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RESEARCH ARTICLE

Client briefing issues and problems for requirement elicitation and validation: A survey among architects

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Abstract

Briefing is the process of determining requirements through communication between an architect and a client for project success. Essentially briefing utilizes knowledge management tools and techniques. This study aims to explore the issues and problems of briefing with a focus on requirement elicitation and validation by investigating the attitudes and approaches of industry practitioners. A literature review was conducted to design the questionnaire survey and interviews. A survey in three themes: organizational information, knowledge capturing in briefing, process for requirement elicitation and validation has been applied to 24 respondents, and 11 interviews were held with open-ended questions. The survey was conducted among the members of the Turkish, İstanbul, and İzmir Association of Architects in Private Practice. Interviews were held with architects (founder/partner) from Ankara. Issues, problems, methodologies for requirement management, and knowledge processes were explored. The involvement of the user in briefing and the experience of stakeholders are important for project success. Furthermore, the knowledge processes: of capturing, indexing, recording, and archiving are used for requirement elicitations. Using comprehensive frameworks for briefing and technology like Building Information Modelling may increase the benefits; however, the awareness of architects in this field is low. Discussions about the issues, problems, and success of briefing processes were held to state the requirement management approaches of architects. The study implicated the importance of requirement validation before and during the design process, the difficulty of capturing knowledge from the client, and assuring the user's involvement with proper experience level in the briefing. These may be used to improve practical studies on requirement management. Furthermore, the study is an actual record of vocational practices, so with the implementation of other research, it contributes as a comparison and evaluation point.

1. Introduction

The term "briefing" in construction projects can be defined as a process for continuously eliciting and validating requirements and matching them with the proper stages in the right schedule. Thus, managing requirements is one of the critical objectives of the briefing process for capturing, analyzing, testing, and validating the knowledge about client needs. Briefing is also critical for successful construction delivery; however, it is difficult to accomplish effectively. Project requirements form the knowledge base that is a product of the project environment and the relationships between project stakeholders. Throughout the literature survey, many studies were found on the briefing process seeking

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frameworks, gaps, and problems by looking into the issue from theoretical and practical perspectives. Studies about the requirement processing on design projects and implementing knowledge management principles into project phases are presented. Architects continuously try to improve the briefing processes to capture and evaluate the requirement knowledge from the client or other project stakeholders. More research efforts must be targeted to improve knowledge capturing and identifying effective tools and techniques in the construction industry [1]. Exploring the knowledge capturing techniques and barriers to improving client satisfaction [2] and defining the themes and subjects from literature about the interaction between architects and end-users for specific building typologies such as housing [3] contributes to these issues of client briefing in the design process. However, industry practitioners' approaches and attitudes in the requirement management briefing process have value and potentially useful statements for implementation. In this research, a survey and a series of interviews explore the important issues, advantages, difficulties, and problems of requirement elicitation methods and processes in client briefing processes. Briefly, the literature survey and research on contemporary strategies are presented, which are used for structuring the survey and designing the framework for interviews.

Actual practices in the industry are valuable for determining important issues and knowledge gaps in the intended sector and field. For Türkiye, some survey studies about the construction industry can be found. Some of these studies focus on the investigation of commissioning practices in the construction industry [4], knowledge management practices in architectural companies [5], and the investigation of the BIM usage ratio of architectural and engineering companies [6]. However, a survey study or theoretical framework exploring the practices of briefing and knowledge processes to elicit and validate requirements among industry practitioners is absent. Thus, one of the main objectives of the present study is to measure and evaluate research outcomes of briefing and knowledge processes on industry practitioners; the other is to define or discover possible issues, problems, and approaches faced by architects while executing the project cycle.

The research framework is shown in Fig. 1. First, through the research on literature, issues, procedures, gaps, and problems were explored and analyzed. Based on the outcome, the main variables of the questionnaire and semi-structured interviews were defined. The questionnaire survey was structured with the definitions of the sample group, limits, and procedure and then initiated within a specific period. The limits and the main framework of interviews were prepared to utilize the advantages of semi-structured interview techniques and were held after the completion of the survey. The analysis and evaluation of the survey and interviews were made individually, and the results were merged finally.

2. Theoretical Framework

Briefing is understanding a person's or organization's needs and resources and matching these to their objectives and mission within a structured process [7]. It starts with the inception stage and does not end after completion, where it also runs through the evaluation of project results. The brief is a product of this process at every stage. It is a formal document that is the medium for expressing or communicating the objectives and needs of the client [8]. The documents may be frozen and stiff, or they may be developing documents according to the changing circumstances for project and project success. Briefing is a set of defining objectives, methods, and instructions in which different parties play roles. It is also a sub-part of the whole briefing process. Briefing is a tool for collaborative work for clients, contractors, and designers.

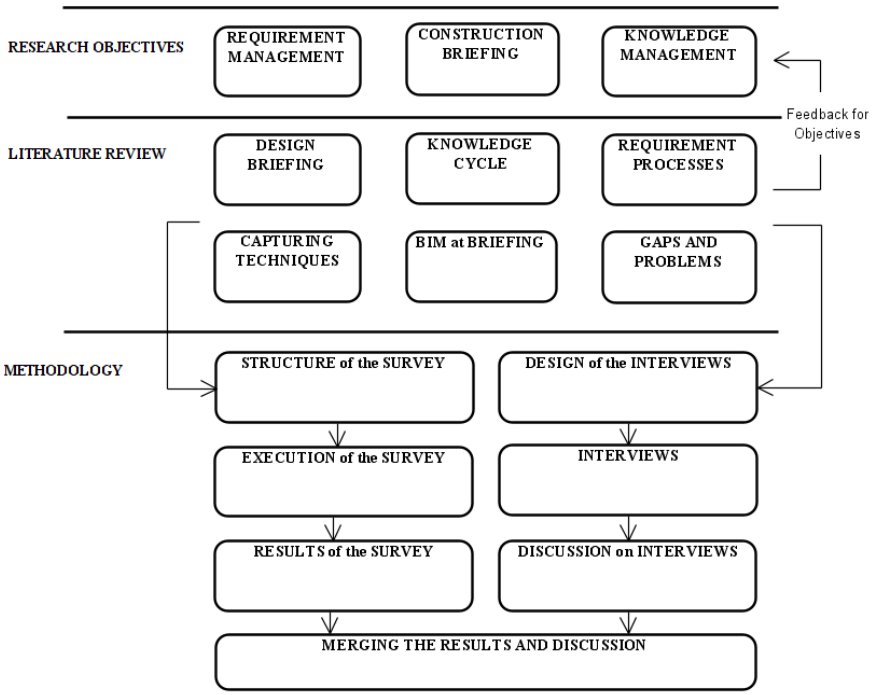

Fig. 1. Research Framework

The aim of the involvement of the client and contractor in briefing is to increase collaboration leading to innovation and efficiency in planning and production [9]. An important goal of the design briefing process is gathering knowledge about client requirements and delivering the design project accordingly [10].

Requirement Management is related to documentation, storage, communication, tracking, and traceability, whereas Requirement Engineering includes elicitation, analysis, prioritization, specification, and validation [11]. This knowledge comes from the Software Engineering discipline, which has dealt with requirements more in the last decades than any other sector due to rapid technological improvements. The whole process could be identified as requirement processing, and most of the authors assumed that the briefing term is a process of identification, articulation, definition, and registration of design requirements [12]. The briefing process could be conducted before and during the design process or continue throughout the project life cycle (Figure 2).

Knowledge Management (KM) concerns optimizing knowledge at the organizational level through diverse tools, processes, techniques, and technologies to increase performance and value and have a return on investment and competitive advantages [13].

Fig. 2. (a) Briefing before and at the beginning of the design process (b) Briefing throughout the project life cycle [12]

Business sectors and researchers increasingly recognize KM approaches, which provide organizations a competitive advantage for meeting objectives against project requirements [14]. KM is a continuous process of managing knowledge to create value, increase productivity and gain competitive advantages with the steps of identification, optimization, and active management by meeting existing and emerging needs [15,16]. The construction industry realizes the benefits and necessities of KM as other sectors; and implements and develops the approach in various project processes. The knowledge cycle is the creation and sub-processes, including capturing, archiving, understanding, and reuse of knowledge. Presentation of the cycle and processes differ by individual researchers. However, they are generally considered a continuous loop for knowledge gathering and refinement. Knowledge is captured from a source (individuals, group, world, etc.) with a technique or method, and then is archived since, for reuse, it must be found and understood, and finally, the knowledge is created with refinement [10]. Good KM practices start with knowledgeable project stakeholders. Those supported by integrated information and data sources result in a satisfactory decision-making process [17]. Various researchers and practitioners examine knowledge typology due to different scientific facts and approaches. Among the requirement knowledge for building projects, briefly, client, site, environmental, regulatory, design, and construction requirements can be stated [18].

The Architecture, Engineering, and Construction (AEC) industry has long sought techniques to decrease project costs, increase productivity and quality, and reduce delivery time [19]. With the developments in Building Information Modelling (BIM), a virtual model of a building consisting of 3D geometry and semantic data of building elements makes it possible to analyze, simulate and develop the project digitally before the construction stage. BIM is not only a technology change but also a process change, by enabling a virtual building represented by intelligent objects that carry detailed information BIM alters all of the key processes involved in building project life cycle [20]. The core function of BIM is to provide users with the ability to integrate, analyze, simulate, and visualize a facility's geometric or non-geometric information [21]. It is also a convenient tool for managing data flow between project stakeholders [22]. One of the important features that BIM brings along is enabling a useful and meaningful communication environment between the architect and the client. As the models are a virtual prototype of the building in the pre-design and final design stages, it is possible to set mutual understanding in the briefing process. Tessama [23] explores the BIM tools and conventional drawing methods and identifies specific improvements BIM brings to architect-client communication. Cloud-based systems of BIM are widely used by project and construction teams for communication and coordination; it seems to be a part of the briefing process.

3. Why Is Briefing Needed?

3.1. Requirement management

Briefing (also known as architectural programming in the US) is a process through which the client informs others of their needs, aspirations, and desires for a project [24]. Defining the project's requirements, followed by the design and production of the building according to these requirements, are crucial tasks for the construction industry. In the traditional approach, the requirements are defined by the client and/or advisors at the initial stage with limited participation of project stakeholders. In some applications, these requirements are fixed and used to implement a design; and in the rest, the requirements are changed and developed throughout the construction project. The problem is to define and compound the gap between the paying client, the user client, and the designer through a successful briefing process regarding requirements. There are communication gaps between paying clients and user clients and designers and user clients [25]. Requirement Management is mainly issued under the briefing term. It is critical for the

successful delivery of construction and hard to accomplish in its effectiveness [26]. Construction clients want projects that maintain accurate designs regarding their demands at appropriate times and budgets. Client demands are defined and stated as a client requirement by the briefing process that project stakeholders establish. However, the construction industry performs poorly in addressing these requirements owing to the uncertainty and complexity of project briefs [27]. In addition, capturing and translating the knowledge from clients to designers or designers to clients are important problem areas for successful requirement processing resulting from lack of time, framework, expertise, etc.

3.2. Cost and time

The client's satisfaction could be achieved by translating the client's needs into a design that specifies technical characteristics, functional performance criteria, and quality standards while completing the project within a specified period and in the most cost-effective manner [28]. Briefing is important in communicating clients' requirements to the design and construction teams, and the briefing process represents a cornerstone for achieving client satisfaction [29]. A construction project's budget and planned schedule are estimated in the earlier project stages (inception). The briefing is for the management of the process utilizing good decision-making. The cost and time parameters may change as the project develops according to inputs. The cost of the change orders and decision revisions increases as the project progresses; simultaneously, the potential for saving decreases and ends with the completion of the project. The briefing is a useful process and tool for identifying the budget-project schedule at the initial stage and balancing the negative effects of the change orders on the project at the execution stage. Managers responsible for the briefing will need to strike a balance between these two forces, allowing the user to have alternative options until the last responsible moment while giving the project team the relevant information at the appropriate stage of the project [7].

3.3. Communication

The strength of the relationship between different actors and their ability to work together is crucial for the construction industry. A good relationship may have various reasons, but it can be provided by only good communication. Communication is the sharing of meaning to reach a mutual understanding and to gain a response: this involves some form of interaction between a sender and receiver of the message [30]. Briefing is a tool, and it is at the center of communication between the client and the designer. It affects the information flow between parties, resulting in qualified information. Communication management is a part of project management that deals with the process of systematic information exchange between project parties, which is essential to identify goals, requirements, and objectives of communication and to coordinate project participants effectively [31].

The communication process benefits from accurate knowledge transfer in a short time and with minimal effort. The mutual semantic attitudes of the sides influence the exchange process between the sender and receiver. With the gathering and decoding of the message, the response is crucial for effective communication. Emotional impact and the content of the message should, therefore, be in balance where equal value is considered. Thus, the components of information: semantic, emotional, and technical levels are critical for communication [32]. The structure of information makes it possible to codify complex and detailed data and distribute it to a wider area. As a tool for capturing knowledge via communication between stakeholders, the briefing should consider the semantic, emotional, and technical factors of effective communication.

In this context, Bogers [33] tries to identify the perception of briefing documents by architects and to formulate recommendations for improving the briefing process as a better communication tool, which is listed as allowing architects to comment on the brief, getting consistency and completeness of the brief checked, being clear about the priorities of the project and status of requirements, focusing on the unique or specific requirements of the

project, and including not only quantitative but also qualitative requirements.

3.4. Project success, performance and evaluation

Baccarini [34] identified project success in two components: project management and product success. He stated that the criteria for measuring project success must be set out at the beginning of the project. Otherwise, different team members will find themselves traveling in differing directions, and one or more might perceive the project as a failure. The success of a project could be linked by the logical framework method (LFM), which defines the relations of subparts for project success evaluation [34]. Product success is related to the goal and purpose, and project management success is related to the output and inputs. The whole success is defined as project success. For identifying the criteria for project success, there are two important keys. One is the method or framework of selection, and the other is gathering the success attributes. The briefing is a powerful tool for maintaining information, controlling information flow, and managing knowledge between project stakeholders. Moreover, commissioning practice is vital to evaluate the activities and whether the final construction situation meets the owner's requirements [4]. Requirements could be defined and tracked by only the briefing process.

The project's performance, determined by feedback, includes information on the project team's performance and the building's performance against the desired project outcomes [35]. An intended comparison between the performance of the building and the desired objectives is possible by an intelligent briefing approach that connects project outcomes with the strategic definition phase of the project.

4. Methodology

In social research, survey studies ask many people questions about their behaviors, attitudes, and opinions [36]. The questions, sample group, and survey procedures should be developed according to the objectives of the research study, respectively, with consistency and accuracy. Commonly, samples are surveyed through questionnaires or interviews, which can vary from highly structured questionnaires to unstructured interviews [37]. The themes aimed to measure, obtained from literature synthesis, should show the relationship between facts. Quantitative approaches seek factual data to study how such facts and relationships accord with theories and findings of any research executed by literature [37]. Thus, this study developed a structured questionnaire to measure and evaluate the important issues, advantages, difficulties, and problems of requirement elicitation and validation methods in the client briefing process among architectural practitioners in Türkiye. Furthermore, two open-ended questions were implemented as part of the survey to understand respondents' thoughts about the issue qualitatively. The survey's main objective is to state the facts and relationships underlined in the literature survey for improving the briefing processes. Findings from the previous studies were measured and tested on how and to what degree parts of the research questions are.

The survey consists of a multiple-choice questionnaire and open-ended survey questions for both gathering information on choices and progress and for expanding the research by the involvement and expression of the contemporary practices of the participants. The survey is divided into three themes. The first theme is related to organizational information, the second is for knowledge capturing in the client briefing process, and the last is related to the requirement elicitation and validation process. The survey was held among the industry practitioners (architects) who participate in the architecture design process and manage the knowledge from the client briefing process. The instructions and explanations were stated on the notice and survey approval page to underline the study's objective. The questionnaire was delivered to respondents via Middle East Technical University (METU Survey) online survey system based on LimeSurvey web tool [38]. The survey was announced through the Turkish Association of Architects in Private Practice (TSMD), İstanbul

Association of Architects in Private Practice (İstanbul SMD), and İzmir Association of Architects in Private Practice (İzmir SMD).

Interviews are one of the most effective methods for collecting data from respondents. The focus group of interviews was decided according to the research objectives. They can be considered an additional data source for the research due to the communication difference from the questionnaire survey. The communication may be one-way or two-way by designing the framework of interviews according to the survey's objectives [39]. The knowledge about industry practitioners' position on the research interest was collected using a questionnaire survey. Semi-structured interviews were held with industry experts with the implementation of pre-results of questionnaire survey for underlining possible problems of requirement management and focusing on specific problem statements. 11 interviews were completed with the architects, who were partners of or had a design company and had at least five years of experience in practice.

The structure of interviews may result in a condition that only the answers to questions can be taken. Semi-structured interviews maintain communication for collecting data and contributing to the research. In this context, interviews were planned in four parts with no strict boundary in the session, in which the approach of the interviewees can be understood. The subjects and objectives of the parts are listed below;

Part 1

- Duration of experience
- Typology and dimension of projects
- Client typology
- BIM and CAD usage
- Project management approach
- General requirement processing procedure

Part 2

For the situations in which the client gives the project requirements in detail, the items below are investigated;

- Analysis procedure of requirements
- Methods of working on specifications
- Interpretation methods of the requirement into projects
- Tracking approach and validation of requirement to proposal with or without client
- BIM or technology experiences in this process

Part 3

For the situations in which the client does not give the project requirements in detail, the items below are investigated;

- Requirement elicitation procedure
- Requirement presentation and validation methods
- Usage of design proposals to visualize the requirements
- BIM or technology experiences in this process
- The problem of working on requirements without getting any approval

5. Findings of the Questionnaire Survey

The survey was conducted between 23/06/2021 and 17/09/2021. The survey announcement was made twice by e-mail and mobile contact groups for the above-mentioned communities. 106 users have reached the survey page; however, 82 preferred not to complete it. Although the response rate is low, findings show that 24 participating industry practitioners presented important views, cases, and facts.

5.1. Respondent profile and organizational information

The respondent profile is stated as; working as an architect/project coordinator/partner at an architectural design company/office in Türkiye. All the 24 respondents taken into consideration suit the criterion. 20 are from Ankara, two are from İstanbul, and two are from Adana. Participation from İzmir or any other city did not exist. Most respondents have ten employees or below and have completed over 100,000 m^2 projects in the last five years. Four companies have over twenty employees, and five have finished projects below 50,000 m^2. The respondent's group has a representative feature while comparing and evaluating employee numbers and completed work amount.

Questions about communication paths and frequency with project stakeholders (Figure 3) and BIM usage (Figure 4) were directed to the respondents to understand their profile regarding the project process and capabilities. Knowledge and requirement management relate to stakeholders with whom a company communicates.

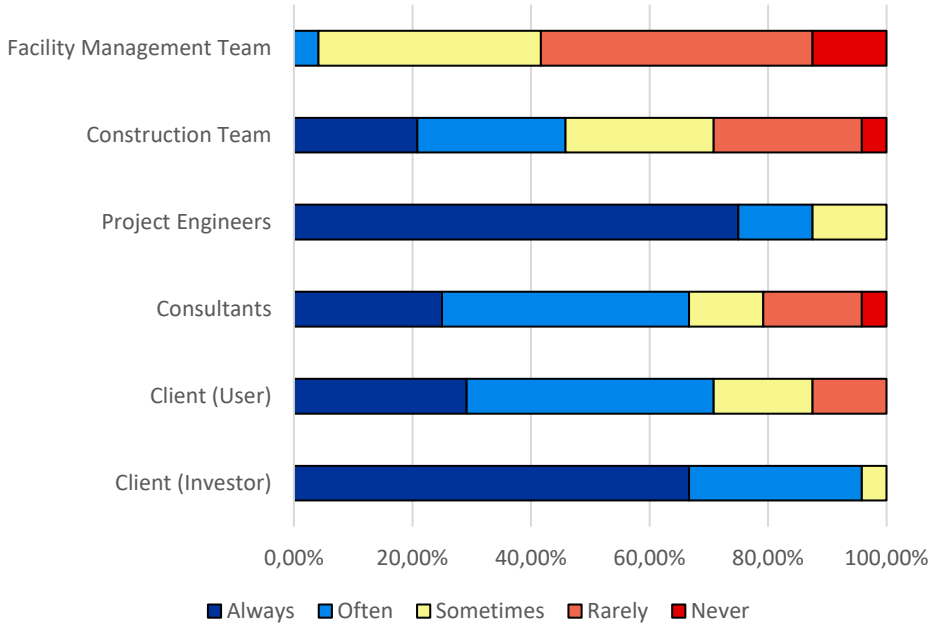

Fig. 3. Communication with stakeholders

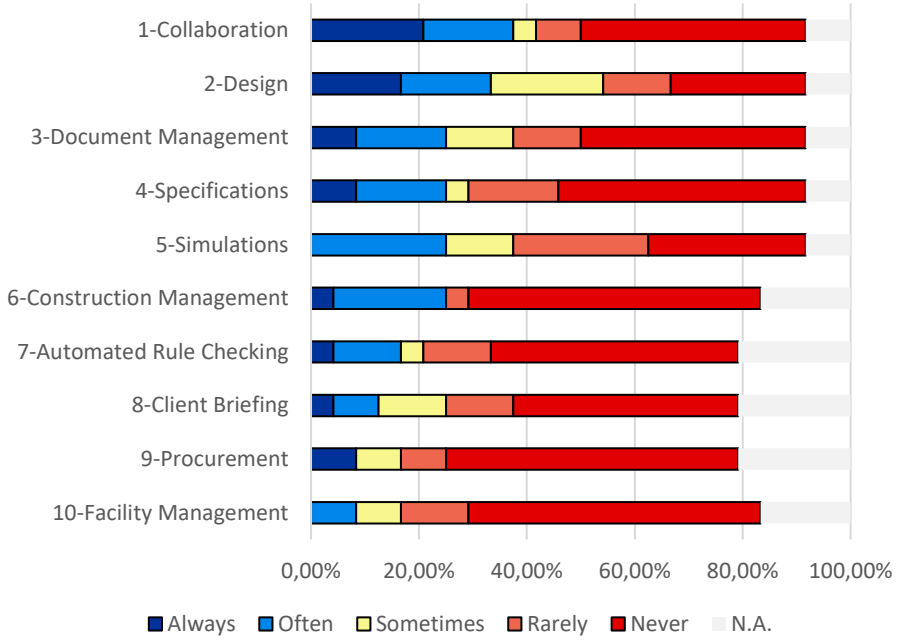

Fig. 4. BIM usage

The experience at BIM is a significant issue in evaluating their approach to technics of technologies that can be implemented in the project briefing process. In the project stage, communication with the client (investor) and project engineers likely take part often, whereas communication with consultants and client users tends to decrease. It can be understood that users' participation in the project process is less than investors'. In the respondents' working profile, communication with the construction team is less than other project stakeholders, and the relation to facility management teams rarely existed. By exploring Fig. 4, some significant results about the BIM usage of companies can be seen. Primarily, BIM usage for different categories is ordered according to the evaluated data by frequency of usage. Collaboration, design, and document management are the first, and client briefing, procurement, and facility management are the last. By looking at the never usage marks, it can also be stated that there is a high ratio of lack of BIM usage for all categories, although there are also users. Besides, NA prompts "Not Applicable" for respondents with no idea what the survey asks. By evaluating it with never and rare usage, awareness about BIM in categories, especially construction management and below, is very low.

5.2. Knowledge capturing at the client briefing process

In this theme, respondents were asked about their briefing process, approaches, and important issues about the knowledge capturing about the project requirements. The results and analyses are given in the same order as in the survey.

Item 1

The techniques and technologies stated in the literature review were presented, and the evaluation of answers can be seen in Fig. 5 with the effectiveness scale. The choices are organized with impact factors to comprehend better. Proposals are the most effective way to manage project requirements in the briefing process. Secondly, interviews, observation, and brainstorming contribute to a briefing for working on requirements. Scenario analysis, sketches, diagrams, and workshops participate in a lower ratio. However, it can be seen that questionnaires, BIM environment, and storytelling are nearly not as effective according to the survey.

Item 2

Taking records is fundamental to knowledge processing for managing requirements and any procedure in which data or knowledge participates. To work on a continuous cycle of knowledge, the recorded data is tracked, recorded, and examined in almost all systems.

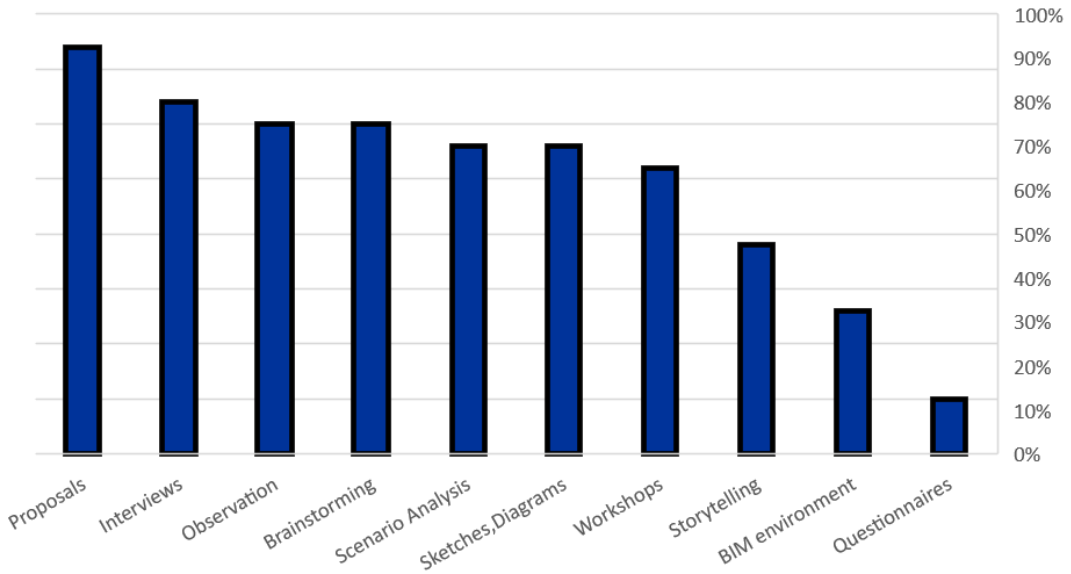

Fig. 5. Effectiveness of Client Briefing Techniques / Item 1

The system used in the recording must be open for implementing different alternatives or proposals. Looking at Fig. 6, it can be said that digital text-based usage is promising and paper-based records are lower than digital. However, the lower usage ratio of using computer processable format and structured database is an area for improvement to initiate the processes about requirement knowledge. In addition, there is an explicit fact that respondents' usage and importance level of recording way seem in parallel.

Items 3/4

Problems and gaps are explored in the review section, which is important in the client briefing process to elicit and validate the required knowledge of architectural projects. Also, methods, approaches, and issues that contribute to the success of the briefing process are specified. Based on the findings of the literature review, respondents were questioned about Item 3, which is the evaluation of the importance of the success of capturing requirement knowledge (Figure 7), and then questioned about Item 4, which is the evaluation of the importance on the success of overall briefing process (Figure 8). Defining the objectives of the project and open-effective communication with project stakeholders are the most important things for gathering required knowledge. Also, in parallel with the review literature review, the involvement of the user client has contributed to capturing requirements for the project for stating the objectives of space. Taking records, evaluating them, and getting approval for requirements' outputs are issues that give great importance. Comparatively, using a comprehensive framework and methods is seen as less important, resulting from within the bounds of the possibility of initiating them for client typologies. The client has an important role and right to decide the briefing procedures and frameworks.

Overall project performance and client satisfaction are affected by the briefing process since the briefing process is an important part of the project life cycle for defining objectives as input. The issues that affect the success of briefing concerning project performance and client satisfaction are explored in Fig. 8. Designer experience is at the first rank, and the inexperienced client is important, meaning that the knowledge of individuals and experience in the industry has significant value. This situation was often stated in research dealing with the briefing process and KM area.

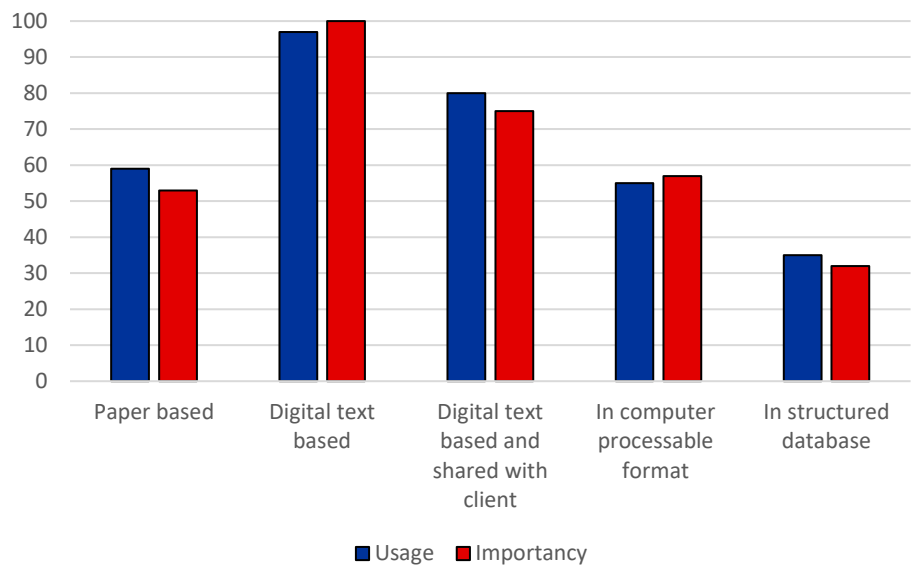

Fig. 6. Recording of Client Briefing / Item 2

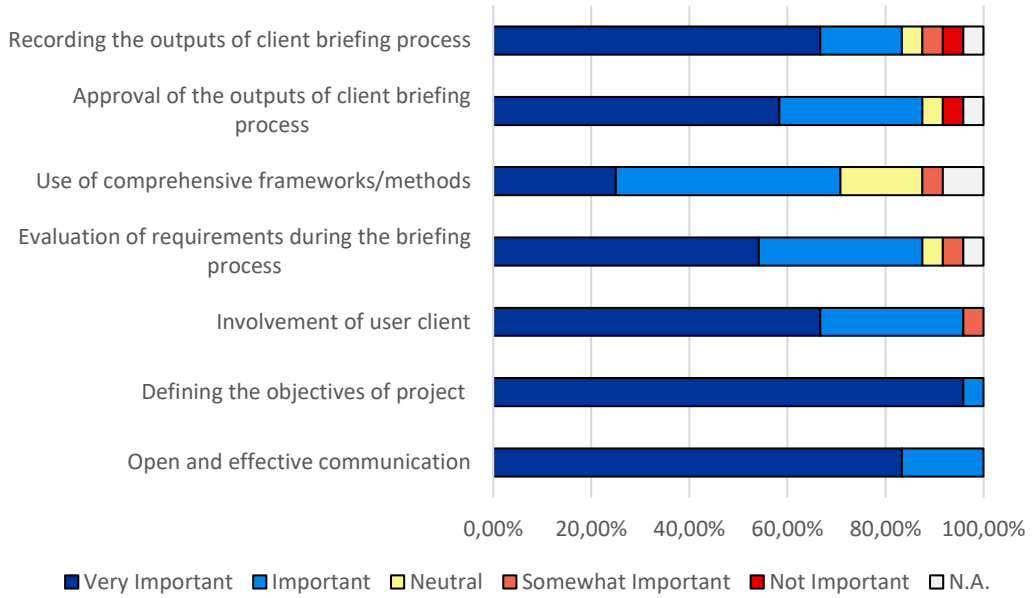

Fig. 7. Items' Importance on Success of Capturing Requirement Knowledge / Item 3

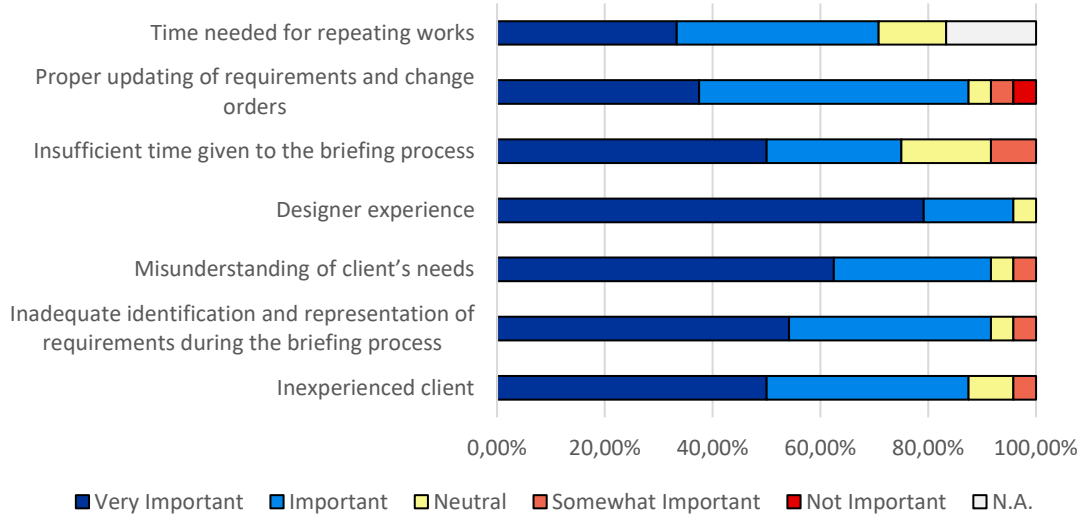

Fig. 8. Items' Importance on Success of Briefing Process / Item 4

Misunderstanding the needs and inadequate identification and representation of requirements are other important cases for the success of briefing, which are also related to the experience of individuals in managing the process. The time needed for repeating works and the overall briefing process should also be considered to sustain success and necessities. Besides evaluating 4 items, respondents were questioned about the problems during gathering knowledge of requirements due to their experiences. The statements that do not coincide with to survey fully are listed below:

- Unable to gather knowledge from the ones who are out of the industry
- Unable to analyze requirements by comparing them with the project budget
- Not thinking of future developments or needs by the client

- Not stating the objectives of the project by clients before starting the project with the designer
- Inexperienced client on both architectural projects and briefing process

5.3. Processes for requirement elicitation and validation

In this theme, respondents were asked about the processes to initiate a knowledge cycle for requirement elicitation and validation. More detailed and defined actions for capturing, indexing, understanding, validating, and reusing requirement knowledge were presented in the survey to evaluate the situation and approaches of practitioners in managing client and project needs. Also, the importance and contribution of the briefing process to project work were investigated. The results and analyses are given in the same order as in the survey.

Item 5

The required knowledge of a design project is one of the important inputs for project environments. Designers start and execute project phases by analyzing this knowledge through some actions for evaluation and validation. As seen in Fig. 9, validation of requirements before the design phase is very important, and clear statements and usage of designer experience for the evaluation also have great value for importance, which emphasizes that designers prefer cases where the requirements are clearly defined, validated before design and also evaluated by their experience. The experience and knowledge of the designer cannot be ignored for validating requirements for executing the briefing process for capturing knowledge from the client. Design proposals are also important media to present ideas and relations for evaluation of requirements with the client, possibly because all requirements cannot be illustrated to an inexperienced client without 2D/3D representations. Respondents give less importance to evaluating requirements with specification libraries and knowledge bases than others. It is seen that they also have importance. However, validating requirements with a client before or during the proposals, including clear statements, has priority.

Item 6

Based on the literature review, some processes can manage knowledge to maintain the continuity of knowledge usage. It can be understood from Fig. 10 that validation of requirements with a design proposal has significant usage and importance.

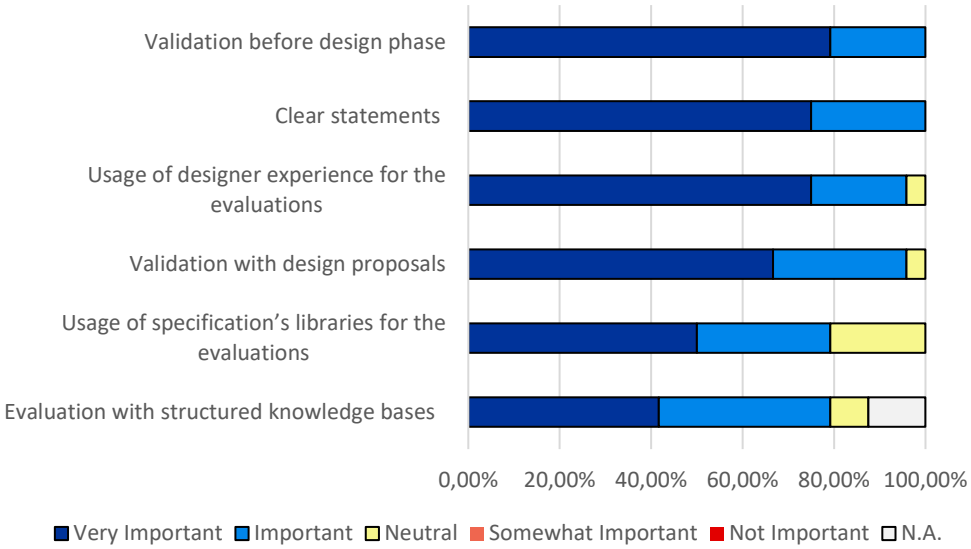

Fig. 9. Importance of Actions on Client Requirements / Item 5

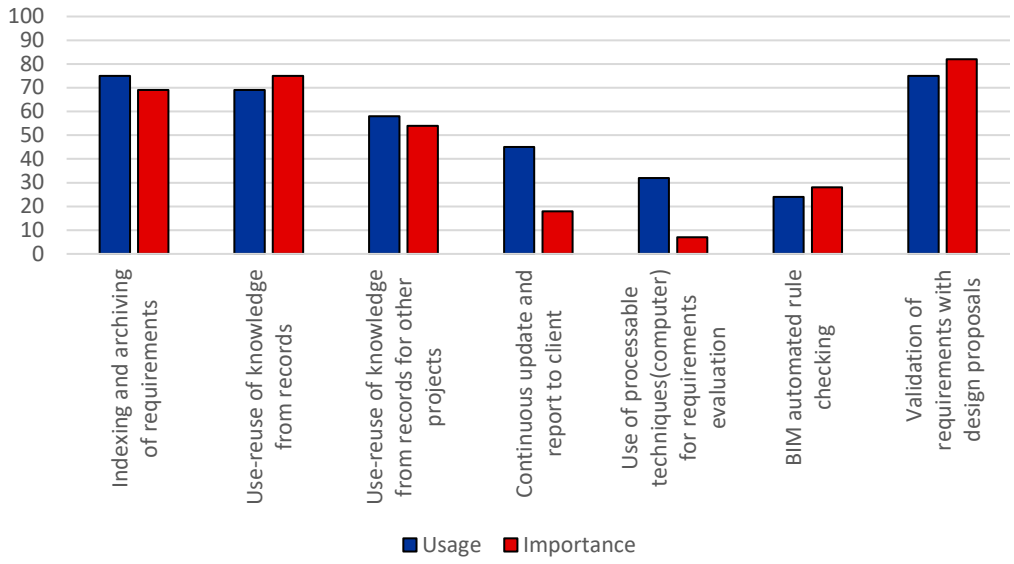

Fig. 10. Knowledge Processes for Requirements / Item 6

Although it is stated that validation before the design is more vital than validation with design proposals at Item 5, Item 6 results in the vitality of proposals. This is an issue to be discussed, in which trends of the practice of Türkiye, especially due to client profile, evaluate requirements in proposal phases, not before design. However, designers tend to prefer validating requirements before starting the design phase. Indexing, archiving, and reusing requirement knowledge have significant value for both usage and importance. With the utilization of various management systems for knowledge, respondents try to control the requirement knowledge for contributing to ongoing and other projects. Usage of processable computer techniques and automated rule checking at BIM is extremely low compared to others; however, the importance of BIM is more noticed than computer processable format.

Item 7

The effects of the briefing process were asked respondents to understand their general approach to a successful briefing for elicitation of the project requirements. Which issues and levels that are affected by the briefing are explored. It can be stated from Fig. 11 that briefing success is effective on design success, time budget of design, and reduction of re-work. Clear, validated, and stable knowledge of requirements brings advantages to the design process. Better decision-making and client satisfaction are also affected by briefing success. Besides, productivity and profits are increased. It can be noted that design briefing success affects the construction phases but at a different level. Briefing success effects on time and budget of construction are comparatively low. Although the briefing is directly related to the construction, this could result from two issues; respondents are not involved in the construction process, and they think the project and construction processes are separated. This is mainly related to practices in the respondent's country. Respondents were also asked in an open-ended question on this theme what they think about the impact of storing, finding, and reusing requirement knowledge during the client briefing process. The statements which have importance are listed below:

- It is important to analyze and record requirement knowledge captured based on typologies.
- Transfer of experience may be done via documentation of knowledge

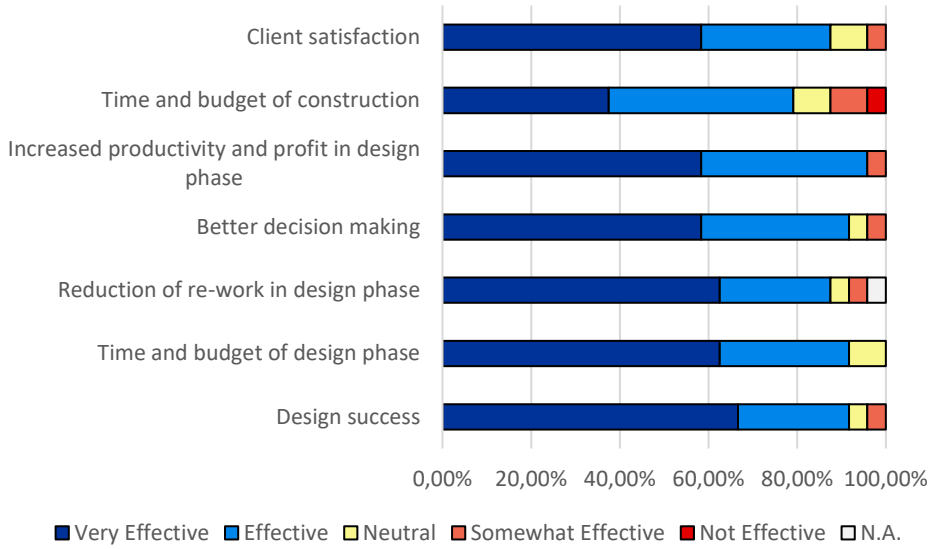

Fig. 11. Issues that Briefing Process Success Affects / Item 7

- The record of knowledge is important for re-creating design scenarios due to changer orders.
- The record makes evaluation inputs (requirements) and outputs (project) possible.
- Requirement management shortens the way to accepted design and takes more time.
- Every question related to projects can be answered from the records of the briefing.

6. Findings of the Interviews

Interviews started after the survey and were completed within November 2021. 11 architects from Ankara who are owners or partners of design companies were approached for the interviews; with their choice, the interviews were held online.

6.1. Part 1

The average interview duration was 40 minutes, and 45% of the interviewees had also participated in the questionnaire survey. Thus, some were already aware of the subject because of their experience on the survey. The average experience of the interviewees is over 20 years, and the project typology they completed is in a wide range. The group has experience in many project types and sizes like residential, mixed-use, health care buildings, office and public buildings, sports buildings, and hotels. The overall rate of client type is 30% public, and 70% private, and some companies are dealing with international projects. BIM usage, planning, and expectations were also probed. For the interview group, 25% of all projects are completed using BIM tools and methods. Some use it due to client wishes, some use it for their development, and some use BIM for not all project processes, for parts like project proposals and 3D representations. However, companies generally tend to integrate BIM usage in their offices in time. They look forward to comprehending the time issue for adaptation, budget for expertise and software license, and proliferation among project stakeholders and clients. Briefly, it can be stated that the potential of BIM is noticed, but the market and compatible working conditions are waiting. Only one office uses BIM for all projects without using CAD drawings. They use CAD only by conversion to communicate and collaborate with those who only use CAD drawings.

Requirements of the project and usage phases of the project were probed to understand their working experience. Approximately in a quarter of the projects, the requirements are submitted by the client before the works on studies are initiated. For 39% of the projects, requirements are tried to be elicitation and validated with a client by some

techniques and studies of a designer. Lastly, in 34% of the projects, there is no submission of requirements, and they are presented and then validated with a client by preparing design proposals according to the project's objections. This diversity is a stimulating situation for the research since one of the important objections is to explore the experiences and approaches to managing and implementing the requirements into project studies.

6.2. Part 2

In this part of the interview, the interviewees were presented with a circumstance where the required studies were done before the project work, before the interaction with the designer and execution of the design study. Then interviewees were requested to comment. The statements from different interviewees about requirements' features, procedures to work on, and experiences are listed below;

Statement #1: Requirements are submitted by project specification document in a high level of detail for international clients. The requirements are investigated manually and imported to the BIM environment as written text. The evaluation for requirements with a project is made manually by using output documents of the BIM model and specification documents.

Statement #2: Requirements are submitted by project specification document, which is hundreds of pages. Team members are assigned to analyze and prepare brief documents for project initiation. Submitting requirements is beneficial, but it is also challenging to deal with.

Statement #3: For the projects in which there is market research by experts and consultants, the requirement documents present the spaces and relation in quantity in more detail. The design work may be held with these inputs considering the legal and site issues, design intentions, and experience.

Statement #4: A client should present and approve the requirements via design proposals, even if they are submitted. Because the client has not enough experience and technical knowledge to evaluate requirements with design.

Statement #5: Requirements are submitted rarely before the project. Besides, when they are presented, it is beneficial for the designer to start the project after analyzing the requirements. However, this situation requires highly qualified clients concerning project stakeholders' knowledge and labor work.

Statement #6: Requirements about space relations, object relations, and electromechanical needs may be submitted before the project. They are very beneficial for solving project problems in further steps and thinking about the general layout of design proposals.

6.3. Part 3

In this part of the interview, the interviewees were presented with a circumstance that the required studies are done after the designer takes a role in the project. Then interviewees were requested to comment. Elicitation and validation of requirements are done before the project work and during the design proposals by designers for various examples. Some companies have objections to getting the requirements before the project works through some meetings and sessions, but some companies think that design proposals could only manage the requirements. The statements from different interviewees about requirements' features, procedures to work on, and experiences are listed below;

Statement #7: Requirements are prepared and presented thinking of the project's conditions, using own experiences and documents before the project work. Without a consensus on requirements, design studies do not start.

Statement #8: Using the project archive for evaluating the new project requirements is important. However, the working team members do not know how to investigate the archive properly. If there is a system to index and find the needed knowledge of requirements, the experience can be externalized.

Statement #9: There is an attempt to maintain the requirement and relation knowledge of project typologies after the completion to use them for further project

Statement #10: For some projects, requirement knowledge is not needed. Designers with experience and studies should figure them out. The client's wish is to benefit from the company experience.

Statement #11: By looking at the client typology, it is stated that clients can only be communicated with design proposals. Thus, any study about preparing requirements in written or digital documents by client or design is meaningless.

Statement #12: Getting approval for requirements, whether documents or design proposals prepare them, is vital for a designer to complete the project successfully.

Statement #13: Universal specification should be considered in preparing for any project legislation.

Statement #14: The attempts to understand, record, and transfer knowledge of requirements will always sustain significance since the experience and knowledge of designers and team members determine the quality of the projects.

Statement #15: BIM usage for design proposals is good for presenting the design and requirements to a client for evaluation and validation. Clients can understand the project environment, and the designer has an easier and more flexible way to develop the project.

7. Discussion of the Findings

The survey and interviews about knowledge capturing in the design process for requirement elicitation and validation, which were held with industry practitioners, explored respondents' contemporary practices and approaches in the research area. While results only relate to the objectives of this study, further analysis and interferences could be held for the investigation of cases: BIM usage, position in the market, project typologies or processes, etc. The results of the items and themes designed for the survey and the interviewees' thoughts were presented in the previous section. The outcome of the results was evaluated by discussing the situation of industry practitioners against the issues.

Open and effective communication with project stakeholders for capturing requirement knowledge and defining project objectives is important for briefing success. However, 65% of architects communicate with clients and project engineers, whereas only 25% communicate with users and consultants. Even though the user's involvement in the briefing is stated as important (Item 3), it is sustained occasionally. Another issue is that capturing the required knowledge from an individual without technical experience is a significant problem for the briefing process. By looking at Item 1 (efficiency of briefing techniques), it can be seen that design proposals are the certain technique for client briefing. Interviews, observation, brainstorming, scenario analysis, and sketches are used extensively. Reasons for preferring the techniques that architects can sustain interactions with individuals are to improve communication levels and to increase the knowledge transfer between inexperienced clients and users. In addition, designer inexperience, misunderstanding of client's needs, insufficient time, and inadequate representation of requirements negatively affect the success of briefing (Item 4). Thus, with sufficient time, project stakeholders with adequate experience could capture and validate needs and requirements with the proper representation tools and methods.

Validation of requirements before the design phase with clear statements is considerably important (Item 5). However, the requirement evaluation by designer experience or with design proposals is also considered. One-third of the interviewees prepare the project requirements and present them by design proposals, even though most prefer to start designs with approved requirements. They stated that clients usually ask for the preparation of project requirements from the architects with the design proposal, and for most of the clients, the only way to work on requirements is via project work. Item 6 shows that validation of requirements with design proposals is used often and stated as important. The conflict between the expectation of requirements before design and the actual state of validating them in design proposals

results from various reasons. Lack of client experience, involvement of users for capturing requirements, practice choices on evaluation of requirements on a 3D proposal instead of text or diagram-based representations, and non-usage of comprehensive methods and frameworks can be stated as critical factors.

Knowledge processes like indexing, archiving, retrieving, and reusing are widely utilized; however, computer processable formats and BIM are not used sufficiently to manage the knowledge. Client briefing is usually recorded (Item 2). Digital text-based documents are used often. In contrast, computer-processable format and structured databases are used less. The importance of taking records, whether in a text, to manage the knowledge, and a level of awareness of the knowledge process for capturing, validating, and creating requirements was observed in respondents. However, the execution of these processes and techniques/technologies used are not observed. Usage of structured databases, computer usage capturing and evaluation for requirements with or without knowledge bases, and BIM usage are not considered to manage requirements. Besides, it can be stated that BIM is not utilized widely when done, notably for collaboration and design and partly for document management, specifications, and simulations. BIM environment is used at a level of design proposals, sometimes for all project processes. However, the capability of BIM, like automated rule checking, is rarely used and not signed as an important process for requirements.

There is a consensus about the broad effects of briefing success over project issues. Design success, time and budget of the design phase, reduction of work in the design phase, better decision-making, and client satisfaction are directly affected by the success of briefing for requirement gathering. Also, briefing as a recorder and processor of knowledge adds important value for transferring the experience between parties and evaluating the requirements. One of the important outcomes of the findings is that the approach of briefing and knowledge processes differ according to the client's attitude. The client typology and way of involvement in the project process define the position of architects. For example, in governmental projects, the architectural program is generally pre-defined, the user-client is unavailable, or the client has a role as government controller. This affects all briefing processes independent from the architectural office's practice. For another example, some companies prepare detailed feasibility studies to develop project requirements before the design phase, or some requirements are thought to be items that will be figured out in the design phases.

8. Conclusion

Knowledge capturing in the client briefing process is important for requirement elicitation and validation to enrich project success. The amount of knowledge related to requirements coming from clients and end-users varies and may be hard to capture and validate. Users' involvement in defining project requirements by overcoming the communication problems arising from experience should be sustained. Technologies for managing knowledge and executing systems for evaluating and analyzing have important value; however, they are not taken into consideration among respondents.

Validation of project requirements by/with clients/frameworks before or during the design phases is vital. However, the method and schedule of it alter all project cycles and procedures. Diversity of procedures on project execution and approaches according to locations and organizations cause different levels of awareness and usage on requirement management cycles at the briefing process.

It should be noted that the study is executed among architects in Türkiye and explores issues of requirement and knowledge management within the briefing. The survey and interview frameworks are designed concerning the existing research in the field and are expected to underline the actual situation and approach of respondents. Generalization of discussion on problems, gaps, and usage of requirement processing techniques, tools, and technologies may be based on the

population of respondents. Even though it may not be complete, the study takes a clear record of issues, problems, and approaches architects face while executing the project cycle. These findings will be a guidance and motivation base for improving the briefing process. Requirement elicitation and validation could be done into a system or framework that sustains the user's involvement, uses beneficial technologies, and executes knowledge processes. In addition, it is recommended and planned that the findings of this study be expanded by developing a strategy or method for improving the briefing process for requirement capturing.

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Author Contributions

E. B. Çalışkan: Conceptualization, Methodology, Software, Formal analysis, Investigation, Resources Writing - Original Draft, Writing - Review & Editing, Visualization; M. K. Pekeriçli: Methodology, Resources, Writing - Review & Editing, Supervision.

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Data Availability Statement

The data presented in this study are available on request from the corresponding author.

Ethics Committee Permission

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Conflict of Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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