 degree. These changes were the causes of the initiation of five variation orders (VO) with a value of 40% of the total design fees. In addition, the consultant claimed extension of time for revising the design which was granted.

While early changes in the concept design reflects the client's intention in trying to maximize his profit by increasing the exploitation area, late changes reflect the importance of the building's aesthetics for the client with no modification in the functional requirement throughout the design process.

3.4.6 *Project P6:*

Project P6 is a high standard green office building. The building consists of three stories above ground and four basements. Basement floors are mainly for parking and electromechanical services. Ground and above floors are for dormitory and office use. It also includes landscape, road works and sidewalks. The project BUA is 45,869 sq.m. and the total contract value is $32M.

The project requirements were conveyed from a special client to the CEO of the design firm directly through a verbal brief based on an idea generated during a social gathering (Appendix A – "Verbal brief format-Project P6").

"Our existing six modular office blocks look old-fashioned and doesn't reflect the company's vision and the surrounding modern and exclusive buildings.

Since we have an adjacent land and the funds are available, why won't we develop a new office building that comprises all functions in one block."

As a start point the client provided the design firm by a map showing the site and the surrounding roads. Building regulations at that area were investigated by the Architect. Technical and financial proposals along with a space programme and three volumetric concepts were submitted. Further information pertaining to all users' names and phone numbers were provided later for the architect to contact and consult them directly. Intensive coordination meetings were scheduled between the architect and all department users to identify the exact capacity and proceed with the developed space planning pertaining to the concept design stage.

The client trusted the consultant by empowering and authorizing him to directly contact end users, at the time he was only focusing on the aesthetic part of the office building. The evolution of the brief was based on a direct dialogue with users which reflects the importance of users' involvement by testing their thoughts to achieve their satisfaction.

3.4.7 *Project P7:*

P7 is an aviation training center that includes facilities for four airplanes simulating systems. The building features also a large lecture hall for around 435 people, library, lounges, cafeteria, multi-purpose/dining hall for 250 persons, and a conference room for 40 persons and an underground parking for 293 cars on a land size of 13,583 sq.m. with a construction cost of $40M. The project was awarded informally through a verbal request from a special client. The brief included only the purpose and the objectives of the project.

As a start point, the client arranged site visits for the designer to similar projects in different countries in order to develop the building programme. Accordingly, the technical and financial proposals were prepared and the programme has been updated to reflect the visits' outcome and the space planning for the simulation part that was supplied by an international specialist.

Since the project components relied mostly on the technological aspect, there were many changes in the plans layout of the building during construction to accommodate to the newest technological changes occurred during the time elapsed between the start the design and the start of the construction.

3.4.8 *Project P8:*

The building is a steel structure warehouse with a maximum height of 16.7 meters above ground level. The project consists of 18,480sq.m. import, export and transit cargo warehouse in addition to 3,200sq.m. of external parking. The construction cost is $25M. The intention to build the warehouse project was conveyed verbally to the consultant.

The initial information was received through email in form of a power point presentation prepared by a cargo specialist. It covers the lot area and dimensions, the tonnage capacity of cargo export, import and transit and a conceptual plan showing all the function's location and areas. Technical and financial proposals were prepared based on the available information included in the power point file.

The main problem encountered during the design process is the lack of information received regarding site conditions and existing services. This information was revealed during tender design stage resulting in an extension of time and a variation

order of 20%. It led in lowering the foundation level to reach the firm soil and to benefit from this area of fill to introduce a basement for cars' parking.

P6, P7 and P8 projects belong to the same client who conveys his requirements verbally based on a long-term relationship with the consultant. Because the client has no experience, he seeks the services of an experienced consultant for whom he trusts to offer services that could exceed his expectations.

On the other hand, it is to be noted that this type of clients cannot judge on the design until it starts to be translated into a physical product. The Project manager argues that during the design process, this client did not interfere; whereas during construction stage, a notable contribution is measured in terms of the requirements' changes frequency at this late stage.

3.4.9 *Project P9:*

The project is a mall that consists of two basements devoted for cars parking and services and three upper floors of leasable areas, anchor shops including Carrefour, food court and food outlets and entertainment areas including cinemas, ice skating rink, bowling alley, electronic games and kids' areas. The original total BUA was 95,000 sq.m., and the construction cost was $70M.

The designer received the client requirements verbally to include information related to the site, footprint, BUA, site setbacks, number of floors and a dome at the center of the mall with no feasibility and market study. Three alternatives were submitted during the pre-award stage along with the technical and financial proposals for the client to select one and sign the contract afterwards. The approved concept was based mainly on the aesthetics of the proposed mall.

Throughout the design process, based on a workshop made with the mall operator and the client at the end of the concept stage, an increase in the total built-up area was agreed due to the need for additional storage areas in the basement and an increase in entertainment area. The client approved the concept design and instructed the designer to proceed with preliminary stage on the basis of the new total built-up area schedule 131,355sq.m., which results in more than 30% increase of area and an increase in budget up to $120M. Accordingly, a variation order was initiated with a value of 20% of the original design fees. New requirements related to the used structural system were provided by the client since he owns a ready-mix plant and a precast concrete factory. Upon client's request to initiate works on site at the earliest, the project was developed on a fast track basis where construction was initiated at the end of the preliminary design stage.

Based on lessons learned from similar projects by the client, the design and coordination on this project were smooth in a way that enabled the design to finish within 6 months with no change in requirements at late stages and with only three RFI's (request for information) during construction.

3.4.10 *Project P10:*

P10 is a general hospital project having a capacity of 155 beds with a plot area of 6,358 sqm. It consists of ground floor, 16 floors of medical services plus four basements and one technical floor covering a BUA of 59,308 sq.m. The contractual construction cost is $85M. The project was awarded after submitting proposal documents to a tender for design and supervision, and the design fees were set to 2.65% of the actual construction cost.

The initial information included in the tender documents specified a five-star hospital with 120 beds only. During concept design, the designer optimized the pre-set area, while preparing for the space programme, and allow for an increase in the bed's capacity to 155 beds after coordination with the concerned authorities; consequently, two basements were added to accommodate for this increase. This change was evaluated as 25% increase in the design fees.

Upon many fire incidents in similar projects, the authorities amended their regulation to prohibit locating kitchens and boiler rooms at basement levels. Therefore, at the end of the preliminary design, the design was modified to include a ramp at the kitchen location, so it can be directly accessible from the ground floor level in case of emergency. Boiler rooms were also moved to the roof floor. A variation order of 5% was evaluated in addition to an extension of time.

Client's experience as a medical doctor along with a good relationship with the consultant, built on previous experience on similar projects in different country, led eventually to a smooth design process.

3.4.11 *Project P11:*

This project consists of constructing a new frame building, located on top of an archeological site. This building would house a site museum directly linked to the archeological in situ presentation. It is a governmental project that was awarded after a tender competition for design and supervision. The initial estimated project cost was $4M corresponding to a total built up area of 2000 sq.m.

The brief focused more on the project's objectives and didn't highlight on any of the functional requirements/space programming. It was the responsibility of the

designer to coordinate with all concerned authorities to prepare different scenarios for the foreseen site museum with their relative cost estimate as part of the technical and financial proposals. Since the brief misses also the intended building style, the designer submitted at the pre-concept stage three different alternatives to include a contrasted style with the environment, modern and classical styles.

Throughout the design process, it was concluded that the conducted data collection, consisting of preliminary inventory of found objects, and the archeological report and survey, was not accurate at the beginning of the project. To that effect, the project programme was modified to fit the new elements and to include many interactive services. Consequently, the built-up area was increased to 5000 sq.m. and the construction cost to $13M. There were also many political interferences to consider the diverse options for this project proposed by students in different universities. In addition, the client asked to take a provision of an additional floor in the design.

Since the project is a touristic site, mistakes in both aesthetics and functional aspects are not allowed. For that, the client was hesitant, at the start, in deciding on an alternative to avoid any potential critique after project completion. Here appears also the great emphasis on the accountability and responsibility in the public sector towards the society in choosing the right solution.

It is worth mentioning that this project was detailed using Revit software to allow for more coordination and consistency in different design elements and to accommodate to the critical site constraints faced during construction.

3.4.12 *Project P12:*

This project is a residential and shopping mall tower. The brief was received via email from the client requesting to enter the competition to a tender for designing a residential and shopping mall. The email included only the location of the project on google map.

To prepare the technical and financial proposals, the architect had to send queries to the client by email asking for more information mostly related to the architectural style of the building. The client didn't respond to the queries and the architect prepared the requested documents including plans for all floors with project composition, schedule of areas, apartments and retails based on assumptions and according to the authorities' regulations. With all the effort spent by the architect to develop a pre-concept design, the project was not awarded.

This type of brief is classified as unclear and reflects the client's lack of experience to well define the project objectives and requirements. This method is usually adopted by clients with the intention to allow consultants spurring their innovation to generate the best they can, so they pick later the proposal that fits more their hidden requirements.

3.4.13 *Project P13:*

P13 is a hotel building, its brief consists of one paper that includes site data and code review of the building regulations (Appendix A – "Invitation letter template-Project P13"). This type of brief forces the Architect to sought for more information to develop the programme necessary to set the design fees. Checking Authorities'

regulations results in permitting more height allowance in the building regarded as 110 meters instead of 40 meters. This project was not awarded.

This type of briefs is unclear and doesn't include the relevant information. It is usually related to an inexperienced client.

Projects P12 and P13 didn't include the basic requirements for the designer to smoothly prepare the technical and financial proposals along with a space programming.

As lessons learned, the consultant should not enter a competition in case of unclear briefs unless the client is paying for this service.

3.5 Project Brief Quality Factors

Based on the surveyed projects, clients' level of experience is found as the major factor in determining the project brief's quality. The quality of the project brief is measured in terms of the availability, clarity and relevance of the brief components. Type and nature of the project, procurement method and the design firm organizational structure are of less importance but have a great influence on the formation and development of the brief during the design process.

Clients are recognized as the core of design and construction processes. Surveyed projects showed that experienced clients who know exactly what they want are able to produce a detailed brief at the pre-award stage allowing a strong start for the project. Whereas, inexperienced clients, who have a low level of knowledge or know nothing about the construction industry, would include the minimum requirements in their written brief or would communicate them verbally.

The brief format and type must not be significantly affected by the type and nature of the project. Unless special requirements need to be achieved for special projects, a very-well developed brief must be prepared.

Basically, experienced clients have the choice to decide on any procurement method, depending on their preferences, considering that the project brief is clear and comprehensive even before the design starts. Whereas, inexperienced clients have limitation on many procurement methods such as design & build approach where the inevitable requirements' evolvement during the construction stages would lead to future difficulties and have a negative impact on the project's objectives in terms of time, cost and quality.

The design firm organization structure plays an important role in understanding and formulating the project brief throughout design stages. Different organizational structures may be observed as one single contact consultant where the architect take the lead to coordinate with the sub-consultants, multiple firms for the different required services and one single entity consultant as an integrated company responsible to execute all the design services.

To reflect the role of the engineer in relation to the perceived client's knowledge, Paton and Dorst (2011) identified four briefing modes' categories (Figure 2). They are classified as "Technician" where the client knows exactly what he needs and which the designer can proceed right to the end; "Facilitator" where the client still knows what he wants but requires a partial assistance from the designer nearly at the end of the brief formulation; "Expert/Artist" where the client knows the objectives of the project and it is the designer responsibility to frame the project based on his expertise; and "Collaborator" being the favorable mode for the engineer as it allows him to collaborate

in a transparent way with the client in framing the brief from conceptualization stage. The briefing process for the written well-developed and concise brief types pertaining to projects P1, P3, P4, and P11 was based on the translation of the requirements into an outline program being part of the pre-concept stage of design. In these cases, the designer played the role of a technician bearing in mind that the design services were carried out by a professional single entity consultant. To that effect, the client's level of sophistication is an additional factor in selecting a professional and a well-known designer to perform the design services. In case of concise briefs for projects P2 and P5, the need for an expert/ technician was necessary to complete the briefing documents. It was difficult to produce a pre-concept set of documents for projects P7, P8, P9 and P10 without the collaboration of both client and designer. Therefore, the same design firm should always accommodate to the different approaches adopted by clients in framing the brief, and it is always the responsibility of the designer to advise the client to what is for his best interest.

The designer's experience plays an important role in generating from unclear briefs successful results. This proves that there is no relation between the type of the brief and the project outcome. To that effect, the project success is always measured through the realization of the client's objectives and requirements and the satisfaction of both client and users after project completion.

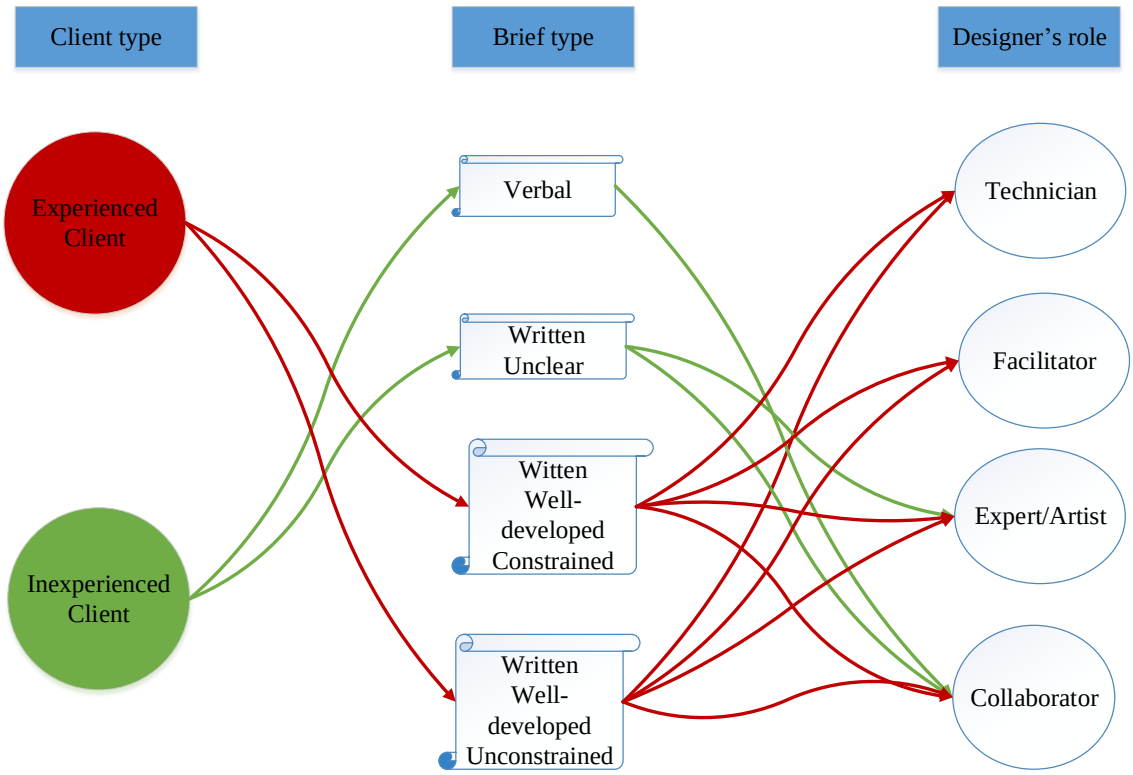


Figure 2–Project Brief Quality in relation to Client's Experience and Designer's Role

3.6 Project Brief Components

The project brief whether verbal or written must be in sufficient detail and include fundamental information to enable the designer understanding the way forward. The studied projects showed a lack of a standard format for the brief and an unsystematic representation of its components. In addition, there were no structured methodology to clarify and identify the client's and project's requirements which leads to an increase of misunderstanding among the involved parties in the briefing process. Therefore, a comprehensive structure is developed to better assist clients in discovering their requirements. This structure allows also for a precise and complete representation of the brief components.

Table 1 summarizes the surveyed projects data covering project types, client types, methods of award, brief formats and types and the original information included in the project brief whether written through formal documents or verbal through a direct contact with the client.

A literature review highlighting on the requirements' characteristics is carried out before presenting the different types of requirements in the project brief and analyzing their active roles in design. Diev (2007) defined requirement as a description of a condition or capability to which a system must follow. It can be communicated directly from users or derived from a formal document (contract, specifications or standard). Richard Stevens indicates that a requirement is just an information unit that describes a system or a facility under consideration and includes constraints, assumptions, plan items, term definitions, etc. To that effect, defining and solving engineering design problems require input data which consists of a collective set of goals, constraints, and the criteria forming requirements used in the design process (Worinkeng, Joshi, & Summers, 2015).

Requirements must be (a) clear and unambiguous to avoid any misinterpretation of their meaning among participants, (b) comprehensive to include the client's expectations and the fundamental information necessary for the design, (c) solution-neutral to allow innovation in creating multiple design alternatives, and (d) in an understandable format in order to be communicated in a way that satisfies all disciplines' information needs (J. M. Kamara, Anumba, & Evbuomwan, 2002).

Table 1: Project Brief Components-Cases Studies

Project number	Project type	Client	Method of award	Brief format	Brief components (furnished by the client)	Brief type
P1	Residential	Experienced-Private-Real estate developer	Formal bidding process	Written/Tender documents	Project title, Project type, Project location, Total BUA, Detailed space program and requirements, Objectives, Authorities' development brief, Topographic survey, Geotechnical investigation report, Feasibility and market study, Conditions of contract and scope of work, Procurement method, Construction budget	Well-developed, constrained
P2	Office/Residential	Experienced-Private-Real estate developer	Formal bidding process	Written/Tender documents	Original requirements: Project title, Project type, Site data, Surrounding roads, Area zone, maximum allowed height, total BUA, Number of floors, Product-mix of apartments New requirements: same design but with less number of floors	Original: Concise, unconstrained New: Well-developed, unconstrained
P3	Educational	Experienced-Public- Academic Institution	Formal bidding process	Written/Tender documents	Background information,Project title, Project type, Vision and mission of the project, Master plan, Objectives, Project description, Project location, Total BUA, Number of floors, Space programme (capacities per function), Site data, Design requirements, Construction budget, Scope of work, Procurement method, Project deliverables and types of deliverables, List of stakeholders/ users, Codes and standards, Construction requirements	Well-developed, unconstrained
P4	Offices	Private-Bank owner	Formal bidding process	Written/Tender documents	Background information, Project title, Project type, Vision of the project, Project objectives, Design guidelines, Project description, Design and space requirements, Construction budget, Site description, Geographic environmental data, Authorities development Brief, Delivery programme, Procurement strategy and scope of work, Programme of work (schedule)	Well-developed, unconstrained
P5	Hotel & Offices	Private-Real estate developer	Formal bidding process	Written/Letter of invitation	Project title, Project type, Total BUA, Objectives, Site data, Number of floors, Feasibility study, Development advisory	Concise, unconstrained
P6	Offices	Private-Airline company	Informal bidding process	Verbal/Public relations	Project title, Project type, project location, Objectives	Short statement, Unclear
P7	Aviation training center	Private-Airline company	Informal bidding process	Verbal/Public relations	Project title, Project type, project location, Objectives	Short statement, Unclear
P8	Cargo warehouse	Private-Airline company	Informal bidding process	Verbal/Public relations	Project title, Project type, project location, Objectives	Short statement, Unclear
P9	Retail	Private-Real estate developer	Informal bidding process	Verbal/Public relations	Project title, Project type, Total BUA, Site data, Number of floors	Short statement, Clear
P10	Healthcare	Private-Hospital owner	Informal bidding process	Verbal/Public relations	Project title, Project type, Project description, Project location, total BUA, Number of floors, Star rating, Number of beds, Similar project in different country	Well-developed, unconstrained
P11	Touristic	Public-Ministry of Tourism	Formal bidding process	Written/Tender documents	Background information, Project title, Project type, Project location, Project descritpion, Vision and mission of the project, Objectives, Purpose, Expected reults, Scope of work, Total BUA, Site data, Site constraints, Data collection, Construction budget, Delivery Programme, Construction requirements, operation and maintenance	Well-developed, unconstrained
P12	Residential and Retail	Private-Real estate developer	Formal bidding process	Written/E-mail	Lot location on Google maps	Primitive
P13	Hospitality	Private-Real estate developer	Formal bidding process	Written/E-mail	Project type, Site data , Code review for the building regulations, Site preview figure	Primitive

Authors highlighted on the importance of differentiating between the project brief/ client requirements stating the main objectives, needs, wishes and expectations of the client and the design brief which includes the client's specific requirements acting a key performance indicators in measuring work progress and project success (J. Kamara et al., 1999; Latham, 1994; Yu et al., 2005). Yu et al. (2008) made also further distinction between the needs of the project regarded as the client's basic intentions that must be fulfilled and the wants of the project considered as the embellishments that are not necessarily required to be done. Therefore, it is important to understand the priorities of users where no sacrifice in high priority needs is allowed for the favor of lower-priority wants. To that effect, Kano (1984), in his model, identified three types of product requirements used to focus on priorities in relation to customer's satisfaction. They are classified as "must-be requirements" that client takes their fulfillment for granted and feels extremely dissatisfied in case of negligence, "One-Dimensional requirements" that are explicitly stated by the client and their fulfillment is proportionally related to the customer satisfaction and " Attractive requirements" that are not wanted or expected by the client and failure to meet doesn't impact the customer satisfaction (Berger et al., 1993; Matzler & Hinterhuber, 1998). In this context, Worinkeng et al. (2015) also classified the requirements as functional and non-functional requirements regarded respectively as the system behaviors "what the system should do" and the system constraints and qualities "how the system must accomplish the what".

Seven types of requirements in construction projects were identified by (J. M. Kamara, Anumba, & Evbuomwan, 2000) and classified as client requirements, site requirements, environmental requirements and regulatory requirements which combine

together to produce design requirements which in turn generate construction and life-cycle requirements.

Cheong, Anumba, Hill, and Bouchlaghem (2003) argues that considering the whole life performance in the functional brief helps in ensuring client satisfaction. This is related to the fact that when preparing the functional brief, decisions regarding purpose, functionality, quality, materials and constructions, costs, procurement method and constraints must be made.

De Jager et al. (2009) indicated that domain knowledge and experience are critical for the formulation of an adequate brief and the interpretation of its content. This aid to well identify the types of requirements with respect to what is fixed, preferences or wish-list and essential information used in the design process. Time and space shall be allowed for the client to test the feasibility of his wishes expressed in the project brief against design requirements (Latham, 1994). To that effect, clients' ambitions should always be in conformity with the budget when asking for additional requirements (J. M. Kamara et al., 2002). Long briefs extending too many pages and containing over-detailed information doesn't necessarily reflect its completeness and usefulness, and clearance of its content (Bogers et al., 2008).

Based on our reflection on the explored brief formats relative to the surveyed projects and a thorough review on literature review, the components of a complete project brief must consist of fundamental and relevant information. Some components must be regarded as fixed requirements at the project onset being common between different types of projects and difficult to be altered, and others are flexible and may develop throughout the project life cycle. It is the responsibility of the design team to

make the fixed requirements viable at early stages in order to avoid any potential conflicts with other arising requirements as design progresses.

Tables 2 and 3 captures the list of brief components/project requirements identified respectively from literature and case studies. Table 2 lists the requirements as described and expressed in literature. These requirements are ranked in Table 3 as per their frequency of existence in the surveyed projects' briefs.

Table 2: Project Brief Components - Literature Review

Project Brief Components	From literature review	
	Description	**References**
Project location	Site information, site conditions, project details, location of the building	(Othman, Hassan et al. 2004), (De Jager et al., 2009), (Ryd, 2004), (kamara et al., 2000), (Wandahl, 2004)
Project title	Project details	(kamara et al., 2000)
Type of the project	Facility use	(kamara et al., 2000)
Project goals and objectives	Aim of the project, purpose and desired outcome of the project	(Rao et al. 2017), (Ryd, 2004), (kamara et al., 2000)
Total Built-up area	Project details	(kamara et al., 2000)
Outline of the project functions	Spatial dimensions, function of the intended facility and relationship between them, facility functions	(Bogers et al. 2008), (Ryd, 2004), (kamara et al., 2000)
Number of floors	Project details	(kamara et al., 2000)
Site information	Site information, site conditions, site requirements	(De Jager et al., 2009), (Ryd, 2004), (kamara et al., 2000)
Client's vision and mission for the project	Business needs	(Rao et al., 2017)
Background information	Background	(Ryd, 2004), (kamara et al., 2000)
List of stakeholders	Project details, stakeholder list	(kamara et al., 2000), (Rezgui et al., 2003)
Space program and requirements	Functional requirements	(Cheong et al. ,2003)
Attributes of the functions	facility attributes	(kamara et al., 2000)
Scope of work	Scope of the project	(Windapo et al., 2017)
Programme of work	Programme for the development	(Yu, Shen, & Chan, 2005)
Project deliverables	Scope of the project	(Windapo et al., 2017)
Type of deliverables	Design requirements	(kamara et al., 2000)
Procurement method	Instruction on procurement and organization of the project, procurement of contract	(Ryd, 2004), (kamara et al., 2000), (Yu, Shen, & Chan, 2005)
Construction budget	Budget, cost target, budget of development	(Rao et al., 2017), (Bogers et al., 2008), (De Jager et al., 2009), (Ryd, 2004), (kamara et al., 2000), (Yu, Shen, & Chan, 2005)
Feasibility and market study	Business needs	(kamara et al., 2000)
Client's objectives	Client's requirements, customer needs, client needs, objectives and requirements	(kamara et al., 2000), (Matzler et al., 1998), (Windapo et al., 2017)
Project master plan/Development rights	Regulatory requirements	(kamara et al., 2000)
Site's geographic environment	Environmental considerations, environmental conditions, environmental requirements	(Rao et al., 2017), (Ryd, 2004), (kamara et al., 2000)
Topographic survey	Design requirements	(kamara et al., 2000)
Codes and standards	Design requirements	(kamara et al., 2000)
Commencement date	Time target	(Ryd, 2004), (kamara et al., 2000)
Period of execution	Time target	(Ryd, 2004), (kamara et al., 2000)
Project architectural style or aesthetics	Client requirements, aesthetics	(kamara et al., 2000), (Wandahl, 2004)
Authorities' regulations	Legal considerations, Statutory requirements	(Rao et al., 2017), (De jager et al., 2009)
Stakeholders/users requirements	User requirements, interested parties, client interest groups	(Rao et al., 2017), (Ryd, 2004), (kamara et al., 2000)
Geotechnical investigation report	Design requirements, site requirements	(kamara et al., 2000)
Instructions on design supervision	-	-
Constructability	Factors influencing the construction of the facility, construction requirements	(Ryd, 2004), (kamara et al., 2000)
Life cycle requirements	Life-cycle costing, life-cycle requirements, operational requirements, whole life performance, technical performance	(Bowen et al.,1999), (kamara et al., 2000), (Cheong et al. ,2003), (Wandahl, 2004)

Table 3: Project Brief Components - Case Studies

Project Brief Components	From Case studies													
	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12	P13	Total
Project location	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
Project title	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	12
Type of the project	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			10
Project goals and objectives	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓			10
Total Built-up area	✓	✓	✓		✓			✓	✓	✓			✓	8
Outline of the project functions	✓	✓	✓	✓	✓				✓	✓	✓			8
Number of floors	✓	✓	✓	✓	✓				✓	✓			✓	8
Site information	✓	✓	✓	✓	✓						✓			6
Client's vision and mission for the project			✓	✓	✓					✓	✓			5
Background information			✓	✓						✓	✓			4
List of stakeholders	✓		✓	✓							✓			4
Space program and requirements	✓		✓	✓	✓									4
Attributes of the functions	✓			✓	✓					✓				4
Scope of work	✓		✓	✓							✓			4
Programme of work	✓		✓	✓							✓			4
Project deliverables	✓		✓	✓							✓			4
Type of deliverables	✓		✓	✓							✓			4
Procurement method	✓		✓	✓							✓			4
Construction budget	✓		✓	✓							✓			4
Feasibility and market study	✓		✓		✓									3
Client's objectives	✓			✓							✓			3
Project master plan/Development rights	✓		✓	✓										3
Site's geographic environment	✓			✓							✓			3
Topographic survey	✓			✓							✓			3
Codes and standards	✓		✓	✓										3
Commencement date	✓			✓							✓			3
Period of execution	✓			✓							✓			3
Project architectural style or aesthetics	✓			✓										2
Authorities' regulations	✓			✓										2
Stakeholders/users requirements	✓			✓										2
Geotechnical investigation report	✓			✓										2
Instructions on design supervision				✓							✓			2
Constructability											✓			1
Life cycle requirements											✓			1

The components for a complete project brief are illustrated and explained below along with their active role during design:

- **Background information** about the client's organization
- **Client's vision and mission** for the project

  These two requirements help in well understanding the project's objectives earlier. If not explicitly stated, these requirements can be gradually explored during early stages after frequent meetings with the client.

- **Project information** as means of **title, type/ function, location and short description of the project**. The decision on the type of the construction facility intended to be constructed (residential, offices, educational, hotel, healthcare...) is usually determined based on the client needs and/or a feasibility and market study conducted by external advisers appointed by the client. **Feasibility and market study** is optional depending on the client's type and the complexity of the project. Its main purpose is to help identifying different feasible options and validate that the selected project is viable to be constructed. The importance of this general information is highly reflected in the frequency of its presence in all projects.
- **Project architectural style or aesthetics**. This type of information cannot be properly expressed by clients/brief writers. Although, clients in projects P1 and P4 conveyed their aesthetics' requirements respectively as "vertical village" and "iconic structure", the translation of these requirements into visual presentations is highly dependent on the architect's experience and his interpretation of the client's preferences.
- **Client's objectives** translated by means of non-negotiable requirements necessary to ensure client's satisfaction. The client's wide objectives vary depending on the project types. They basically include the criteria of measuring the project success based on fulfillment of users and business needs, efficiency of the investment (return on investment: ROI), satisfaction related to project's aesthetics, completion of the project with high quality, on time and within budget, etc. Specific objectives must be expressed by clients as mentioned in projects P1, P4 and P11 where designers must consider their fulfillment as

priority. Although not expressed, all clients have the common general objectives with respect to time, cost and quality for which their fulfillment is taken for granted.

- **Project goals and objectives** intended to deliver a facility fit for **purpose** for which it must be clearly stated in the brief. The project objectives are, but not limited to ensure safety, durability, serviceability, energy conservation, functionality and flexibility. The project must also be delivered in time, within budget limitations and provides good value for money, without compromising the delivered quality. The project objectives are mostly expressed in all surveyed projects, but the detailed level of information depends on the briefs formats and types. In all cases, project's objectives must be early identified during design in order to be translated into design requirements with the work progress.
- **Stakeholders/users' requirements** including a list of all stakeholders including users and their relative requirements.
- **Authorities' regulations** depend on the project type and location. For specific areas, this information is obtained through a document called development brief that includes the project master plan and specifies the development rights (floor space and land use) and other physical and regulatory constraints placed on a particular parcel. The low rank of this requirement in the surveyed briefs is due to the fact that in practice, its use is more significant in the post-award stage. The designer is responsible in consulting authorities during conceptualization and later while preparing for the building permit in order to submit a package conforming to their regulations. This was highly reflected in project P10 where the consultant, while preparing the concept drawings, optimized the bed's

capacity when validating the information furnished by the owner with authorities.

- **Site information,** considered as a basic fact about the project, includes **site location**, **area**, surrounding roads, site's capture from Google maps, **site conditions** (future demolition, existing services and utilities…), and **site's geographic environment**: rainfall, climatic temperature, wind and earthquakes.
- **Topographic survey** regarded as an essential document containing site information that allow the designer ascertaining the site's adequacy to house the proposed project.
- **Geotechnical investigation report** assesses the ground conditions and provides information such as the nature, stability and capacity of the soil and the water table. This requirement is needed as a design input for selecting the shoring system and the foundation types and sizes.
- **Design requirements,** considered as negotiable, are not usually explicitly expressed. They may evolve throughout the project life cycle to a certain extent in relation to design stages. The design requirements are generated from the combination of many requirements that must be fixed before proceeding with the design. The design requirements include **total built-up area, number of floors and schedule of areas, outline of the project functions and their attributes forming the space programme**. Typically, these requirements are rarely furnished in the brief except for the total built-up area and the number of floors regarded as necessary for the consultant to estimate his design fees. Large developers who had conducted feasibility and market study provide a detailed space programme to the consultant. This is applicable for projects P1, P3 and P4.

Users involvement in projects P3, P4 and P6 during early phases helped also in determining the space programme.

- **Codes and standards** that set a system of rules the designer must comply in developing the design to meet the general requirements such as stability, safety, function and performance of the project's components. Experienced consultant must have sufficient knowledge in most applicable codes and standards in different countries. Clients may mention a precise standard that must be followed in case a special component/function in the building is introduced. These requirements are used once the design is initiated.
- **Scope of work** describes the design services the consultant must perform on the project in accordance to the key design stages and the adopted procurement method.
- **Programme of work** specifies the design completion period as date and duration allocated for key design stages of the project, including approval periods required by the client. This requirement is important for the consultant in planning activities, monitoring progress and estimating required resources throughout the design process.
- **Project Deliverables** must suffice to provide the information required as indicated in the scope of work and achieve them by the pre-set deadline dates. The project deliverables are considered complementary to the project requirements and need to be read in conjunction with each other.
- **Type of deliverables** indicates the requirements for delivering the project by specifying the type of deliverables using different softwares such as CAD, BIM, 3D, etc.

- **Procurement method** indicates the strategy in delivering the project. For traditional contracts, the client procures the construction in three major packages enabling works, main construction works and furniture fixtures and equipment. The client requirements representation is highly dependent on the adopted procurement path. For instance, in design bid build or traditional contract, the client has a certain degree of flexibility in deciding his requirements during the design process; whereas in design build, the client must formulate an adequate set of requirements before beginning of construction, for which any changes during construction can prove costly.
- **Construction requirements** related to **the construction budget, the commencement and period of project execution and constructability requirements.**

  The construction budget, considered as the **estimated cost of construction,** aims to control the design in producing a project within budget. Cost reporting aligned at design stages' gateways is submitted to monitor the up to date construction cost estimate. Many clients tend to hide this financial information intentionally in the project brief to allow the consultant being more innovative in providing the client with many alternatives at early stages. In public projects (ex: project P11), the construction budget mostly relies on the received funds to cover or support the total project cost. With the brief's evolution throughout the design process, the construction budget become a major constraint against the change in client's requirements.

  The commencement and period of the execution are necessary for timing the design activities properly. It helps in managing to prepare for the building permit

(enabling works), design and bidding. Special attention is required for the components requirements related to long-lead items that must be procured in real time to ensure its availability in the market in order to protect the project programme and avoid any delay during construction.

Constructability requirements serve the project objectives in facilitating the ease of construction and enhancing the quality performance of the building. For that, the design team must observe constructability requirements as they emerge with the design progress. The client must also conduct constructability review and include it as part of the design service agreement with the consultant. Project P11 addressed constructability in selecting the structural system, designing, detailing and installing the project's components using BIM to facilitate ease of construction according to the available site constraints.

- **Life-cycle requirements** are necessary for the consultant to design and specify according to the required lifespan of the facility's components where the service life shall meet or exceed these requirements. This issue depends highly on the efficiency of maintenance and the ease of material replacement. Therefore, when making a choice for a material, designers must weigh between opting for something that costs less now but probably cost more to operate later, as oppose to invest in a better product now that has less impact on cost, environment and energy consumption issues, etc. The low rank for this requirement is an area of concern. To that effect, the **value engineering** must be included as a requirement for the important role it plays in accounting for life-cycle cost requirements. For that, it must be involved during the design at gateway stages defined in coordination between both client and consultant. Only project P11 did

highlight on this particular issue in the project brief since the nature of the project and the environmental conditions that must be ensured in terms of maintainability and preservation requirements for the archeological objects, obliges the designer to account for during design.

- **Instructions on design supervision** applicable when the consultant is performing both design and supervision services. These requirements specify the responsibilities of the consultant/engineer during construction and maintenance periods.

After going through a deep explanation of each requirement and relate their relative level of importance to their active role in design, it is important to highlight on four important requirements found common in all projects' briefs which are the project title, type and location and the project goals and objectives. Although other requirements have a lower rank, such as built-up area, project description, number of floors, scope and programme of work and client's objectives, it is important to address them in the brief for their significant role in assisting the consultant in preparing both technical and financial proposals.

A significant deviation in information procurement for the different studied types of written briefs is noticed, this is highly related to the client's level of experience and project types. The information provided in verbal briefs is restricted to the project title, type and location and a short statement of the project objectives having the high rank among all other requirements. These furnished requirements reflect the client's thinking in providing the consultant with the information he believes, in his perspective, is sufficient for the designer to proceed forward. Whereas, the consultant must, before proceeding with the design, pursue the regulatory requirements through coordination

with authorities. The consultant must also work collaboratively with the client to identify the client's objectives and remaining requirements the earliest possible through meetings and workshops. These emerged requirements must always be subject to regular review and feedback provided by the client.

With the design progress, the designer must combine the high ranked requirements with site information and authorities' regulations and other fixed requirements, make them viable in order to produce the design requirements that must comply with codes and standards.

Recognizing that the information included in a complete brief are not all used during the pre-award stage. Each requirement must be used at the right time and in the right way according to its active role during the subsequent stages of the design process. Once the post-award stage is initiated, the brief components must be thoroughly clarified, interpreted, validated, prioritized and developed in a way to gradually freeze the requirements at key stages. To this extent, some requirements must be fixed, and others are regarded as flexible and expected to evolve throughout the design process forming our discussion in the next chapter.

CHAPTER 4

EVOLUTION AND DYNAMIC POTENTIAL OF THE PROJECT BRIEF

4.1 Preamble

The aim of this chapter is to analyze and study the evolution of the brief components and identify their development factors. A structure that can manage the evolution of project brief aligned at design stages' gateways is also proposed. The methodology includes aligning requirements at gateways to stages according to their active role and monitoring the impact of dynamic changes occurred during design for the surveyed projects along with their causes and their relative stages of occurrence.

4.2 Evolution of the Project Brief

A complete list of requirements is the first step into representing the brief components precisely and explicitly. Requirements' development requires the design team to be engaged in dynamic activities necessary to investigate, evaluate and update the project brief components, in coordination with all stakeholders, throughout the project design stages. The evolution of the brief starts at the point the client takes the decision to build. Since the design process is complex, iterative and dynamic, it is important to recognize that the brief develops and becomes more detailed with the project progress throughout its different stages.

One must distinguish between proper evolution where an efficient evaluation and management process is set throughout the project life cycle and an improper evolution where lack of clarity is unresolved during early design phases causing future

difficulties. To that effect, as early stages are the most complex to understand, carry out and manage, a suitable time should be allocated to understand and identify the project brief components prior to proceed with each subsequent stage. The development of the requirements must also be controlled through a continuous feedback from clients at gateways, planned as per the programme of work, with further documentation at the end of each stage.

4.2.1 *Case studies*

In the complex and dynamic construction environment, external and internal change/development factors play a vital role in the evolution of the project throughout its life cycle. Internal factors are mostly related to the interdisciplinary and intradisciplinary coordination within the design firm. External factors are sometimes inevitable and hard to expect and might have positive and negative impacts on the project. Our study aims to highlight on the changes caused by external factors and proposes mitigation measures to control their impact or eliminate their occurrence. For that, the development of the brief is examined in relation to thirteen real-life projects discussed in chapter three (3), where changes occurred during the project design stages were summarized. The majority of these changes was accessible through “monthly progress reports” where summary of all activities is monthly documented with respect to the work progress. In addition to our findings in the surveyed projects, unstructured interviews were conducted with many design practitioners from different disciplines in the design firm. These also aim to identify the major changes occurred in different projects along with their relative stages of occurrence and their impact on the design process.

Tables 4 and 5 summarize the various changes that took place respectively in the surveyed projects and as per the interviews' results. It includes projects/interviews numbers, changes descriptions, changes drivers, changes relative stages of occurrence, their relative impact and the variation orders' (VO) percentage ratio. There are six stages design stages, programme development or pre-concept design (5%); concept design (15%); preliminary design (20%); design development (30%); construction documentation (20%); and tender design (10%). These percentage ratios represent the amount of work performed at each stage relatively to the required total amount of work.

The consultant is entitled to an appropriate adjustment in his schedule/fees for any change affecting the consultant's services for the project. This is usually compensated as means of extension of time and/or additional fees claimed in form of variation orders. The VO percentage ratio represents the value of the changes' cost measured against the total design fees of each project.

Not all occurred changes are linked to a negative factor, reasons and effects of changes must be investigated to identify their nature as value-added and non-value-added. A value-added change is one initiated to achieve client's and project's requirements by maintaining a good balance between reducing cost, improving functionality and observing constructability without compromising the delivered quality. For that, added-value changes could enhance client's value system when compared to their relative direct consequences in terms of cost and rework. Whereas, a non-value-added changes compromise the client's value and project performance systems by cutting costs and sacrificing quality. It is important to note that the influence of a change is highly related to its type and relative stage of occurrence which

determines the value of the variation order and in turn impacts the overall project cost and schedule.

Table 4: Description of Changes-Projects

Project	Change ID	Change description	Change driver	Stage of occurrence	Impact	VO percentage ratio
P1	P1-1	Changing in authorities' seismic design requirements and Joining the 2 plots to have one building instead of 2 separate structures	Changes in authorities regulations	Preliminary Design	VO	29.52%
	P1-2	Introducing value engineering VE#1 and extension of the preliminary design stage	Exceeding construction cost	Preliminary Design	VO	16.00%
	P1-3	Finalizing structural design done by others	New scope of work	Preliminary Design	Time extension	0.00%
	P1-4	Adding car park at basement 7	Change of the market demand of an additional car park at basement	Design Development	VO	0.60%
	P1-5	Redistributing the apartment types at various levels and modifying external façade	Change of market demand of the distribution of the building's apartments	Throughout the design process until start of Design Development	Time extension	0.00%
	P1-6	Deleting basement 4	Change of the market demand for an additional basement	Design Development	VO	2.86%
	P1-7	Dropping LEED certificate	market study	Design Development	No impact	0.00%
	P1-8	Implementing items from value engineering VE#1	Exceeding construction cost	Construction Documentation	Time extension	0.00%
	P1-9	Preparing BOQ for tendering test	New scope of work	Construction Documentation	Time extension	0.00%
	P1-10	implementing value engineering VE#2 items	Exceeding construction budget	Construction Documentation	VO	0.00%
	P1-11	replacing the mechanical system from water-cooled VRVs to Air-cooled chillers	Cost consultant advice- expensive system and not installed before in the country	Construction Documentation	VO	6.21%
	P1-12	Changing the heating systems from under-floor heating to under-floor/radiators combination	High installation cost of the system	Construction Documentation	VO	9.50%
	P1-13	Changing bathrooms, kitchen layouts and finishes in other rooms	Design workshop with ID	Construction Documentation	VO	2.86%
	P1-14	Replacing the structural system of slabs from bubble to U-boot system	Unavailability of the system in the local market and high cost to import and install	Tender Design	VO	3.33%
P2	P2-1	Redesigning the building to be 30 floors instead of 40 floors	Exceeding construction budget	Construction Documentation	VO	40.00%
P3	P3-1	Changing the built up area to be 76,000 sq.m. instead of 27,000 sq.m. This resulted in changing the location of the building to another larger plot	User involvement to include students and staff at early stages	Concept Design	New design agreement	50.00%
P4	P4-1	5 months' delay in getting approval on the concept design causing an abortive work due to coordination with the international architect and authorities to get approval being part of the local architect duties in supporting the client	Lack of international architect expertise	Concept Design	Not compensated to maintain a good relationship with the client	0.00%
	P4-2	Adding 3 basements to be 7 in total after introducing 2 auditoriums and technical areas in basement floors	New scope of work	Concept Design	VO	20.00%
P5	P5-1	Changing in basic design requirements related to the number of floors	Changes in authorities regulations	Concept Design	VO	10.00%
	P5-2	Late involvement of the hotel operator during Preliminary phase	late involvement of the operator	Preliminary Design	VO	12.00%
	P5-3	Adding one basement	New scope of work	Design Development	VO	4.00%
	P5-4	modifying the façade skin by the client after submitting a building model	Aesthetics aspects	Design Development	VO	10.00%
	P5-5	flipping the building 180 degree due to disregarding the environmental impact of the surroundings on the distribution of hotel and office towers	Site conditions	Tender Design	VO	30.00%
P6	P6-1	Intensive meetings with users	Request made by end users	Preliminary Design	VO	10.00%
P7	P7-1	Changing equipments	Technology advancement	Tender Design	VO	15.00%
P8	P8-1	Lowering the foundation to reach good soil. Adding new basement to benefit form this dead fill area above foundations	Unforeseen site conditions	Construction Documentation	VO	20.00%
P9	P9-1	Increase in built-up area- adding one basement	New scope of work	Preliminary Design	VO	17.00%
	P9-2	Mall operator sets the strategic distribution of all types of shops and areas	Late involvement of the mall operator	Design Development	VO	10.00%
	P9-3	Late involvement of a large anchor tenant -Carrefour	Late involvement of end users	Design Development	VO	7.00%
P10	P10-1	Changing the number of beds from 120 to 155 to fit and maximize the usage of the provided built-up-area according to authorities' regulations. This change resulted also in adding 2 more basements to be 5 instead of 3	Misinterpretation of the Authorities' requirements	pre-Concept Design	VO	25.00%
	P10-2	Transferring the boiler room to the roof due to many fire incidents occurred in the country which resulted in fatalities	Changing authorities regulations	Preliminary Design	VO	5.00%
P11	P11-1	Increase in built-up area from 2000sq.m. to 5000sq.m.	Inaccuracy in data collection of archeological objects	Preliminary Design	VO	45.00%
	P11-2	Provision for one additional floor	Political and public authorities' interference	Construction Documentation	VO	18.00%

Table 5: Description of Changes-Interviews

Interviews	Change ID	Change description	Change driver	Stage of occurrence	Impact	VO percentage ratio
	In-1	The client and the operator changed their requirements related to having shared facilities for the mall and the hotel	Late involvement of the operator	Preliminary Design	VO	10.68%
	In-2	changing the distribution of spaces to be 3 bedrooms only instead of 2 and 3 bedrooms with 200 sq.m. and 245 sq.m.	Change of the market demand of the distribution of the building's apartments	Tender Design	VO	20.00%
	In-3	Sudden workshop with 22 end users was held during the client review period based on his request after proceeding with the design development stage. This meeting resulted in retrieving back with the design to the concept stage	Late involvement of end users	Design Development	VO	30.00%
	In-4	Rework of the interior design services done by a subconsultant	Lack of the interior designer expertise	Construction Documentation	VO	15.00%
	In-5	The designer gave the client a low construction cost. At the start of the Preliminary Design, the client changed the requirements for the furnished apartment to be 3 stars instead of 5 stars to stay within budget	Lack of designer expertise and limited construction budget	Preliminary Design	Not compensated	0.00%
	In-6	VE involvement at late stage	Late involvement of value engineering	Design Development	Rework-Extension of time	0.00%
	In-7	Shoring for other building lies within the plot area, but it didn't affect the site. Existing conditions were not delivered	lack of information (no accurate data collection)	Concept Design	No impact	0.00%
	In-8	Structural systems changed	Speed up construction	Tendering Design	VO	20.00%
	In-9	As per agreement, no ID to be involved during design based on the design agreement. The building to be delivered as core and shell. Each doctors will assign his own ID whenever rent	Late involvement of ID	Design Development	VO	20.00%
	In-10	Repeating the design with less cost	Exceeding construction cost	Preliminary Design	VO	10.00%
	In-11	variation in the function of the ground floor from retail area to restaurant-Addition of 4th basement for parking	Change of the market demand of the intended use of the ground floor	Preliminary Design	VO	11.66%
	In-12	Interior Design involvement	Late involvement of interior designer	Design Development	VO	5.50%
	In-13	Hotel has been changed to residential because hotels were not rentable in the country, the hotel requires at least 5 years for the return on investment at the time the country was facing political problems, the client changed it to residential building and all apartments were sold	Change of market demand of the intended use of the building- improper feasibility study	Tender Design	VO	50.00%

4.2.2 *Analysis of project brief development factors*

Surveyed projects and conducted interviews have resulted in identifying 34 valid changes that were subject to variation orders. Points reflecting the changes that had no impact (P1-7 and In-7), dropped by the consultant to maintain a good relationship with the client (P4-1, In-5) and subject to time extension (P1-3, P1-5, P1-8, P1-9, In-6) were removed. Exceptional changes that do not occur frequently (P2-1 and In-13) were also excluded to reflect a logical changes' distribution with respect to design stages. The valid changes are represented in Table 6 along with their corresponding VO percentage ratio and classified according to each design stage.

Table 6: Change Records-Stages of Occurrence

Change ID	Stages of occurrence	Change drivers	VO percentage ratio
P10-1	Pre-Concept Design	Misinterpretation of the Authorities' requirements by the client	25.00%
P3-1	Concept Design	Early users' involvement	50.00%
P5-1		Changes in authorities regulations	10.00%
P4-2		New scope of work	20.00%
P1-1	Preliminary Design	Changes in authorities' regulations	29.52%
P6-1		Requests made by end users	10.00%
P9-1		New scope of work required by the client	17.00%
P11-1		Inaccuracy in data collection of archeological objects	45.00%
P5-2		late involvement of the operator	12.00%
P1-2		Exceeding construction cost	16.00%
In-1		late involvement of the operator	10.68%
In-11		Change of the market demand	11.66%
P10-2		Changes in authorities' regulations	5.00%
In-10		Exceeding construction cost	10.00%
P1-4	Design Development	Change of market demand for an additional car parks at basement	0.60%
P9-2		Late involvement of the operator	10.00%
P5-3		New scope of work	4.00%
In-12		Late involvement of interior designer	3.03%
In-3		Late involvement of end users	30.00%
In-9		Late involvement of interior designer	20.00%
P1-6		Change of market demand for an additional basement	2.86%
P11-2	Construction Documentation	Political and public authorities' interference	18.00%
P9-3		Late involvement of end users	7.00%
P1-11		Unavailability of the system locally	6.21%
P8-1		Unforeseen site conditions	20.00%
In-4		Lack of the interior designer expertise	15.00%
P1-12		High cost for the installation of the system	9.50%
P1-13		Design workshop with ID	2.86%
P5-5	Tender Design	Site conditions	30.00%
P7-1		Technology advancement	15.00%
In-8		Speeding up construction	20.00%
P5-4		Aesthetics aspects	10.00%
In-2		Change of the market demand	20.00%
P1-14		Unavailability of the system locally	3.33%

Table 7 provides the list of changes ranked as per the value of the VO percentage ratio. These changes are further classified in 7 categories illustrated in Table 8 with respect to the range of the VO percentage ratio. The corresponding change rate for each category is also displayed. Table 9 shows the developed factors grouped per type of change.

Table 7: Change Records-VO Percentage ratio

Change ID	Stages of occurrence	Change drivers	VO percentage ratio
P3-1	Concept Design	Early users' involvement	50.00%
P11-1	Preliminary Design	Inaccuracy in data collection	45.00%
In-3	Design Development	Late involvement of end users	30.00%
P5-5	Tender Design	Site conditions	30.00%
P1-1	Preliminary Design	Changes in authorities regulations	29.52%
P10-1	Pre-Concept Design	Misinterpretation of the Authorities' requirements	25.00%
P4-2	Concept Design	New scope of work	20.00%
In-9	Design Development	Late involvement of interior designer	20.00%
P8-1	Construction Documentation	Unforeseen site conditions	20.00%
In-8	Tender Design	Speeding up construction	20.00%
In-2	Tender Design	Change of the market demand	20.00%
P11-2	Construction Documentation	Political and public authorities' interference	18.00%
P9-1	Preliminary Design	New scope of work	17.00%
P1-2	Preliminary Design	Exceeding construction cost	16.00%
In-4	Construction Documentation	Lack of the interior designer expertise	15.00%
P7-1	Tender Design	Technology advancement	15.00%
P5-2	Preliminary Design	late involvement of the operator	12.00%
In-11	Preliminary Design	Change of the market demand	11.66%
In-1	Preliminary Design	late involvement of the operator	10.68%
P5-1	Concept Design	Changes in authorities regulations	10.00%
P6-1	Preliminary Design	Requests made by end users	10.00%
In-10	Preliminary Design	Exceeding construction cost	10.00%
P9-2	Design Development	Late involvement of the mall operator	10.00%
P5-4	Tender Design	Aesthetics aspects	10.00%
P1-12	Construction Documentation	High installation cost of the system	9.50%
P9-3	Construction Documentation	Late involvement of end users	7.00%
P1-11	Construction Documentation	Unavailability of the system locally	6.21%
P10-2	Preliminary Design	Changes in authorities regulations	5.00%
P5-3	Design Development	New scope of work	4.00%
P1-14	Tender Design	Unavailability of the system locally	3.33%
In-12	Design Development	Late involvement of interior designer	3.03%
P1-6	Design Development	Change of the market demand	2.86%
P1-13	Construction Documentation	Design workshop with ID	2.86%
P1-4	Design Development	Change of the market demand	0.60%

Table 8: Change Ranges

Categories	*Range of VO percentage*	*Change rate*
A	$A \geq 35\%$	5.9%
B	$25\% < B < 35\%$	11.8%
C	$20\% \leq C \leq 25\%$	14.7%
D	$15\% \leq D < 20\%$	14.7%
E	$10\% \leq E < 15\%$	23.5%
F	$5\% \leq F < 10\%$	11.8%
G	$0\% < G < 5\%$	17.6%

Table 9: Change Records-Types of Changes

Change ID	Stages of occurrence	Change drivers	VO percentage ratio
P3-1	Concept Design	Early users' involvement	50.00%
P6-1	Preliminary Design	Requests made by end users	10.00%
In-3	Design Development	Late involvement of end users	30.00%
P9-3	Construction Documentation	Late involvement of end users	7.00%
P10-1	Pre-Concept Design	Misinterpretation of the Authorities' requirements	25.00%
P5-1	Concept Design	Changes in authorities' regulations	10.00%
P1-1	Preliminary Design	Changes in authorities' regulations	29.52%
P10-2	Preliminary Design	Changes in authorities' regulations	5.00%
P11-2	Construction Documentation	Political and public authorities' interference	18.00%
P11-1	Preliminary Design	Inaccuracy in data collection	45.00%
P8-1	Construction Documentation	Unforeseen site conditions	20.00%
P5-5	Tender Design	Site conditions	30.00%
P4-2	Concept Design	New scope of work	20.00%
P9-1	Preliminary Design	New scope of work	17.00%
P5-3	Design Development	New scope of work	4.00%
P5-2	Preliminary Design	Late involvement of the operator	12.00%
In-1	Preliminary Design	Late involvement of the operator	10.68%
P9-2	Design Development	Late involvement of the operator	10.00%
In-12	Design Development	Late involvement of interior designer	3.03%
In-9	Design Development	Late involvement of interior designer	20.00%
P1-13	Construction Documentation	Design workshop with ID	2.86%
In-11	Preliminary Design	Change of the market demand	11.66%
P1-4	Design Development	Change of the market demand	0.60%
P1-6	Design Development	Change of the market demand	2.86%
In-2	Tender Design	Change of the market demand	20.00%
In-4	Construction Documentation	Lack of the interior designer expertise	15.00%
P5-4	Tender Design	Aesthetics aspects	10.00%
P1-2	Preliminary Design	Exceeding construction cost	16.00%
In-10	Preliminary Design	Exceeding construction cost	10.00%
P1-11	Construction Documentation	Unavailability of the system locally	6.21%
P1-12	Construction Documentation	High installation cost of the system	9.50%
P7-1	Tender Design	Technology advancement	15.00%
In-8	Tender Design	Speeding up construction	20.00%
P1-14	Tender Design	Unavailability of the system locally	3.33%

Figure 3 shows a graphical representation of these changes identified by the type of changes' drivers in function of design stages and VO percentage ratios. Inspection of changes' distribution is based on two classifications:

4.2.2.1 General classification of changes

- Concentration of points reflects the frequency of changes that took place during each design stage. It is noticed that most changes take place at the beginning of each stage. This indicates a healthy changes' distribution where most changes and additional requirements arise at the beginning of each design stage. This

information is usually provided by the client as feedback after the review period conducted at stages' gateways.

- High VO percentage ratios are found at the start and the end of the design process. Even though the rate of the brief development must decrease at late stages, a noticeable amount of changes with significant VO ratios is observed at the end of construction documentation/start of tender design stage. This is highly related to the fact that, since all design aspects must be completed at this stage, emerged client's requirements and unforeseen problems must be handled before proceeding to the construction stage.
- Changes with high value of VO, within category A ≥ 35%, hit early design stages to include users' involvement and inaccuracy in data collection.
- Changes with a VO range 25% <B < 35% are distantly spread along the design stages involving changes in authorities' regulations, late involvement of users and late investigation on site conditions.
- Changes that have an impact of a range 10 %≤ E < 15% are mostly concentrated at the preliminary design stage where critical decisions are made and the most value is generated.
- Possibility of encountering a change that will hit the fees up to 10%, including categories E and F, is almost constant at later stages and include different type of changes.
- Changes with lower VO's values 0 %< G < 5% are mostly encountered at the design development stage. In addition, this stage covers the less amount of changes since interdisciplinary and intradisciplinary coordination takes place to

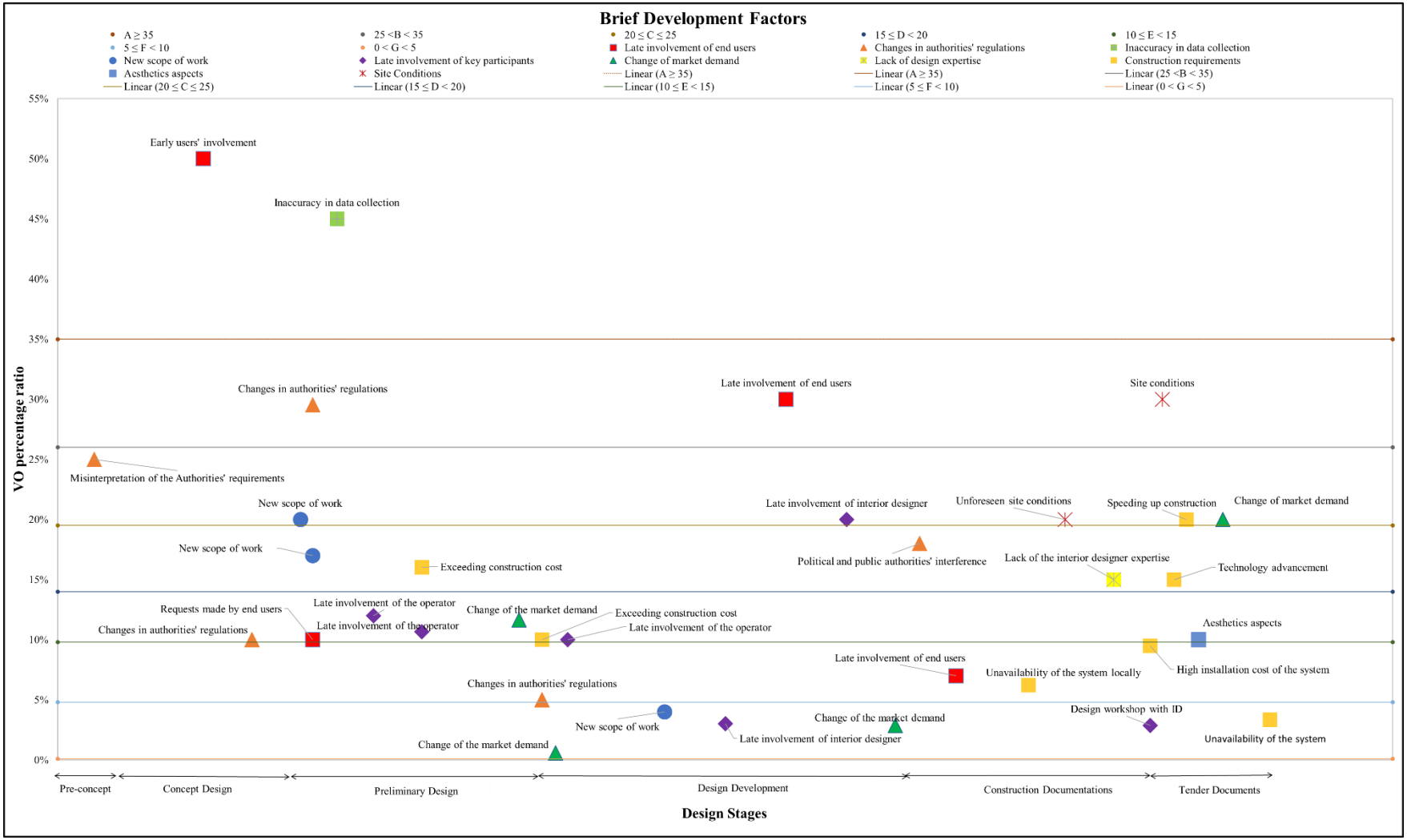


Figure 3– Brief Development Factors- Distribution throughout Design Stages

ensure the production of a well-coordinated set of documents that serve better the project and avoid any potential conflict during construction.

4.2.2.2 Classification of change types

The change factors are summarized and attributed to their corresponding brief components along with mitigation measures to control or eliminate the changes' occurrence:

- User's involvement was observed during all design stages with high impact levels. It is noticed that the impact is reduced with the design progress which means that the designer and the client are still learning about this requirement throughout the design. As long the observation of the users' involvement requirement is not satisfied and completed at early stages, it is still incrementally having impact even when occurred at later stages for different projects. Identifying this requirement at early stages led to a detrimental increase in projects P3 built-up area, where users' requirements were not counted in at all. Recognizing the high VO generated from this change at early stages, a full re-design for the project could've been resulted would this requirement been emerged at later stages.
- Inaccuracy in data collection being part of project requirements resulted in a high VO at the early stage. In project P11, this requirement was essential since it determined the built-up area that should house the archeological objects. For that, it must be incorporated and confirmed at the very early stages.
- Disregarding site conditions occurred twice at the construction documentation and tender design stages resulted in a high VOs. Results showed that site

conditions development factor was related to the inaccuracy of the geotechnical investigation report and inadequacy in the study of the surroundings for which they must have been verified and completed before proceeding with the design.

- Change in authorities' regulations cannot be expected at which stage it may occur. It only can be controlled throughout a continuous review at milestones defined by both client and designer and a prompt update of the project's affected parts.
- Political and public authorities' interference must be resolved by early coordination with all project's stakeholders as part of meeting stakeholders' objectives and requirements.
- New scope of work, directly related to changes in client's requirements, can have impact on design fees when occurred at any stage throughout the project life cycle. For that, identification and understanding the client's requirements is necessary at the very early stages.
- Late involvement of key participants takes place in all stages with high variability of impact. These participants have a significant role especially in projects that necessitate involvement of external parties or specialists such as operators and interior designers. Therefore, there must be an early coordination regarding this issue between the client, designer and all concerned parties before proceeding with the design development.
- Constructability requirements such as exceeding construction cost, unavailability of systems in the local market, changing systems due the high cost to import, high cost of installation or to speed up construction are all observed mostly at later stages with high impact. These are all development factors related to

overlooking construction requirements at the time when building systems meant to be identified. To that effect, client in project P1 introduced an intermediate preliminary design stage to involve value engineering to assist in providing alternative solutions considering constructability requirements and helping to achieve the target cost. Technology advancement taking place at the tender design stage is considered also as a construction requirement that should always be observed in selecting the building systems especially in cases where design may extend over a long development period span or when systems are not available during design stages.

These changes could've been recuperated or avoided were the associated requirements observed at due stages. This is highly related to the incompleteness of the brief at the time this information was required.

- Aesthetics' aspects change is observed at tender stage with 10% VO ratio. It has been part of changing the skin of the building in project P5 and its occurrence was mainly due to the lack of presentation and visualization of the project at early stages.
- Change of market demand arises at different design stages and causes large impact on the overall project when occurred at later stages. Conducting an adequate and accurate feasibility and market study during the pre-project planning phase with continuous updates could avoid the client serious implications that affected the project's cost and time significantly.
- Changes in the interior distribution of the building's components are one important change feature that is very common during design. Architects considered that the frequent changes in the interior distribution of a building are

considered as part of the coordination between both client and designer for which they are not compensated to a certain extent. Table 10 and the corresponding Figure 4 show the apartments' redistribution for project P1. This requirement was part of the project's objective and was explicitly stated in the design brief (Appendix 1) as:

"To provide a residential product-mix of 2, 3 and 4+ bedrooms apartments"

The client changed his original requirements related to the apartments' types and sizes from 2, 3, 4 and 4+ to be 1, 2, 3, 4 and duplexes in order to accommodate to the misinterpretation of the market demand early during design. This could also be associated to the continuous and updated revision of the market demand conducted by the client. This requirement was fixed by the beginning of the design development stage.

In addition, constraints and procedures on future related changes were set by the land lord in form of contract that should be signed by all new tenants. This contract was established to regulate the apartments' internal modification the tenant may execute after construction completion all under the supervision of the design firm.

Table 10: Project P1-Appartments' Redistribution

Product mix of 1, 2,3 and 4+ bedroom apartments	1 Bed Apt.	2 Bed Apt.	3 Bed Apt.	4 Bed Apt.	5 Bed Apt.	Duplexes	Total
Concept and Preliminary design stages	0%	25%	45%	20%	0%	10%	123 Apt.
	0%	30%	45%	21%	0%	4%	123 Apt.
	1%	35%	52%	11%	1%	0%	123 Apt.
	1%	47%	30%	18%	1%	3%	127 Apt.
	0%	50%	28%	19%	0%	3%	128 Apt.
	0%	40%	38%	19%	0%	3%	127 Apt.
	0%	50%	35%	13%	0%	3%	136 Apt.
Design development stage	1%	47%	33%	14%	0%	6%	131 Apt.
	1%	47%	33%	14%	0%	6%	131 Apt.
	1%	47%	33%	14%	0%	6%	131 Apt.

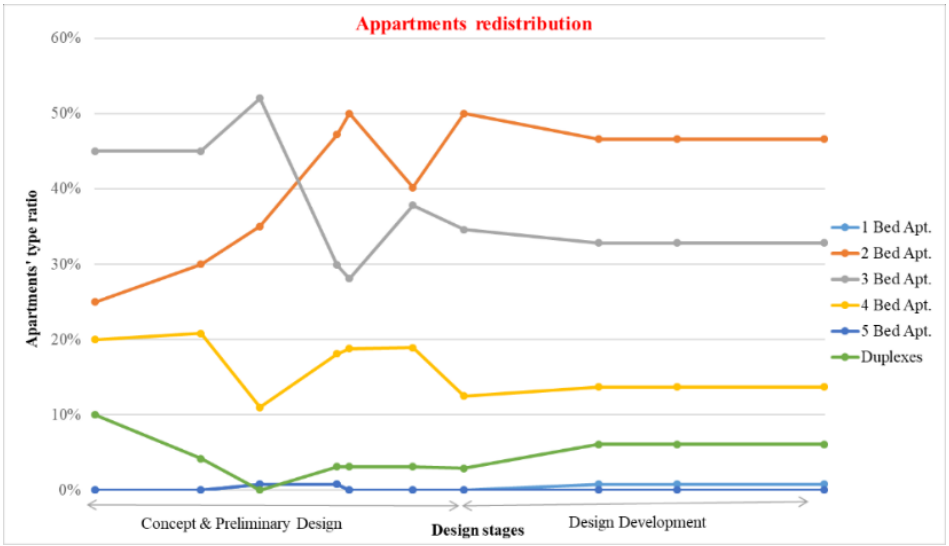


Figure 4– Project P1-Apartments' Redistribution

Based on the interviews conducted with the practitioners, they highlighted on other factors that do not have a direct impact on the design process such as lack of communication between the designer and the client and inadequate time allocated for design. These factors must be thoroughly examined since they might delay the design schedule, and lead to deliver uncoordinated construction documents that do not reflect the client's requirements and cause conflict during construction.

Changes occurred during all design stages for different projects indicate that their associated requirements were incomplete at the time of occurrence during the design process. Incomplete requirements will continue to hit deign fees as long as the designer keep learning about them incrementally. To that effect, at some point in time, these requirements must be identified and fixed to avoid their negative consequences on the overall project performance.

4.3 Dynamic Potential of the Project Brief

No brief is complete at the project onset. Results showed that the development of the brief is certainly required in terms of information procurement and continuous revision and updating. Since the ability to control cost is high during early stages, it is the responsibility of all project's key participants to communicate under the client's supervision to help in clarifying ambiguities and identifying requirements to achieve successful results. However, this doesn't mean that all requirements must be captured and fixed at the early stages. It doesn't also negate the fact that the brief is an ongoing process that keeps on evolving throughout the project life cycle. Therefore, a formulation between these 2 approaches must be set to control the brief evolution. To that effect, it is important to highlight on and introduce what literature review agree on and what is actually practiced regarding the project brief's dynamic potential.

4.3.1 *Literature*

Consultants lean towards fixing the project brief at the beginning of the design with further documentation of the occurred changes to support fee claim for additional services (Rezgui et al., 2003). Clients are always anxious to quickly proceed with no enough time allocated to the project briefing stage causing the brief to gradually evolve and extend throughout the project lifecycle (J. M. Kamara et al., 2002). For that, clients consider the brief as a dynamic document to encounter for any additional requirements that may arise, and that the consultant/contractor are responsible to achieve in order to ensure the client's satisfaction (Rezgui et al., 2003).

The Royal Institute of British Architects (RIBA) Plan of Work 2013 organized the briefing process by limiting its development in three phases: "stage 0: Strategic

Brief" regarded as validation of the client's business case, "stage1: Preparation and Brief" entailing the initial project brief that includes sufficient information to proceed with the design such as the project's spatial requirements, the project's objectives, site information and budget, and "stage 2: Concept Design", equivalent in our study to the preliminary design stage, includes outline proposals, building services systems, outline specifications and preliminary cost information to form the final project brief after which the brief should not be modified. De Jager et al. (2009) argue that RIBA plan of work is not exercised in practice, highlighting on the late changes instigated by clients and stakeholders. On the other hand, Yu et al. (2005) supported RIBA approach and recommended the development of a distinct stage for briefing to identify and define client requirements. This will allow the formulation of a comprehensive brief to prevent any re-scoping, re-design and re-work on projects that may cause loss of time, over-budget or abortive work. The period allocated for the briefing stage depends on the project size and complexity.

Othman et al. (2004) illustrated different adopted approaches to eliminate and control brief changes by giving examples on "RIBA" plan of work, "The process protocol" where the project brief must be frozen after a cririca period, "The Netherlands" considering the brief as an ongoing activity by trying to early identify the critical decisions and leaving flexibility for unresolved issues until the related information became available, and "The Learning from experience" (LEAF) emphasizing on the need to improve the brief based on learning from completed construction projects. Hence, Othman (2005) believes that the brief has to be flexible, well organized, and responsive to the client requirements.

Based on a comparative study conducted by Yu et al. (2008) on the variables having an impact on the briefing process, professionals in the United Kingdom, the United States and the Hong Kong indicate that if the brief is fixed, they prefer it to be fixed right after the completion of the sketch/preliminary design. J. Kamara et al. (1999) agrees also that the brief development starts from the initial statement of needs and combines with other porject design stages to end up at the preliminary design stage.

4.3.2 *Is the brief dynamic in practice?*

Based on our study, interviewed practitioners commented that they cannot ask clients to freeze the design at the project onset. Clients provide designers with requirements based on assumption that are likely to change. For that, expert designers can work out based on these assumptions by always keeping room for changes and then try to find a way to mitigate them. Besides, designers believe that when a controlled flexibility exists, there are always potential for generation of new ideas that allow for innovation and appropriate design solutions to be developed.

Designers believe that they must always meet clients' emerging requirements and users' needs and adapt to other development factors for which designers are entitled to be compensated for extra work. However, this is part of the consultant's management strategy in satisfying their client in order to build a long-term relationship with them. Although consultants are compensated for this extra work, but frequent changes may have a destructive impact on the designers' morale. They also consider that the dynamic potential of the brief must be covered in the contract in terms of additional fees, extension of time and new scope of work. Therefore, the design team must consider the project brief to be dynamic to a certain extent throughout the design process.

It is to be noted that not all briefs evolve throughout the whole project lifecycle. For instance, a well-developed brief does not require a further development rather than clarification, verification and validation of its components. For that, in case of clear briefs, architects proceed in making the building exactly as written in the brief yielding high profits to the consultants.

To conclude, the project brief should be aligned to design stages and requirements shall be gradually frozen at gateways to phases avoiding any potential changes that may cause serious implications.

4.4 Project Brief in stages

Controlling changes/development factors, identifying their involvement and tracking their relation to the brief evolution throughout the project design stages is an area of concern. Although many studies highlighted on the inefficiency in the briefing process and explored the different development brief drivers, authors recommended the need for further research to develop a system to manage the briefing process at early phases. To that effect, a project brief framework aligned at design stages gateways is proposed for the traditional design bid build delivery method is illustrated in Figure 5. This framework functions as an awareness alert to clarify, identify, verify, validate, prioritize and develop the requirements included in the brief components relatively at stages' gateways. This helps in minimizing the occurrence of unnecessary changes and managing variation orders effectively. These requirements are then classified as fixed or flexible, each at the right way and in the right time, in a healthy environment allowing the design to proceed effectively as planned.

Fixed requirements mean that the designer cannot proceed into the next stage of design unless they are fully complete. Otherwise, the design will be based on assumptions that may not be fully accurate. Once the required information is available, a variation order may be initiated depending on the change impact with respect to the stage of occurrence. On the other hand, flexible requirements represent correct but insufficient information for which its incompleteness doesn't affect the design dramatically. However, the designer found the flexible requirements necessary to build on for the next stage. These flexible requirements are further developed by the designer to be fixed requirements based on their active role in a certain stage.

Formal and systematic design reviews must be conducted at the close-out of each design phase to ensure that the up-to-date design meets client's requirements. Client's decisions at stages' gateways must also be frozen and documented to avoid any potential late changes in the client's requirements.

This framework outlines also the involvement of the participants that control the development of the requirements at each stage, the reference document regarded as the updated project brief, the type of activities performed, the mechanisms of the information's exchange, the relative deliverables and the corresponding requirements which need to be validated and fixed relatively at design stages' gateways. This framework comprises 8 stages: Pre-project planning and tendering under the pre-award phase, pre-concept, concept, preliminary, design development, construction documentation and tender documents under the post-award stage. The development of the brief is illustrated as per the below time line for which the dynamic potential of the project brief is examined, and the requirements that need to be frozen or allowed to

evolve are identified at gateways in the context of the design phases that take place along the project life cycle.

4.4.1 *Pre-project planning phase*

The evolution of the brief starts at the time the client foresees an opportunity to build a construction facility. This generated idea is considered as an outline business case where the client justifies his investment. A statement of needs entailing an outline of the client's general requirements is conveyed to the independent client advisor to conduct a feasibility and market study. The aim of this study is to make sure that the client's intended option is viable. To that effect, the outline business case is transformed into a detailed business case confirming that the project fits the client's vision, mission and objectives.

At the beginning of this stage, the outline of the client's general requirements is considered to be the project information (type, title, location); the client's vision and mission and background information; the project's objectives; the development rights (floor space and land use), the budget and the outline programme of work for the project. Noting that only the project location and the client's vision and mission and background information are fixed at this stage, whether all other requirements are deemed to be flexible for later stages. At the end of this stage, project type, title and objectives joined the fixed requirements list.

4.4.2 *Tendering phase*

At this stage, tender documents are prepared by the client's team as means of request for proposal documents to tender for design. It is very important to investigate

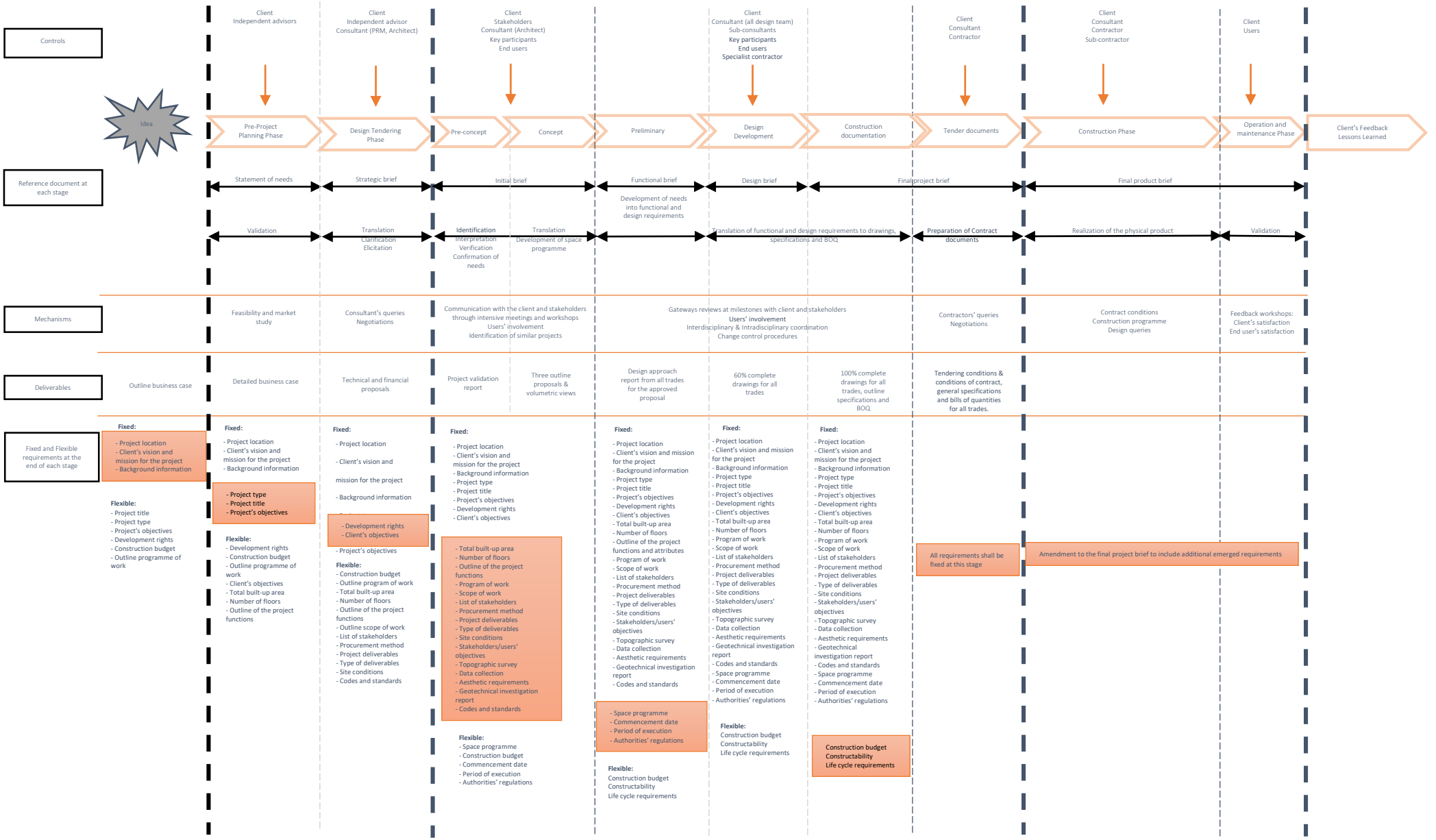


Figure 5–Project Brief Framework

about the client's level of experience at this stage to well estimate the areas of concerns and risks associated with the project for which they must be considered as contingency factors in determining the design fees.

Based on the client's statement of needs and the recommended results of the feasibility and market study, client's brief writers are responsible to write the strategic brief that should include sufficient details necessary for the appointment of the consultant. Based on the surveyed results, the project location, type, title and objectives are the minimum requirements to be included in a concise strategic brief. The components of the strategic brief are developed based on queries raised by the applied consultants during questions and answers period. This includes clarification on the furnished requirements and elicitation for additional requirements necessary for the preparation of both technical and financial proposals. This additional information must cover a project description including the total built-up area, outline of the project functions and the number of floors all subject to validation after further investigation on authorities' regulations. Outline of the scope of work, procurement method, list of stakeholders, project and type of deliverables, site conditions, codes and standards are also needed. These requirements give the consultant a rough idea on the amount of work expected along with the required time and resources necessary to achieve the intended design services. Once awarded and upon discussions and negotiations between both client and winner consultant, the above basic requirements including the consultant design fees are more or less fixed.

4.4.3 *Pre-concept stage*

At the project onset, architects evaluate the brief completeness and write an inception report that sets out the project understanding based on their interpretation of the above-mentioned requirements including their concerns and assumptions on unclarified issues. This document is discussed during the kick-off meeting and regarded as a project validation report subject to client's approval/comments.

4.4.4 *Concept design stages*

At this stage, all project requirements, included in the project brief, are restated and gradually expanded by translating the "non-design terms" into "design terms", in form of plans, setting out of the typical floors and volumetric concepts. Site conditions, topographic survey, site's geographic environment and collected data are validated, authorities' regulations are examined, functional spaces in terms of space programme with schedule of areas and attributes of the functions are explored. Basically, three outline proposals are submitted to the client for which one is approved after conducting several meetings and workshops between client, consultant and all concerned stakeholders.

4.4.5 *Preliminary design stage*

At this stage, all project participants, including sub-consultants, must be on board; users' involvement is very crucial and value engineering has also a significant input. The client and project needs are developed into functional requirements. The full scope of the project is defined. For the approved alternative, all major systems in the building, describing the proposed design approach, are specified and integrated into the

final project proposal serving as planning phases for the subsequent design stages. This stage must also be concluded with a preliminary cost estimate report submitted for client's review. For that, geotechnical investigation report, codes and standards are reviewed, design requirements are identified, technological solutions are evaluated, constructability and life cost requirements are observed.

This stage includes intensive activities since all brief components are evolving and solutions are discussed to add more value. Upon approval of the client on the submitted package, and ensuring its compliance to codes & regulations, the consultant shall submit the approved preliminary design to the concerned authorities, to obtain the required preliminary permit approval, prior to developing the design.

4.4.6 *Design development stage*

An extensive detail of the selected systems in the building is carried out by the design team at this stage. The envelope of the building is fixed, and minor modification of space requirements is allowed only at the beginning of this stage. Technical and operational requirements are developed into design requirements, in accordance with the deliverables, to form 60% complete drawings showing a detailed design for all aspects of the building along with an outline of systems and major materials specifications. Constructability and life cycle requirements must be practiced, key participants and users must be fully involved. The available information of the adopted systems must be conveyed to the client's cost consultant along with the construction cost estimate for their review/comments.

At the end of this stage, the construction cost estimate is revised by the client and should be adjusted, at the following stage, as necessary to meet the client's target. The

client's review at the close-out of this stage plays a critical role since it introduces the preparation of construction documents. No changes in the frozen requirements are allowed beyond this point unless unexpected, uncontrollable and unforeseen conditions may arise.

4.4.7 *Construction documentation stage*

Upon approval of the design development stage by the Client, the design team shall prepare a 100% complete comprehensive package of the construction documents for the project including the detailed drawings, specifications and bill of quantities for all trades. This includes final approval from all stakeholders and end users. This package must ensure the submittal of a complete and coordinated set of documents from all disciplines and the construction of safe, economical, flexible and reliable systems based on latest technology.

4.4.8 *Tender documents*

The consultant shall prepare the tender documents required for the project, per project component and for all the trades. These documents are composed of the tendering conditions & conditions of contract, general specifications and bills of quantities for all trades.

Material & systems are specified taking into consideration availability, constructability, and ease of maintenance. The principles of cost effectiveness must be strictly observed. The tender documents shall set forth in detail the complete requirements for construction of the Project. Tender packages shall be identified and prepared in close coordination with the client.

4.5 Development of the brief throughout the project life cycle

To conclude, Figure 6 shows the briefing process throughout the project life cycle defined as the formation of the brief where the client's and project's requirements are developed into design solutions which in turn are realized into the final physical product. This process starts when the client foresees an opportunity to build a construction facility which is generated into an idea. This idea is then transformed into statement of needs or an outline business case that is validated through a feasibility and market study into a detailed business case. The detailed business case combined with the statement of needs and additional emerged requirements are consolidated into a strategic brief. This is considered as the first client's attempt to translate and describe his possible requirements into a formal document. The strategic brief is developed with all consultants participating in the tender during questions and answers period. Upon selecting the winner consultant and after negotiating and signing the contract, the pre-award stage is initiated. At the pre-concept stage, the consultant proceeds with his interpretation on the strategic brief to form an inception report. This is regarded as the consultant's project understanding that must be confirmed by the client before submitting the three outline proposals forming the deliverables at the concept design stage. Upon the client's approval on one proposal, the initial brief is created to include the fixed and flexible components specified in Figure 5. Once confirmed, the design team proceed in selecting the building design systems that forms the functional brief at the end of the preliminary design stage. At the start of the design development stage, the functional brief is developed into design solutions to include the design drawings, bill of quantities, and specifications forming the design brief. During construction documentation and tender design stages, the design brief is translated into the final

project brief announcing the end of the design process. The final project brief must include all the requirements taken into consideration during design for which are reflected in the product of the design phases regarded as the tender documents.

Yet, the development of the brief is not finalized at this stage, further VOs may be initiated due to the arise of additional requirements during construction. At the construction stage, the design product is going to be realized into a final physical product. The final physical product of the construction phase is the built-facility which reflects the further amendment on the final project brief to end up with a final product brief regarded as the as-built brief.

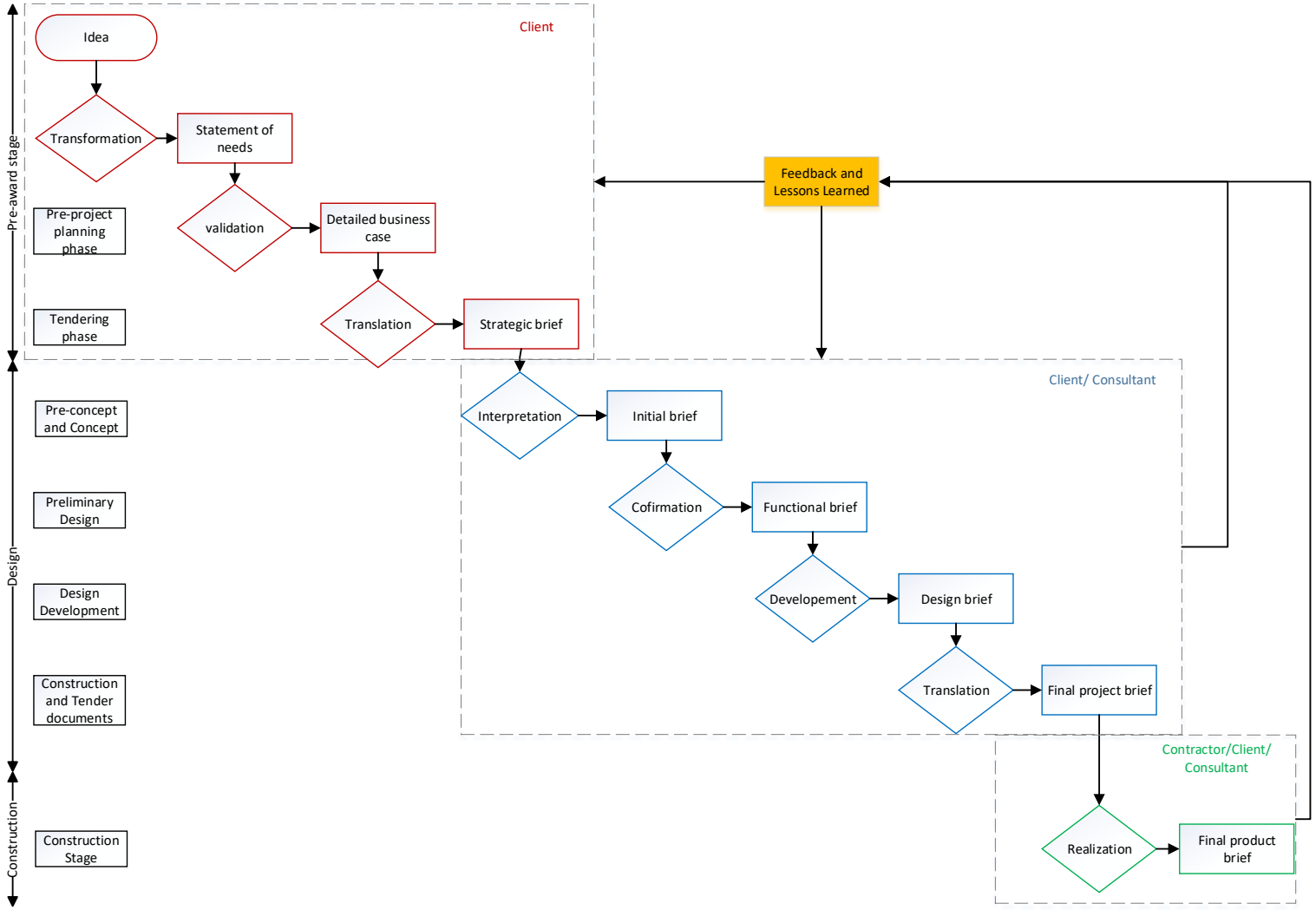


Figure 6–Project Brief Evolution

Lessons learned must be captured at the design and construction completion to feed forward in future projects. This will help in adding more value to the client by improving the design process and minimizing the chances of encountering changes during construction being a major factor of claims and disputes.

4.6 Summary

Whereas literatures agreed on the dynamic nature of the brief, they failed in elaborating more on this issue and were satisfied in explaining what should be done and not how it should be done. This research succeeded in developing a brief structure that sets and aligns explicitly and precisely the project's requirements at design stages gateways and helps in properly managing and controlling the brief evolution based on different development factors.

Since more effort needs also to be exercised to understand the client needs, the only way is to educate the client based on a clear structure that displays explicitly all the necessary requirements helping to generate a well thought out project solutions.

The proposed brief framework can be applicable to every scale project and customized according to the culture of the construction industry (consultant, client, contractor). This can be achieved by tackling the major faced challenges and difficulties that are reflected in the change types that took place, along with stages of occurrence and their implications on the design fees in terms of variation orders. Being the case, the next step is to investigate the changes' causes and attribute them to the project's requirements. Aligning these requirements is the final step to develop an effective mechanism to manage the inevitable changes in requirements which allow for tracing and correlating the history of design decisions to the evolving client's requirements.

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

Being the first interaction point between the client and the design team, the project brief, being verbal or written, should be thoroughly interpreted considering it as the control point that gives the project a strong start.

This study explored different project brief formats and types encountered in the construction industry. It is recommended that a brief must be more generic by focusing on the client's and project's objectives and less constrained by including minimal information related to functional requirements. This allow the designer to be more creative in generating innovative solutions.

Results showed also a high correlation between the client's level of experience, the brief quality (format and type) and the designer's role in formulating and developing the design brief throughout the design process.

At the project onset, the completeness of the brief must be verified by the design consultancy team under the lead of the architect. At the initiation of the design, all project participants must be involved to generate well-coordinated and correct design solutions.

This study presented a comprehensive brief structure that includes a complete representation and explanation of the brief components allowing for an early identification and clarification of the project and client's requirements. The brief components are mainly considered as the client's objectives, project's goals, site information, authorities' regulations, users' requirements that combine with each other to produce the design requirements that must comply with codes and standards and

account for construction and lifecycle requirements. The relative project deliverables must meet the scope and programme of work according to the adopted procurement method all by maintaining a good balance between time, cost and quality. Each requirement must be identified in real time according to its active role at the relative design stage.

In addition, our study investigated the different development factors/changes that determine the dynamic potential of the project brief. Inspection of results showed a direct relation between the emerged changes/development factors of the project brief and the variation orders claimed by designers. Clients use variation orders process to adapt to the influence of the brief evolution's factors.

A high correlation is found between types of changes, their relative VO percentage ratio and their impact on the design process, in terms of cost overrun and time extension, with respect to their relative stages of occurrence.

Change types were summarized and attributed to their corresponding brief components along with mitigation measures to control or eliminate the changes' occurrence. The distribution of these changes is strongly considered to investigate the dynamic potential for their associated requirements throughout design stages.

Accordingly, a project brief framework was developed to assist organizations in better identifying the brief components and controlling the development factors responsible for the evolution of the brief. Integrating these different factors in the briefing process allows for innovation to take place rather than focusing on exploring them while proceeding with the design.

Furthermore, the proposed framework has combined both fixed and dynamic brief views by aligning requirements as relevant at each design stages' gateways. This

must ensure a proper communication and mutual understanding between all projects participants and a constant flow of information throughout the design process. Moreover, using this framework helps improving the decision-making process in making the right decisions at the right time.

To better enhance the effectiveness of the dynamic brief framework, there must be a full integration and collaboration of all decision-makers and key project participants. This requires an early identification of all key project participants to allow the formation of the integrated team during the early phases of the design process. A full support and commitment of the client, considered as the core element in the construction industry, must also be secured to assure a successful implementation of the proposed brief framework.

Consequently, consultants, in coordination with clients and stakeholders, will be able to control or eliminate the occurrence of many late changes caused, for instance, by newly emerged client's requirements, disregarded site conditions, late involvement of end users and project's key participants, lack of observing constructability and materials' availability and ignoring the technology advancement. This results in shifting the decision-making process to the early design phases, where the ability to control the basic project objectives represented mainly by time, cost, quality and function is high. Ensuring a healthy environment for the implementation of the dynamic brief framework will also aid maintaining an ideal distribution and representation of the requirements that reflects a proper evolution of the project brief throughout the design process.

For future research, this study can be extended to include a larger sample of projects covering considerable types of the potential changes that may occur during

design stages. These projects must have a proper documentation on the changes occurred during all design stages along with their impact on the design process. The proposed brief framework can also be applicable on a real-life project from early stages to experiment its validity.

Finally, considering that the briefing, design and construction are integrated, future research is also recommended to involve the construction stage and analyze the reasons of the initiation of variation orders that cause disputes and claims so that more brief evolution factors could be accounted for during design. This would serve the project better and save the client serious implications in terms of time, cost and quality.

APPENDIX 1

PROJECT BRIEF TEMPLATES

The block xxx site area is approximately 5,000sq.m. with a total allowable BUA of 53,200sq.m., where development manager intends to develop a high end residential twin towers project on two sites (plots 01 &02)

Competition Program

Design to offer a Unique Living Experience Concept in total BUA of 53,200 sq.m.

Space Program

1. *Ground floor*

The design shall offer visitors and tenants a breathtaking view to landscape area…

- *Drop off area*
- *Few outdoor short-stop parking spaces per tower*
- *Parking access ramps*
- *Entrance lobbies 1 to 2 story height*
- *Physical separation between lot xxx and lot xxx*
- *Main street commercial spaces to have a separate entrance than that of the apartment blocks*

2. *Apartments*

The design consultant needs to enhance the client wish to design a vertical village.

- *Enhance the client wish to design a vertical village*
- *Apartments could range in area between 200 to above500 sq. meters.*
- *Apartments must benefit from north and south exposure for natural day night*
- *Clear height in apartment living space should not go below 3.20m*
- *Master bedroom (15%-20% larger than the regular bedrooms) with private master bath and walk-in closet*
- *Bedrooms (22-28 sq. meters) with a private bathroom each*
- *Family room, naturally lit and of the size of a bedroom, which could be converted into an additional bedroom if necessary*
- *Reception area (at least 8x10m in area)*
- *Dining area accessible from pantry*
- *Guest bathroom (no shower needed)*
- *Service areas: Kitchen (including pantry) Breakfast area with a view; Maid's room and WC (including shower,) Laundry room and drying area, Storage space*
- *Simplexes, Duplexes and penthouses or sky apartments*

3. *Basements*

The design should achieve the most economical basement layout and allow for landscaping on top.

- *May extend over a number of floors to house common services, storage areas and parking spaces*
- *Visitors parking within plot 1802 separate from that of the residents*
- *60 sq. meters apartment (including 2 rooms, 1 bathroom and kitchen) for the building attendant*
- *Drivers' rooms should not exceed 10m2 (1 per apartment). Drivers' rooms will have no natural light*
- *Parking spaces (as per requirements below)*
- *40 visitor's parking spaces*
- *Private storage rooms (1 per apartment) with a minimum area of 8m2 and max of 10 m2*
- *Technical rooms to accommodate transformers, generators, fans, electric boards, and garbage rooms.*

Car Parking requirements: the following are the owner, law and authorities:
Housing

- *2 car spaces for every apartment up to 225 sq. meters*
- *1 additional car space for every additional 60 sq. meters of larger apartments with a maximum limit 4 car spaces per apartment*

Retail

- *1 car space for up to every 60 sq. meters*
- *1 car space for additional area increments equal to or more than 20 sq. meters*

Additional requirements:

- *25 additional car spaces for tenants*
- *40 additional car spaces for visitors*

4. *Clubhouse and other common facilities*
   - *Gym/Health Club*
   - *Indoor or outdoor pool area (+supporting services)*
   - *Indoor/outdoor playground*
   - *Sauna, steam and massage rooms, toilets, showers and changing*
   - *A Property Management office area must be accommodated for, including: 1 Manager's office, 2 staff offices, 1 technical engineer's office, Storage space for equipment and spare parts and Services (Kitchenette and WC)*

Objectives

- *To propose architectural concept that may enter competition for good architecture*
- *To design high rise tower coupled with limited retail on the ground floor*
- *To design the tower in compliance with authorities' requirements*
- *Propose a design that can obtain LEED certificate*
- *To provide a residential product-mix of 2, 3 and 4+ bedrooms apartments*
- *To accommodate the applicable requirements for car parking*
- *Admit light and views from areas outside the sector (mainly the sea) to inner parts of the sector*

Attachments:

- *Development brief*
- *Conditions of Contract and Scope of work*
- *Feasibility and market study*
- *Topographic survey*
- *Geotechnical investigation report*

Design brief-Request for proposal documents-Project P1

Attention: Mr. xxx

Project: xxx

Subject: Letter of Invitation to Tender for Design Services and Construction Supervision

Dear Sir,

It is the intention of xxx Company SAL to develop and construct its tower to include an Office/ Residential tower. The project is located on an approximate 7,100 sqm land lot located to the left of the xxx in xxx. The area zone is xxx and the maximum allowed height is 190 m. The total built up area shall be around 53,260 sqm distributed over 3 basements, GF and 40 floors. The project shall provide a residential product-mix of 1, 2, 3 and 4 bedrooms apartments.

For further information, please refer to:

xxx
Address: xxx
Tel: xxx

Attachment:

- *Site Location*

Project Site Location

Invitation letter template-Project P2

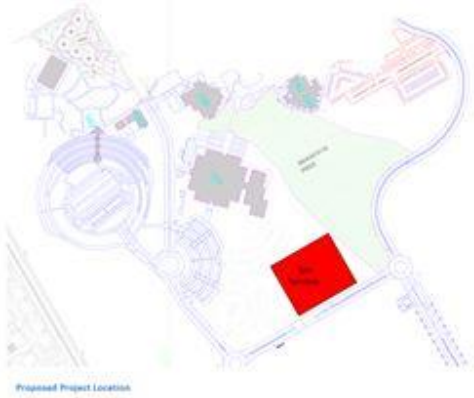
The design consultancy firm for the proposed project has to provide comprehensive services for Conceptual Design, Preliminary Design, Detailed Design and Construction supervision for xxx Building with gender segregated entrances for Male and Female students. Specified development area is mark on the attached University master plan. Estimated total built up area is 27,000 square meters consist of:

1- Capacities with respect to the number of people that occupies each function for:
- *VP Office*
- *Career service Center*
- *Center for Advising & Retention*
- *Student Counseling Center*
- *Student Learning Support Center*
- *Student Information System*
- *Student Services*
- *FAO*
- *Admission Department*
- *Registration Department*
- *Shared Facilities*
- *Other Supported Services*

2- External (Soft and Hard Landscaping)
3- Basement Car Park

Objectives:
The building design process to be considered enhancing to qualify the maximum possible score level under the xxx Sustainability Assessment System 4-star ratings and to meet Green Building design process requirements. This project will be implemented under the Building Information Modeling (BIM) environment from the design up to the execution of the project contractor.

Attachments:
- *Conditions of Contract and Scope of work*
- *Site Location*



Scope of work-Project Description-Request for proposal documents-Project P3

In order to select the consultancy firms that best fulfil their objectives and provide the highest standards of professional services, xxx Bank wishes to receive proposals for Design & Supervision services and other associated consultancy works for its new Headquarters in xxx. The vision of xxx Bank is to have a design that portrays an image of strength, transparency, and dynamism which is the perception of the Bank in the market, and that is consistent with its motto: "xxx".

Design Guidelines and Objectives

- *The design will need to be guided not only by functional, technical and economic requirements, but also by aesthetic and symbolic considerations.*
- *It is desired to achieve a building demonstrating the principles of well-conceived economy, sustainability and an application of alternative forward-looking technologies and energy sources.*
- *Ensures structural safety, stability, and serviceability.*
- *Serves as an iconic structure .....*
- *Portrays a unique style .....*
- *Optimizes both concepts of functionality and user-comfort.*
- *Provides an efficient, functional, and pleasant working environment ...*
- *Provides adaptability and flexibility in the space....*
- *Provides the necessary safety and security measures....*
- *Is delivered within budget limitations and provides good value for money, without compromising the delivered quality*

Design and Space Requirements

- *Façade design to project an image of strength, transparency, and dynamism which is the perception of the Bank in the market*
- *Building design requirements*
- *Most important branch of the bank*
- *Two entrances.*
- *area of minimum 800 m2 to 1000 m2*
- *A height of minimum 3.75 m net is preferable on the General Management floors (even more if possible).*
- *An auditorium that can seat about 250 people*
- *General Management space should include offices for the xxx Group Chairman, should also include offices for 10 additional deputies and advisors.*
- *Chairman of the Bank, 3 General Managers, the Secretary General, and a board room that can seat up to 25 persons.*
- *Individual secretaries' offices*
- *at least 3 meeting rooms and other services such as kitchenette and easily*
- *accessible restrooms*
- *a cafeteria and if possible, an area which can be used for receptions on the roof.*
- *many parking spaces as possible underground distributed along 3-4 basements*

Request for proposal documents-Project P4

Construction Budget

- *The total construction budget is not to exceed 40 million USD for the project.*

The site

The site is situated in xxxx. The total site area of 2,669 sq.m. is currently unoccupied.

The site's geographic environment consists of:

- *Rainfall: xxx*
- *Temperatures: xxx*
- *Earthquakes: xxx*

Project Description (Authorities requirements)

- *The maximum allowed height is 40m.*
- *The maximum site coverage area is 70%.*
- *The net max foot print is 1,868m2.*
- *The allowed net development right is 14,500 m2 (One Building)*
- *The site is best described as trapezoidal in shape.*

Authorities' Development Brief and Requirements

Programme and scope of work

Dear Sir,

xxx real estate developer would like to construct two separate towers / buildings approximately BUA for each tower is 24,000 Sqm. One for office and retail support and another one for four-star hotel & serviced apartments.

the Project will contain two main functions (Hotel and Offices) in addition to other commercial functions at the ground level and its mezzanine where these functions shall be dedicated for serving the project itself as well as the surrounding community.

You are kindly requested to proceed with the preparation of the program development for this project for which we aim to develop with an inspiring architectural design that takes advantage of the excellent & prime commercial location of the site and reflect xxx vision.

The site area is 10,000 sqm and it is located adjacent to xxx in xxx.

For more information, please contact:
xxx
Tel: xxx

Attachments (received by e-mail):
Feasibility Study
Development advisory
Site

Request for proposal document-Project P5

"Our existing six modular office blocks look old-fashioned and don't reflect the company's vision and the surrounding modern and exclusive buildings. Since we have an adjacent land and the funds are available, why won't we develop a new office building that comprises all functions in one block."

Verbal brief format-Project P6

Project: *Development of xxx old building*

Site Data

Location: xxx

Street: xxx

Area: 4338 sq.m

Code review

Zoning: xxx

FAR: xxx

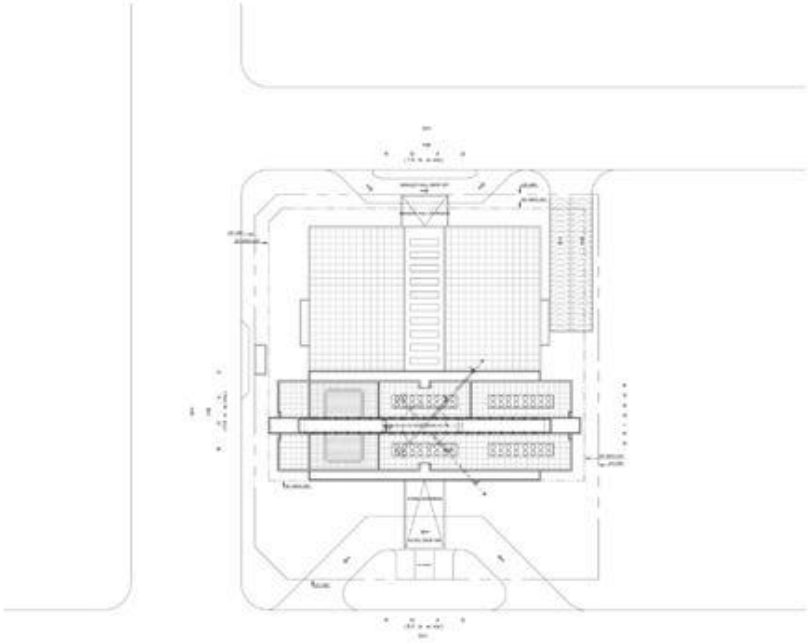
Horizontal exploitation: xxx

Height: GF+ Mezzanine+ 9 Floors (Total height 40 m)

Setbacks: front side= xxx

Lateral sides= xxx

Back side= xxx



Invitation letter template-Project P13

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