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DECISION-MAKING OF CORPORATE CLIENTS DURING STRATEGIC BRIEFING PROCESS ACCORDING TO KNOWLEDGE ACQUISITION TYPES

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Abstract. Organizational clients with limited experience in strategic briefing often face challenges in identifying building project outcomes for achieving a competitive edge in their business. Communication with practitioners during strategic briefing facilitates clients in acknowledging the importance of timely decision-making and being involved in a knowledge spiral to acquire the information. Knowledge-acquisition by clients can lead to behavioral changes, both within themselves and their organizations. This study classifies knowledge-acquisition types (KATs) and investigates the potential for rational decision-making in briefings. A framework, developed through a literature review and practical insights, is validated by introducing the Action Research approach with stakeholders across ten building projects in sectors: manufacturing, retail, and public enterprises. The framework, refined during interactions among researchers, clients and service providers, identifies KAT1 as the domain knowledge, KAT2 as the administrative knowledge, and KAT3 is the facility knowledge of clients. KAT4, the difference between groups with and without construction-project experiences, relates to the procedures for achieving strategic objectives. This involves understanding the project and organizational characteristics through knowledge accumulation and managing client interactions to ensure successful projects. The Action Research framework facilitates knowledge exchange among clients and practitioners, empowering corporate clients to effectively achieve strategic objectives through group decision-making.

Keywords: Action Research, strategic briefing, decision-making, group decision-making, knowledge management, knowledge acquisition.

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1. Introduction

To obtain ideal results from building projects, clients should clarify the desired outcomes aligned with the business purpose in a briefing to project practitioners shaping the final delivery (Chung et al., 2009; Luo et al., 2010). Inaccurate briefings make it difficult to achieve strategic objectives owing to misunderstandings (Shen et al., 2004). Collaborative briefings leverage internal expertise of organizational clients and the domain knowledge of practitioners, facilitating effective communication during design and construction (Xu et al., 2021; Dikmen & Burns, 2022). Challenges in the briefing include unclear strategy, difficulties in client decision-making, unstructured requirements, and limited project understanding (Chung et al., 2009). When building knowledge for briefings, clients and practitioners face obstacles such as time constraints, organizational characteristics, insufficient support, and employee resistance (Carrillo & Chinowsky, 2006; Dave & Koskela, 2009). To address these, an environment must be cultivated where clients can consider important aspects of the projects early on. One effective approach is to establish a dedicated group to collect, coordinate, and disseminate information during briefing. However, some clients may require guidance to actively participate in such meetings.

Efforts have been made to categorize essential aspects of clients' decision-making. Yu et al. (2008), Yu and Shen (2015), and Tang et al. (2015) identified and prioritized critical success factors for briefings. Clients then focused on the entire harmonized output over individual rankings. Luo et al. (2011) advocated web-based group decision-making for briefings. Under the umbrella of knowledge management, Kivrak et al. (2008) and Tan et al. (2012) introduce platform as collaborative environments with offline and online interactions. Anumba and Pulsifer (2010) explored the importance of knowledge management in construc-

tion, reviewed it from a system perspective, and discussed knowledge application based on human awareness of knowledge sharing. However, expecting inexperienced clients to achieve this ideal scenario and leverage practitioners' expertise is unrealistic, as they are unlikely to have meta-knowledge required to initiate a proper consultancy process (Kim, 2003). Hence, it is essential to adopt an approach that enables the clients to acquire meta-knowledge and the process on the building project during strategic briefing.

A strategic brief's nature is dynamic and continuous, requiring adaptation to unexpected changes. Strategic briefing is divided into design briefing for design and project briefing for construction. The design briefing process involves understanding the purpose, forming the design brief by analyzing the requirements, developing alternatives, and selecting a detailed design considering changes. Project briefing includes investigating objectives, identifying needs, determining strategy, and supporting implementation (Nutt, 1993). However, improving client satisfaction through strategic briefing appears optimistic as service providers have failed to fulfil client requirements (Kim, 2003). Additionally, organizational structure could influence an employee's behavior and attitudes in the strategic briefing. Work specialization, departmentalization, establishment of a chain of command, and span of control are required to enhance organizational value (Zwemmer, 2008).

In this study, we intend to examine the internal decision-making processes of clients to ascertain how they achieve their strategic goals. The following research questions will be addressed and investigated: What factors contribute to the decision-making process? What occurs subsequent to the formulation of a decision that deviates from the client's expectations? Which parties have the requisite knowledge and data to define and reflect the building project requirements? What are the knowledge acquisition and the decision-making processes? For instance, corporate clients may want to expand their market share or improve customer satisfaction while considering professional practitioners' advice on outputs, including the feasibility. Through this encountering, clients recognize individual professional domains, i.e., architectural, civil, mechanical, and electrical, and obtain fundamental advice for decision-making (KAT1). This interaction is part of clients' knowledge-acquisition, which is formed by extracting, structuring, and organizing knowledge from knowledge sources, and knowledge transfer to others (Aronson, 2003). Alternatively, it is a process of elicitation, representation, implementation, and validation. Elicitation is the identification and definition of rules; representation is the presentation of knowledge (briefings in this context); implementation is translation of expertise into knowledge for others; and validation is testing (Berri, 2010). The nature of knowledge-acquisition may vary depending on the clients' initial knowledge (KAT2 and KAT3) on building procurement, their involvement in the briefing process, the capabilities of the client organization, and the potential for substituting domain knowledge (KAT4) through knowledge building. Heterogeneous status of individuals belonging to clients' organization is a challenge.

Clients set decision-making criteria based on past purchasing experiences and act rationally according to consumer psychology. When not fully relying on professional guidance, they depend on their own beliefs, experiences, and knowledge. Considering the pivotal role of clients in project procurement, it is necessary to investigate both the knowledge-acquisition and internal decision-making processes of organizational clients. Knowledge sharing, learning, and building occurs internally within the client organization as a recognition process. There is a growing need for research on decision-making within client organizations. Studies on group decision-making highlight the impact of diverse values and capabilities on communication, knowledge building, and decision-making processes. Determining the internal modes of organizational clients through external surveys or observations is difficult. Following a constructivist approach, researchers participated in the real-world situations as facilitators rather than observers, guiding the ideal process. In this context, Action Research can be introduced to interpret the organizational clients' decision-making process.

This Action Research approach assists to explore and interpret the internal modes of client's group decision-making processes according to knowledge-acquisition types (KATs), especially during briefings for the planning, design, and procurement phases of building industry projects. The Action Research framework is implemented by researchers, as facilitators, to leverage the expertise with organizational clients to support decision-making. To interpret the influence of experience and knowledge on decision-making, the research subjects consisted of the following ten groups: five groups of corporate clients (novices) without experience in building project's procurement and five groups of clients with the experience and necessary knowledge. The research objectives are multifaceted, with researchers as facilitators and clients as decision-makers. The objectives from the facilitator side are 1) to categorize KATs according to knowledge sources and flow routes, 2) to facilitate intra-organizational knowledge sharing, and 3) to support knowledge building through iterative processes with clients and professional practitioners. The clients are expected to 1) increase awareness of decision-making factors and 2) acquire knowledge required for decision-making. The process and outcomes from knowledge-acquisition are the research results and proofs for framework validation simultaneously. This study contributes to exploring how building-project clients make project decisions when lacking prior knowledge. A fundamental assumption is that the knowledge-acquisition framework effectively utilizes domain knowledge from practitioners, enhancing decision-making satisfaction for inexperienced clients.

2. Background on client decision-making

2.1. Building industry clients

Clients in building projects must provide project requirements against strategic objectives (International Organization for Standardization, 2000). This requires each client to elicit strategic goals and requirements to communicate with project participants. Clients' awareness influences their expectations and needs. Different types of clients, including individuals, corporations, and real-estate developers, have distinct perspectives, and understanding them is crucial before undertaking building projects (Green, 1996; Kim, 2003; Hayes & Smith, 2005). During the design and construction process, inexperienced clients face knowledge gaps, i.e., differences in awareness with project participants owing to various factors: communication skills, stored information, and social contacts (Tichenor et al., 1970; Amer & Attia, 2019). The process of bridging these gaps provides insight into the challenges faced by heterogeneous clients and practitioners collaborating in briefings (Korotkova et al., 2024). Because the nature of building projects is unique and complex, clients' expectations (publicity, economic benefits, quality) cannot be guaranteed when the outputs are completed (Chung et al., 2009; Kiani Mavi & Standing, 2018). Multidimensional problems such as uncertainty about actual profit and excessive demands cause business delay, increased cost, risk, and dissatisfaction (Ebrahimnejad et al., 2012).

Some researchers have examined key factors affecting decision-making, considering decision quality, performance, and satisfaction (Fan & Shen, 2011). The main factors include client characteristics, performance, feasibility, financial stability, and market conditions (Kometa et al., 1996), as well as factors including strategic goals, economic feasibility, social expectation, and sustainability, influence problem identification, outcome analysis, criteria's application, and bidirectional comparisons on causalities (Ebrahimnejad et al., 2012). Individual ability (e.g., effective communication and coordination within teams) and the organization's nature also influences decision-making (Robbins et al., 2017; Wuni & Shen, 2020). The maturity of organizations can be determined by experienced organizational members (Kiani Mavi & Standing, 2018). In this study, we examined the decision-making process based on the main factors listed in Table 1.

2.2. Decision-making rationale and collective intelligence

Rational decision-making helps establish criteria, identify alternatives, and evaluate objectively (Abubakar et al., 2019). A central aspect is logical consistency throughout the decision-making process (Martino et al., 2006). To this end, a role of clients is providing a strategic objective to identify economic goals and social requirements (Papulova & Gazova, 2016). Given the complexity of decision-making, clients collaborate with participants to make efficient and appropriate decisions. This involves considering the perspectives of diverse stakeholders while exchanging information and coordinating opinions (Ren et al., 2021). Clients should manage participants by understanding them through interpretation and judgment during knowledge sharing (Abubakar et al., 2019). This allows clients to specify factors in the process to reconcile conflicting opinions and satisfy requirements (Eleftheriadis et al., 2018).

Group decision-making is derived from decision-making by individuals with distinct cognitions, attitudes, and motivations to solve common problems (Beach, 1993). While it is important for organizational members to make decisions based on a collective consciousness with common goals and shared emotions, different perspectives affect the process and outcome of collaboration. In discussions, clients have the opportunity to interact equally with experts and learn how to communicate and respond to feedback. Hereby, organizational clients acquire diverse information, reduce errors, and improve performance (Hayes & Smith, 2005). Group decision-making depends on the nature of the organization, not just the individuals. If a group evaluates problems more objectively and from various viewpoints than an individual, the satisfaction of its members can be increased (D. W. Johnson & F. P. Johnson, 2012). In this aspect, group members feel a sense of belonging and are more likely to accept a common opinion (Hayes & Smith, 2005). Accordingly, group decision-making should be considered at both the individual and group levels (D. W. Johnson & F. P. Johnson, 2012). Clients should collaborate with members through knowledge-acquisition to generate ideas, evaluate alternatives, and reconcile conflicting opinions. Therefore, group decision-making acts as a positive function for problem-solving and enables better decision-making by allowing for the sharing of different information.

2.3. Client strategic briefing

Building industry clients interact with practitioners in strategic briefings, which is a dynamic procedure that plays a pivotal role in the successful delivery of projects (Luo et al., 2010; Ahmad et al., 2011). Strategic briefing is defined as communicating the purpose of the project, whereas project briefing is a description of project requirements related to operations and functions. Collaborative briefing promotes the sharing of skills, information, and expertise between clients and participants, acting as a means of knowledge-acquisition, enabling the achievement of strategic goals even under several constraints (Chung et al., 2009; Ahmad et al., 2011). At the beginning of a new project, clients without expertise in building projects must create a brief. In this case, clients should clearly indicate their requirements so that participants can identify, structure, analyze, rationalize, and translate them (Kamara et al., 1999). For effective briefings, clients should recognize the actual capabilities of organizational members with relevant knowledge to solve problems (Dikmen & Burns, 2022). Therefore,

Table 1. Main factors affecting decision-making in a construction project

Main Factors		I/E	Authors								
			Zhong et al. (2022)	Krabbenborg et al. (2020)	Onubi et al. (2020)	Kiani Mavi and Standing (2018)	Arif et al. (2016)	Yu and Shen (2015)	Tang et al. (2015)	Love et al. (2012)	Explanation at the building project level
Fundamental aspects of project	Strategic goals	I/E				O	O		O		Establishes the underlying purpose to start the building project.
	Client needs	I/E		O		O	O	O	O	O	Reflects on requirements: writing client needs for themselves, (technical) specialists, and their users.
	Project feasibility	I/E	O							O	Lacks accurate information on future net returns and is limited in resources. Project feasibility is connected to strategic objectives.
	Project characteristics	E	O			O				O	The project is characterized based on its size, and purpose of use.
	Cost-effectiveness	I/E	O	O	O		O			O	Reviews budget compatibility based on cost distribution, financing limitations, and capital input.
	Timeliness	E	O						O	O	Controls design and construction schedules, including master schedules.
	Quality standard	I/E			O					O	Ensures quality control of building materials and structural stability. Aims to minimize non-renewables resources and prefer local sourcing for low carbon footprint.
	Resource availability	I/E			O		O				Improves the function and quality of the building.
Client & organization	Client characteristics	I		O					O		Depends on the relationship with the member's consciousness.
	Client experience	I				O			O		The performance of comparable projects affects process management.
	Client capabilities	I	O	O		O	O	O			Refers to collaboration between participants and organizational members enabled by the client's communication skills.
	Client technical understanding	I				O			O		Client-side involvement includes quality control, safety management.
	Organizational member capabilities	I	O			O			O		Influence each project team on client decision-making process.
Environment	Risk management	E				O			O	O	Control of the supplier and the supply chain with the assistance of consultants and contractors.
	Market conditions	E				O					Strategic objectives need to be created by using information from domestic and international markets.
	Relevant Laws & regulations	E			O						Ensure project compliance with applicable laws and regulations.
	Public benefits	E	O		O						Ensure health and safety, minimal environmental impacts during construction.
Sustainability	Economic contribution	E					O				Influences strategic goals and the client-side estimation of project feasibility.
	Ethical standards & social impact	E				O		O			The construction project should consider social benefits.
	Client satisfaction	I	O		O			O			Compares facility's profits with expectations.

Notes: I – Internal factors influening decision-making; E – External factors influencing decision-making.

project participants should understand the detailed briefs to satisfy clients' expectations and ensure that suitability of the briefing related to the information provided. Ultimately, the requirements that are collected, captured, and transformed during the briefing process are reflected by the participants in the building project (Chung et al., 2009; Ahmad et al., 2011). We propose that collaboration in the briefing process is essential to increase the efficiency of organizational management and performance of building projects through enhanced knowledge-acquisition.

2.4. Knowledge management for decision-making in a briefing

Cognition is a process by which information that is gathered through the senses reaches behaviors, functioning as human information processing (Kellogg, 2016). As a response system, a schema is a cognitive process interpreting data, retrieving information, and making informed guesses even without specific knowledge (Reed, 2012). It is a key component in achieving strategic goals (Kellogg, 2016). Based on factual information, which represents the descriptive knowledge of experts in a particular field, schemas are formed, and representations are developed. The process is used to plan strategies, automate problem-solving, and perform necessary monitoring (Reed, 2012). The premise of a schema is that knowledge is integrated within an organization to form a knowledge structure for action, encoding, remembering, understanding, storing, and utilizing knowledge (Reed, 2012). While knowledge structures provide predictions, encodings of information can be distorted during memory storage and retrieval (Cheng et al., 1986). Clients acquire knowledge through communication, perception, memory, concept formation, and symbolization to solve problems (Awad & Ghaziri, 2004). This is related to the fact that decision-makers determine actions based on human senses and experiences (Greenberg et al., 2017).

Although cognitive science is mainly concerned with individuals, some studies have considered knowledge management at the organizational level (Irma et al., 2004). Clients' strategic briefing is related to their own intentions and organizational nature based on capabilities and values (Allee, 1997; Sievinen et al., 2020). Client's cognition abilities affect their ability to suggest strategic goals and solve problems, and cognition changes influence practitioners' behaviors (Kim, 2003). Organizational practice fosters knowledge creation, sharing, and acquiring knowledge in briefings (Allee, 1997). Organizational clients can enhance learning, create value, and utilize knowledge (Dalkir, 2011). In collaborative briefings, clients require knowledge of strategic goals and requirements to develop design concepts (Xiao, 2012). Organizational clients gain knowledge by combining raw data, personal knowledge, colleagues' experience, similar project data, and expert recommendations (Hwang et al., 2018). Organizational members who assist clients are experts in finance, law, accounting, and procurement (Kometa et al., 1996).

To understand and utilize knowledge to solve problems, it is necessary to verify its usefulness, discard inappropriate knowledge, introduce new experiences, regeneralize experiences, and present new content. Knowledge management includes acquiring, utilizing, learning, contributing, evaluating, building, sustaining, and divesting knowledge (Bukowitz & Williams, 2000). Dalkir (2011) divided knowledge management into capturing, filtering, codifying, refining, sharing, accessing, learning, applying, evaluating, reusing, and eliminating knowledge. Knowledge sharing involves communication with other individuals, departments, and organizations. Irma et al. (2004) presented knowledge management as a process: discovery, capture, sharing, application, exchange, direction, and routines. Knowledge application enables efficient decisions and actions. Routines refer to the repetitive utilization of knowledge through procedures, rules, and norms to guide behavior (Irma et al., 2004).

In a knowledge spiral, externalization is the formalization of knowledge, combination denotes knowledge sharing, internalization is understanding and knowledge-acquisition, and socialization involves interaction with practitioners (Nonaka & Takeuchi, 1995; Irma et al., 2004; Dalkir, 2011). Knowledge sharing provides opportunities to change practices (Love et al., 2012; Rupietta & Backes-Gellner, 2019). Kamel (2007) explains knowledge-acquisition as follows: (1) knowledge is collected based on interaction with organizational members; (2) interpretation identifies knowledge for problem-solving; (3) analysis forms theories on problem-solving strategies; and (4) design involves identifying information, clarifying issues, and discussing new problems. Meanwhile, Berri (2010) describes knowledge-acquisition as an iterative process involving elicitation, representation, implementation, and validation, that improves problem-solving abilities through informed decision-making. We propose a decision-making framework, as a method of knowledge-acquisition in collaboration with group members.

The knowledge acquired within organizations is stored in a multitude of formats, including documents, organizational processes, and systems. Furthermore, it is embedded in the minds of individuals in the form of experience, memory, and skills (Liebowitz, 1999). The existence of knowledge gaps is relevant to the education and social sectors. In the field of knowledge gap research, E. Gaziano and C. Gaziano (1999) distinguished between socio-cultural phenomena that are either naturally occurring or socially constructed, as well as between individual or collective actors as the objects of study (Gaziano, 2017). In the context of business, knowledge gaps are perceived from a marketing standpoint, existing between established and emerging markets, and between buyers and sellers. These gaps are sustained by the perpetuation of functional power structures, the limitation of marketing resources, and the intensification of time-to-market pressure. Such challenges are associated with the difficulties of knowledge sharing regarding the requirements of both existing and new cus-

tomers (Lilien, 2016). These include patterns of behavior and values, as well as differences in interpersonal communication. The application of factors such as interest, attention, motivation, and relevance can assist in narrowing the knowledge gaps (Gaziano, 2017).

3. Research method

3.1. Methodological approaches in social decision-making research

Organizational clients make decisions using knowledge within the organization, which is a social decision-making context rather than an individual process. Qualitative data are gathered through interviews, focus groups, case studies, and ethnography. Qualitative research interviews help participants reveal their voices in the discussion and can be categorized as either unstructured or semi-structured, as demonstrated by Bryman (2016). Unstructured interviews allow participants to share valuable insights, whereas semi-structured interviews provide a set list of questions. Focus groups facilitate interactions among participants to generate valuable information (Thelwall & Nevill, 2021). Therefore, focus groups support to analyze knowledge and experiences, and they review what and how participants think (Tam et al., 2020). Focus groups are fast and cost effective, and provide useful insights (Gold & Vassell, 2015). Meanwhile, case studies involve analyzing a specific phenomenon using multiple sources of evidence (Thelwall & Nevill, 2021). Ethnography to investigate cultural groups can be used to comprehensively analyze the complexity of social events based on variation and stability (Blommaert, 2018; Bardi, 2021). One party emphasizes the explanation from their own perspective, whereas the others refer to the possibility of an account by the evidence observed and collected (Atkinson et al., 2001). Action Research is adopted in this study for direct engagement with participants to account for collective consciousness.

3.2. Action Research, conceptual model, and ethical considerations

The Action Research approach is rooted in education and integrates empirical and practical knowledge to solve real problems from a pragmatist perspective (Eden & Ackermann, 2018; Nzembayie et al., 2019). It is a critical and reflective approach that examines the validity of domain knowledge and considers the nature of client organizations (McKernan, 1996). Data collection and analysis form the basis for action. The understanding of any situation is incomplete, but it supports the interpretation of behavior (McIntosh, 2010). In interactions, organizational clients leverage their skills, experiences, and competencies for problem-solving and knowledge construction. Action Research enables the study of human beings while bringing new ways of awareness and behaviors (Morton-Cooper & Palmer, 2000). The researcher intervenes in problem setting, collaboration, and decision-making with clients. Action Research enhances participants' capability for real problem-solving and theory creation (McKay & Marshall, 2001). Researchers' intentional self-participation and client competencies are instrumental in effective problem-solving (Mertler, 2016). Using this approach, researchers improve effectiveness, enhance client professionalism, increase practitioners' understanding, and seek organizational change through cooperation (Azhar et al., 2010). This study focuses on directly engaging clients in collective decision-making through Action Research. The cyclical process involves the stages of planning, action, development, and reflection (Mertler & Charles, 2011). Other Action Research approaches encompass problem identification, analysis, hypotheses formulation, data collection and interpretation, and execution and evaluation of outcomes (McKernan, 1996). Key elements include recognizing issues, selecting alternatives, and interacting with relevant parties (Krabbenborg et al., 2020). Additional approaches involve diagnosis, action planning, action taking, evaluation, and learning. Diagnosing is identifying problems, including self-interpretation, whereas action planning is based on organizational goals. Action taking refers to executing plans and prompting substantial changes. Evaluation involves evaluating the results of the action, and learning refers to knowledge creation during knowledge sharing. This entire process is repeated (Azhar et al., 2010; Love et al., 2012). Various data sources, such as presentations, reports, recordings, and correspondence, can be utilized (Naughton & Hughes, 2008). In the context of Action Research, a conceptual model for client decision-making can describe the overall area of activity using terms and concepts from building projects, which is more abstract compared to a logical and physical model (Halpin & Morgan, 2008). The practical role of conceptual modeling involves definitions as generalizations (Wazlawick, 2013). Within conceptual modeling, which comprises language and procedures (or relationships), language demands clarity, simplicity, and semantic relevance (Halpin & Morgan, 2008).

Investigators must adhere to the ethical principles and standards outlined for psychologists, as specified by the American Psychological Association [APA] (2002) and Sales and Folkman's (2000) '*Ethics in Research with Human Participants*'. When participant consent is necessary, comprehensive information about the study's purpose, duration, procedures, rights, benefits, confidentiality, and contact details should be provided. However, consent may not be required in certain circumstances: 1) when the participant reputation remains intact, and confidentiality is guaranteed, 2) when the study aims to enhance job or organizational efficiency without detriment to participants' employment, while also ensuring confidentiality, and 3) when the study adheres to relevant laws and regulations (Martin, 2007).

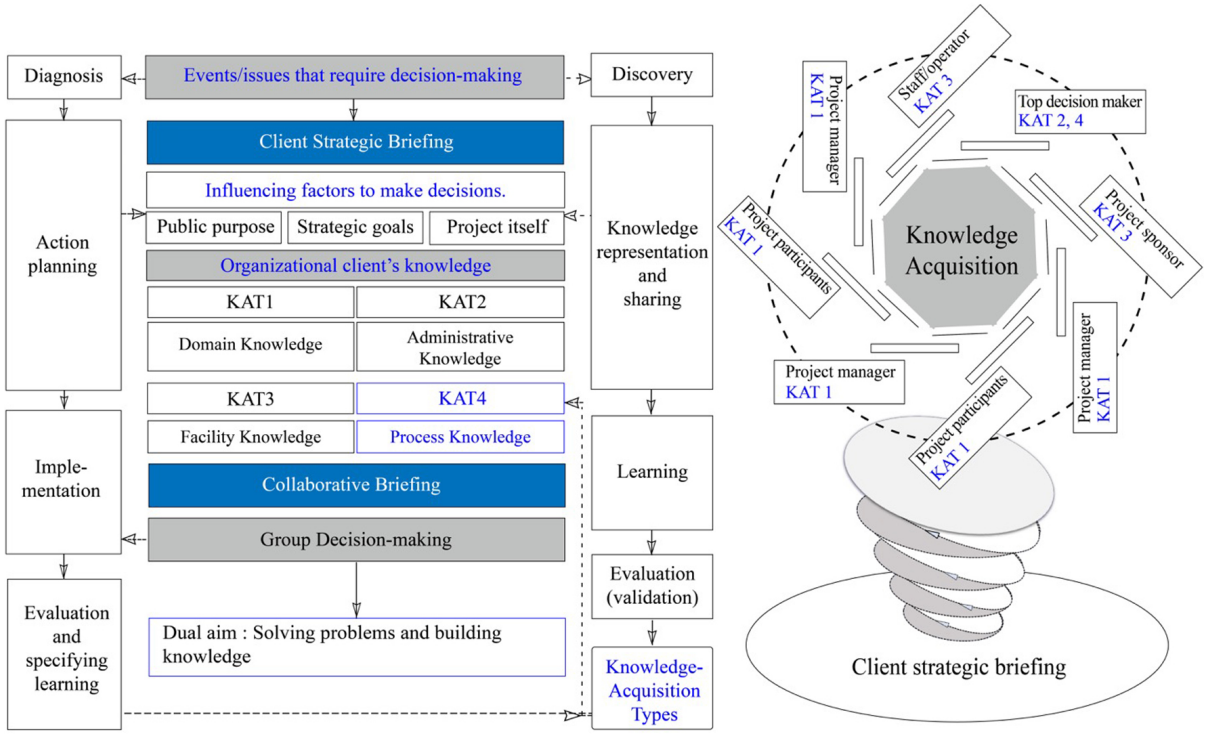
3.3. Research process

Knowledge-acquisition, including modified knowledge management, may be carried out in the following stages: discovering, presenting, sharing, learning, and evaluating knowledge, which is then repeated. Phase 1: Knowledge discovery based on problem diagnosis. A problem refers to a state that deviates from the client's requirements, as communicated through briefings. The aim of this phase is to effectively solve these issues. Researchers collaborate with the client to identify key points in briefings for decision-making. It is important to recognize that each client may have a unique perspective when diagnosing problems and identifying knowledge sources. Various factors, including the characteristics of individuals and groups, must be considered. Phase 2: Knowledge representation and knowledge sharing for action planning. Clients collaborate with practitioners to plan and achieve strategic goals, such as ensuring business feasibility and enhancing efficiency. During briefings, decision-makers contribute valuable insights that are crucial for informed decision-making. Knowledge representation and sharing are integral components designed to support clients, particularly those with limited domain knowledge. Phase 3: Learning and implementation in this phase. Client decisions are applied. Multiple factors influence decision-making, including the project itself, the client's capabilities, organizational domain knowledge, and the external environment. Knowledge is acquired throughout the client decision-making process, with inputs from both clients and organizations during briefing sessions. Phase 4: Evaluation for validation. Outputs of the decision-making process are evaluated to enhance future decision-making during the planning, design, and procurement phases. Phase 5: Knowledge-acquisition, as KAT4. Drawing upon different KATs, the outcomes of decision-making are integrated into a body of knowledge, as depicted in Figure 1. Through knowledge-acquisition, the KATs are utilized to inform decision-making on other issues or projects.

4. Knowledge-acquisition framework

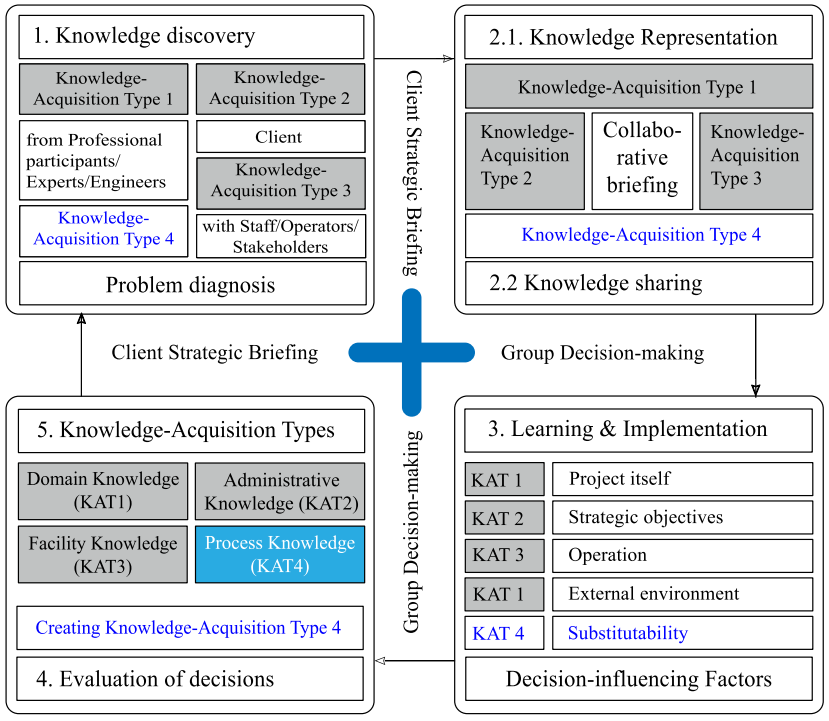
4.1. Types of knowledge-acquisition

Each member is assumed to participate in briefings and projects according to their experience (whether in construction or non-construction) and their perspective (client or employee). They make decisions by integrating various knowledge source depending on the problem. Based on this approach, KATs were classified. Regarding practitioners' construction knowledge, clients can enhance communication with project participants by defining strategic goals (Ahmad et al., 2011). Each client possesses specific criteria rooted in their industry expertise (Sievinen et al., 2020). When addressing non-construction knowledge, like social demands and operational requirements, clients leverage their understanding of participant behavior and data analysis to ensure the success of construction projects. To minimize risks in construction projects, clients also utilize procurement knowledge when sharing information (Kometa et al., 1996; Wong, 2019).



Note: KAT1 = Knowledge-Acquisition Type 1 (Domain Knowledge); KAT2 = Knowledge-Acquisition Type 2 (Administrative Knowledge); KAT3 = Knowledge-Acquisition Type 3 (Facility Knowledge); and KAT4 = Knowledge-Acquisition Type 4 (Process Knowledge).

Figure 1. Knowledge-acquisition and decision-making process



Knowledge-Acquisition Type 1 (KAT1)	
What content do practitioners advise on?	Whether to contact architects, builders, consultants, and others who are project participants.

Knowledge-Acquisition Type 2 (KAT2)		
What content is recognized based on the requests of top decision makers and users?	What content do clients utilize in their daily work (e.g., safety and quality control)?	What content do clients utilize in administrative knowledge?
Existence of strategic goals and business requirements.	Whether to utilize work experience, such as managing team members, etc.	Prior experience with similar process (e.g., marketing).

Knowledge-Acquisition Type 3 (KAT3)	
What content do clients utilize in procurement work?	If clients employ staff in specialized fields: facility operator, and legal and accounting team, to utilize expertise.

Knowledge-Acquisition Type 4 (KAT4)		
What content is similar to case analyses?	What content do clients utilize from the results of construction performance analyses?	What content do clients understand as if clients are producing final products?
Whether there is knowledge available to analyze similar projects.	Whether to retain and use data accumulated from construction performance.	Whether to utilize experience from similar project outcomes, including outputs, results, and benefits).

Figure 2. Knowledge-acquisition types according to intelligence sources

Figure 2 illustrates the clients' knowledge-acquisition process and the various knowledge sources involved. Sharing knowledge during briefings fosters decision-making, learning, and the development of new knowledge. Using this process, stakeholders express viewpoints, develop collective intelligence, and accumulate knowledge. Our aim is to design a framework that classifies KATs for effective decision-making. KAT1 is the domain knowledge that flows from professional practitioners to clients, while KAT2 is the administrative knowledge that the clients obtain through managing their own businesses. KAT3 is the facility knowledge gained from maintaining or operating existing ones, and KAT4 is the process knowledge of clients acquired while carrying out construction projects.

4.2. Knowledge-acquisition framework for building projects clients

Facilitators and organizational clients participated in discussions to understand the decision-making and knowledge-acquisition process. Each phase consists of: (1) discovering KATs to solve problems based on strategic goals, (2) presenting and sharing knowledge for action planning, (3) learning during decision-making and execution, including trial and error, (4) evaluating results, and (5) acquiring knowledge, as KAT4, as depicted in Figure 3. This iterative process facilitates the formation of KAT4, thereby enabling the application of knowledge in the decision-making process. We assume that the knowledge required for project development is obtained from the client, stakeholders, and experts. Consequently, identifying the sources of knowledge is crucial to ensure accurate responses when making decisions in construction projects. Clients strive to estimate reasonable business expenses and project duration, analyze the pros and cons of various alternatives based on requirements, and leverage their expertise through Action Research. The clients' comments and meeting outcomes can be analyzed, with the relevant information summarized in Table 2.

5. Action Research and analysis

5.1. Action Research design

1) Action Research period: Each of ten building projects was conducted from March 2021 to November 2022. 2) Research subject: Table 3 illustrates the members of each organizational client. Building projects have been undertaken across diverse industries: manufacturing, retail, and services. In projects *A*–*E*, the client possessed non-construction domain knowledge. The clients for projects *A*, *E*, and *F* aimed to expand their market presence within the manufacturing industry. Project *B's* client focused on mitigating project risks by leveraging their expertise in financing. In project *C*, several clients were involved early on; however, owing to the inherent complexity of the decision-making process, the authority was delegated to a single leader to minimize bias. Project *D* involved board meetings led by a top decision-maker, where matters were deliberated and decisions were made. The clients for projects *F*–*H* were international entities with their own standards, derived from their experience executing similar projects. Projects *I* and *J* had public sector clients, comprising multiple stakeholders involved in investment, procurement, and operations.

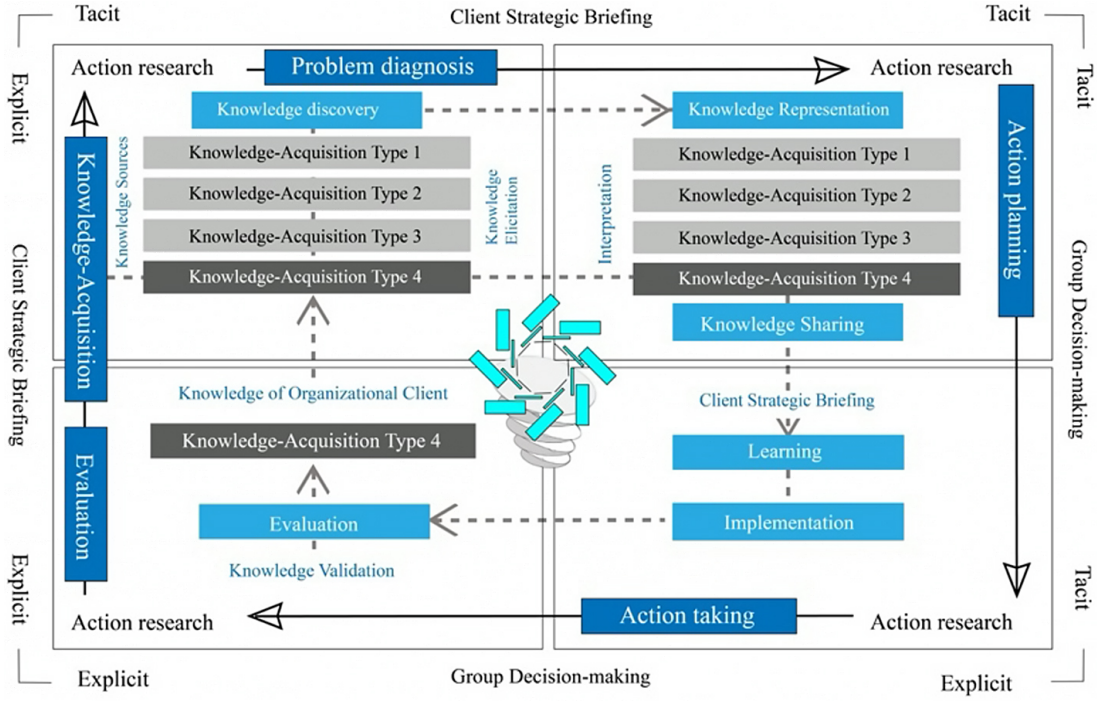


Figure 3. Knowledge-acquisition framework for construction-industry clients

Table 2. Assumptions and information for decision-making

Research Assumption	What client needs to know	Phase of Knowledge-acquisition	Required information
1. Client acquires necessary knowledge through consultations with external experts. **2.** Client possesses industry specific knowledge and experience. **3.** Client gathers information from stakeholders. **4.** Client has prior experience in placing orders and hiring personnel.	Requirements / Project participants / Business expenses / Project duration	Knowledge discovery	Clients evaluate the cost and duration of comparable facilities, considering the project size and usage.
			Clients consider the detailed needs of employees, investors, and customers.
			Clients provide valuable insights and relevant information based on their first-hand experience: space utilization and machinery operation.
			Clients consider the details of relevant companies prior to initiating the bidding process.
		Knowledge representation	Upon receiving the clients' briefing, the architect develops a preliminary design, assesses the estimated construction cost, and determines the projected duration.
			Clients aim to select equipment, and an equipment company based on a careful assessment of their prior operational experience.
		Knowledge sharing	Clients provide their preferred specifications based on expertise and prior experience.
			Clients seek to assess experience of bidders in handling similar projects, including performance of contractors, financial status, reliability, and other relevant factors.
		Learning and implementation	Clients are keenly aware of potential escalations in project costs and duration, and are particularly interested in identifying effective measures to prevent such increases.
			Clients strive to acquire additional data and information to facilitate informed decision-making.
			Scope changes in design or construction work lead to claims by the participants. The client endeavours to minimize and effectively address such claims.
		Evaluation	Relying solely on a ratio-based approach makes it challenging to accurately assess the adequacy of construction costs. It is imperative to determine the appropriate estimated construction cost through a comprehensive evaluation.
			Design changes are often requested by clients, but it is important for clients to recognize that such changes can result in delays during the construction period and increased construction costs.
			When consultation regarding construction costs is rejected, the selection of participants becomes challenging, necessitating the use of a negotiation method.

3) Research hypothesis: The decision-making process is influenced by both the knowledge possessed by decision-makers and the organizational context. 4) Research objective: Action Research aims to enhance organizational clients' decision-making by utilizing the knowledge-acquisition approach during briefings. The specific objectives are as follows: (1) enhance client satisfaction by ensuring building usability, (2) effectively manage organizational members by identifying their individual knowledge, and procedures, (3) foster trust by actively involving clients in the decision-making process, (4) expedite the decision-making process by directly addressing issues based on knowledge sharing and utilization, and (5) provide objective evidence to support the appropriateness of decision-making.

5.2. Research methods and methodological limitations

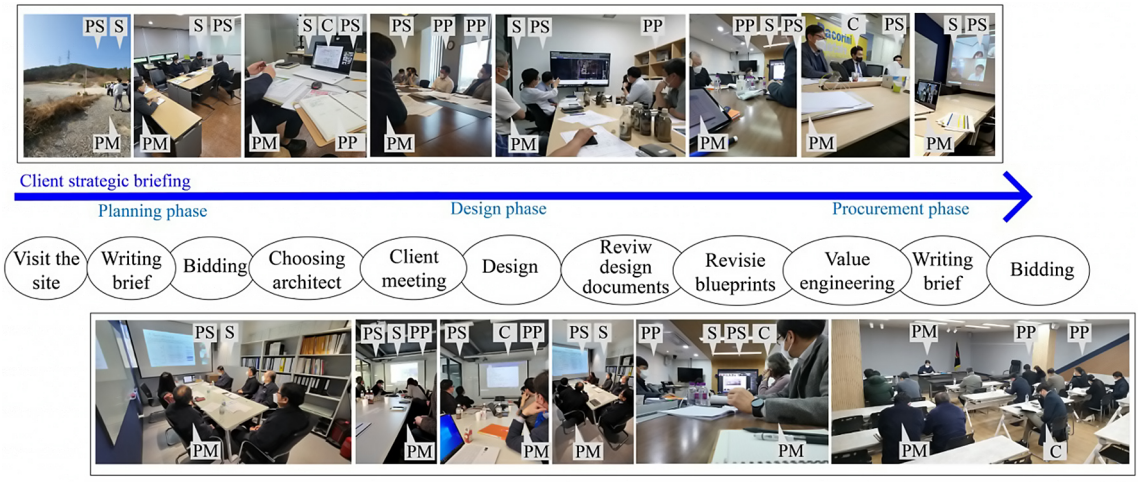
Following an Action Research approach, researchers (facilitators) and clients actively participated in the decision-making process of each project via face-to-face meetings or video conferencing. The researcher conducted briefings with the client and practitioners periodically or whenever specific issues. The Action Research process, based on strategic briefings, involves iterative phases: 1) problem diagnosis, 2) action planning by knowledge sharing, 3) implementation according to group decision-making, 4) evaluation of results, and 5) knowledge-acquisition.

First, with the assistance of facilitators if necessary, clients establish strategic goals and criteria, which are provided to practitioners during briefings to assist in diagnosing issues. Second, researchers and clients recognize the various factors influencing decision-making, as shown in Table 1. Facilitators and practitioners can streamline the number of ideas or alternatives by considering the characteristics of the building, client, organization, and environment that impact decision-making, enabling them to be efficiently reviewed, shared, and decided upon. Additionally, the clients' intentions, causes, and knowledge sources can be collaboratively investigated to find solutions during the process of action planning. This approach explores the applicability of different KATs in the knowledge-building process and establishes a link between the knowledge-acquisition and decision-making processes of clients collaborating with practitioners. Third, in strategic briefing, it is highly advantageous to utilize the expertise of clients who possess extensive knowledge in their respective industries, such as manufacturing and the medical sector, throughout the planning, design, and bidding phases, as depicted in Figure 4. Specifically, during the implementation phase, clients can contribute their perspectives to practitioners in numerous ways, including through site visits, the preparation of briefs, the selection of design and service companies, the establishment of criteria, and the delivery of briefs. Additionally, clients and project practitioners engage in thorough briefings to review design drawings, and identify and decide on VE alternatives that ensure both functionality and cost reduction. Fourth, clients and practitioners develop briefs that reflect the characteristics of the projects. This is achieved by evaluating the consequences of actions based on knowledge-driven decision-making. This process encompasses the derivation of bidding conditions and the evaluation of factors for the selection of a construction company. Fifth, clients' knowledge-acquisition plays a pivotal role in determining project outcomes. Clients gain knowledge, efficiently provide their opinions and perspectives to facilitators and practitioners, and assess the suitability of the buildings based on the strategic goals. This process aligns with the decision outcomes derived from the Action Research approach.

Table 3. Participants of the Action Research Program

Project name	Client business	Members of client organization					Nature of group
		Top decision maker	Project sponsor & Staff [a]	Number of subjects	Project managers	Project participants	
A	Manufacturing	1	5	6	Multi-disciplinary participation [b] (at least 5 people per project)		EG
B	Finance services	1	5	6			
C	Medical services	5	5	10			
D	Sporting services	1	13	14			
E	Manufacturing	1	5	6			
Sum				42			
F	Manufacturing	1	6	7			CG
G	Sales facility	1	7	8			
H	Sales facility	1	7	8			
I	Public enterprise	1	6	7			
J	Public enterprise	1	7	8			
Sum				38			

Notes: EG – Experimental group (comprised of clients inexperienced in similar projects); CG – Control group (comprised of clients experienced in similar projects); [a] it consists of members from operations, accounting, and legal advisory; [b] Related fields include architecture, civil, mechanical, and electrical engineering.



Note: C = Client; PS = Project's sponsor; S = staff; PM = Project managers; PP = project participants.

Figure 4. Sequence of events in the Action Research methodology for decision-making

The following limitations are inherent in this Action Research method: 1) The decision-making research period can be lengthy, as problematic issues typically require multiple meetings, emails, and phone calls for the transfer of knowledge to be resolved. 2) The process and the results of the research are contingent upon the willingness and support of the clients. 3) The researchers must be cognizant of the client's hidden intentions, which are frequently challenging to discern and may only become apparent when complications arise.

5.3. Implementing Action Research to enhance client decision-making

In Action Research of Project *A*, the client (EG, a consumer of building) and staff had been managing the plant for several years (KATs 2 and 3). In relation to problem diagnosis, the selection of equipment company was postponed owing to unconfirmed specifications. After selecting the equipment manufacturer, the client requested adjustments to the equipment layout to enhance the factory's production efficiency according to the strategic goals. As part of the knowledge sharing process, an assessment of the appropriate span and size of columns was required to ensure the efficiency as well as the structural stability of the building (KAT1). In the decision-making process for the implementation, organizational clients acquired mutual knowledge. Delayed decision-making on the design and practitioner changes resulted in increased business costs and business period extension. The clients not only presented the opinion in their own field but also gathered insights from experts in other fields during the collaborative briefing. During evaluation, the client was able to learn from knowledge (including knowledge structure: principles, concepts, and ideas), understand participant feedback and review results, and negotiate and compromise on designs to the appropriate level, taking into account HACCP certification and site conditions. This was because the client had acquired knowledge that could replace domain knowledge in the decision-making process (KAT4). To achieve strategic objectives, the client needed effective organizational management to ensure that project participants adhered to the client's strategic briefing and avoided unnecessary overdesign, as depicted in Figure 5.

On the other hand, Project *G*'s client (CG, a building supplier) utilized the expertise and real-estate development experience as KAT4. To diagnose the problem, client's strategic goal was to form a distribution network to supply products. To ensure corporate reputation, revenue, and building quality, the client wanted to maintain the operations of existing businesses and carry out expansion construction at an appropriate construction cost within a limited period, reflecting the rapidly increasing inflation rate after COVID-19 (KAT2). During the knowledge sharing, the project sponsor provided the information such as opinions and functional requirements based on cases from a tenant company and other branch office (KAT3). A construction road was opened in the existing parking lot, so that store customers could use the existing road. The practitioners then reviewed construction methods (KAT1). The project period was extended owing to the changes in design aimed at reducing construction costs and a review of the licensing agency. Phased project implementation was considered for a quick start of construction. The client analyzed inflation rate, material cost, and labor cost, based on market research (KAT4) to determine appropriate construction costs owing to a difference in perspective with the contractor. For the implementation, the contract was delayed because an agreement between the client and the contractor could not be achieved. The client requested that practitioners support decision-making through cross-validation with an expert group, who could present objective information and opinions. After reviewing the opinions of practitioners and the results of external expert groups at the collaboration briefing, the client intended to reflect construction cost reduction methods in the design, and implement phased construction based on knowledge sharing.

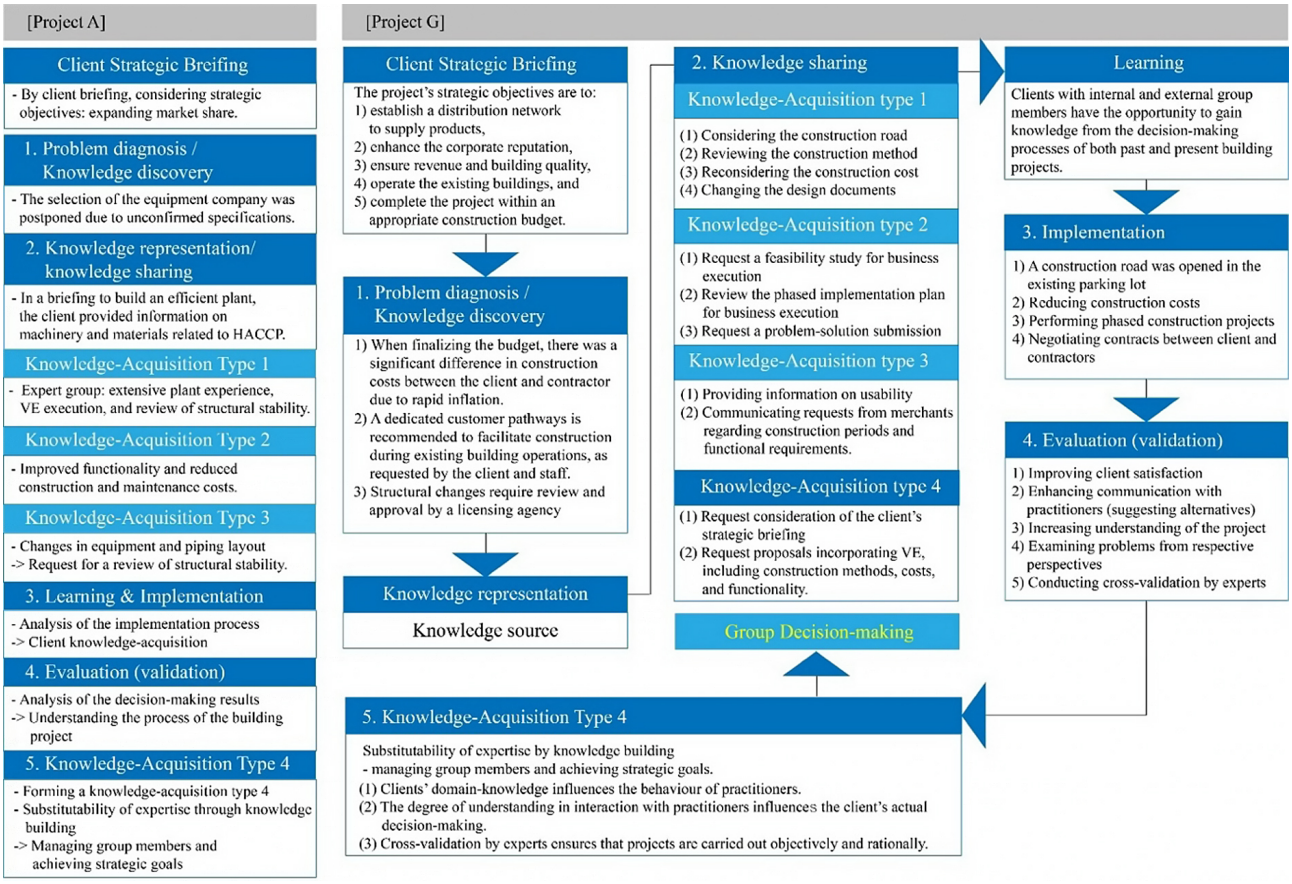


Figure 5. Action Research of client strategic briefing for Projects *A* and *G*

By evaluating, the client communicated with practitioners to increase satisfaction, and client's decision-making based on the domain knowledge influenced the behavior of practitioners. The degree of understanding in interaction with practitioners influenced the client's actual decision-making. By communicating with practitioners and examining problems from their respective perspectives, the construction project was appropriately, more objectively, and rationally carried out based on collective intelligence through cross-validation by experts inside and outside the organization. As a result, KAT4 was accumulated according to the experience of the construction projects. Knowledge structure and organization management of practitioners actively carried out in collaborative briefing was used to implement phased construction. However, owing to the characteristics of the building, the client's experience was limited to building sales facilities, and the items that could be utilized for VE were limited, as listed in Table 4.

Prior to proceeding with the project, the guidelines in which the awareness level of client, interests, experience, and values were reflected, were provided to practitioners as a client strategic briefing to be reflected in the outcome. When issues arose, cross-validation was useful in decision-making on issues sensitive to project participants. Project *A* (EG) was carried out by changing the project participants for design changes. Project *G* (CG) was carried out step-by-step by sharing opinions with the project participants based on each position in the pre-construction briefings. Additionally, considering the substitutability of domain knowledge (KAT4), the problem-solving process in projects *A–J* facilitated learning and partial resolution of similar problems. However, acquiring knowledge to solve all problems was somewhat difficult, depending on individual capabilities and the characteristics of the building project. Experience with procedures is advantageous for knowledge creation, and it was possible to obtain a rough understanding by using existing information. The client attempted to leverage the domain knowledge to make decisions with a group of experts to judge the legality, site suitability, and technical feasibility of each field. The mentioned projects had a significant interest from clients and members of the organization. This implies that it was necessary to prevent technicians from making arbitrary decisions and utilize the knowledge of clients and the organizational members to construct facilities suitable for the intended use. Therefore, the understanding of the project itself, the relationship with the practitioners, and the organization capability and nature affected the decision-making process and outcome. As shown in Table 4, many clients share knowledge with practitioners to enhance functionality, shorten construction time and minimize costs, as methods of achieving strategic goals. The expertise in each respective field, which encompasses the main factors influencing decisions and the required information from the client, as presented in Figure 2 and Table 2, can be further augmented to ensure adequacy when challenges arise. In particular, the per-

Table 4. Design documents review and VE performance

Project name	Architecture	Landscape & Civil Engineering	Mechanical Engineering	Electrical & Telecommunication Engineering	Fire Engineering	Sum
A	36	1	10	14	22	83
B	37	16	11	17	29	110
C	11	2	10	11	0	34
D	35	16	17	13	29	110
E	26	8	13	20	17	84
F	32	2	2	7	10	53
G	24	9	8	3	3	47
H	45	0	19	32	59	155
I	18	9	2	2	0	31
J	72	3	15	34	10	134

formance of design review and VE is influenced by various factors, including the duration of managerial involvement in the design phase, quality of design documents, and attention given by the client and organizational members. Additionally, clients and operators with experience in various fields such as manufacturing, real estate, and service provided related information, requirements, and recommendations through their experience, especially in the machinery and electrical sectors for a building project. In the process of decision-making for problem-solving, the experience and knowledge of clients and members inside and outside the organization also influenced the other party's knowledge creation, including knowledge structure, as internal decision-making mode during the communication process. In Project *C*, when cost-related decisions were required, the representative disseminated pertinent information obtained via social networking services (SNS), including the decision-making process, deadline, and outcomes. The fact that decisions could not be reversed was explicitly stated in advance. Clients who were not engaged with the project demonstrated a greater receptivity to the representative's perspectives, likely owing to the heightened workload associated with the representative's dual role as a project leader and fulfilling his own job responsibilities. To reduce the selection and response biases, the clients who lacked prior experience or faced difficulties in decision-making owing to either a small or large number of participants obtained objective information by touring similar buildings with project practitioners. They also interviewed the clients of these buildings and made decisions based on relevant laws, regulations, and certification manuals, including cross-validation by practitioners. Consequently, the knowledge-based decision-making process effectively minimized bias, largely owing to the clients' willingness and active support in acquiring data, information, and knowledge.

5.4. Results: Action Research and knowledge-acquisition types

In the early stages of the project, the client (EG) mainly leveraged the possession knowledge (knowledge structure) and the operators' knowledge. Workers outside the organization unilaterally conveyed their opinions to clients, which made decision-making difficult as it required relevant experience or knowledge. The clients were able to make decisions by analyzing feasibilities based on the domain knowledge flows from practitioners, known as KAT1. KAT2, that is the administrative knowledge of the clients obtained through managing their own business, was applied when non-construction issues arise, such as understanding the client's business purpose. This is to ensure that the decision's outcomes align with the client's ultimate goals. Additionally, clients made decisions based on facility knowledge that they maintained and operated, as KAT3. Occasionally, the clients acquired facility knowledge from employees or operators within the organization. Leveraging the concept of substitutability, KAT4 evaluates whether the client can partially replace expertise through knowledge sharing and acquisition. This is the process knowledge of clients acquired while carrying out the construction projects. KATs for decision-making are a combination of knowledge types and knowledge transfer path – unidirectional, bidirectional, and multilateral, which means that one or more KATs can be simultaneously selected depending on the nature of the problem. Through briefings with participants, ideas were exchanged, adjusted, proposed, and selected using KATs 1, 2, 3, and 4 related to the conceptual model, as depicted in Figure 6. When similar problems arise, organizational clients can obtain the accurate information required for decision-making and ask the right questions to members with relevant knowledge as part of the knowledge-acquisition approach.

The clients of CG were introduced for comparison with EG. This Action Research required security to listen to the client's subjective opinions in the decision-making process, to find out how their opinions based on knowledge could be applied to decision-making on the building projects, and to ensure that intentions are not distorted. As depicted in Figure 6, organizational clients have KATs 2 and 3. Project managers and project participants have KAT1 in various fields: architecture, structure, and civil engineering, but they have different perspectives. When having different opinions, heated discussions take place, and through this process, clients build knowledge for decision-making.

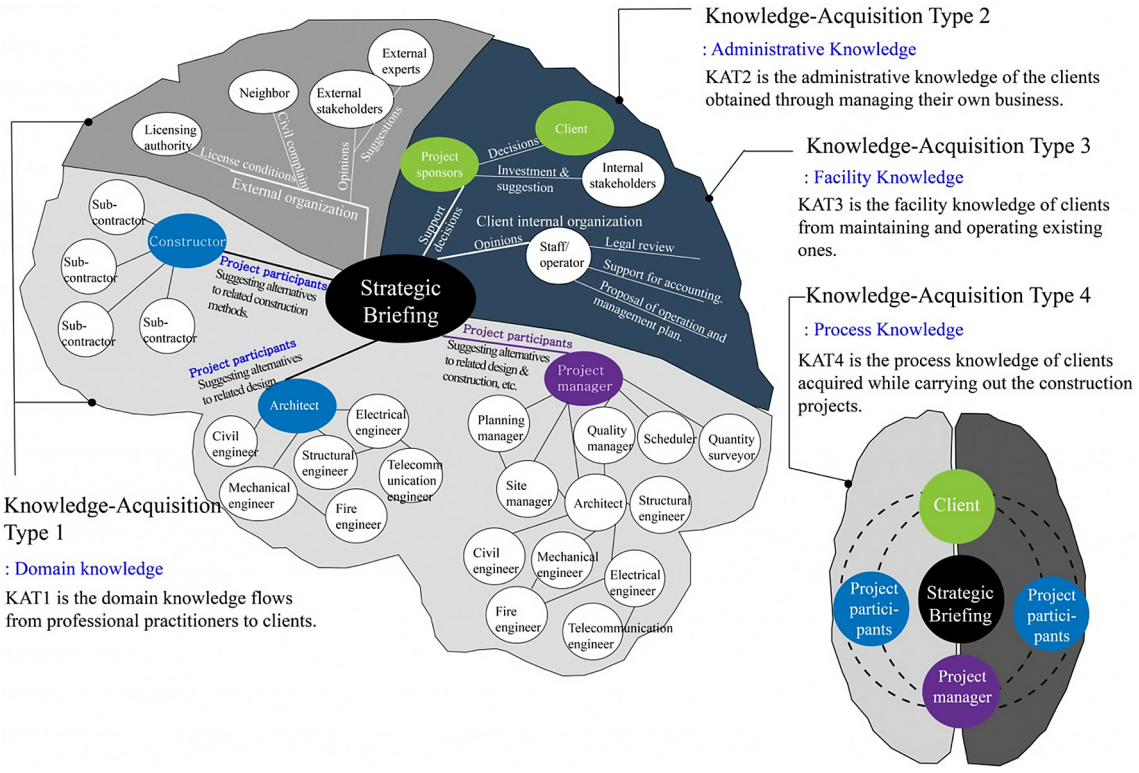


Figure 6. Conceptual model of Knowledge-acquisition types for decision-making

The clients intended to estimate the project costs and period, reflect the requirements, know the decision results in advance by comparing with other buildings and evaluate the results, based on the domain knowledge of experts. These improved client's satisfaction with the project process and results. During Action Research, the client acquired knowledge even in the first project (EG) as well as existing clients (CG). Although they lack experience on a building project, clients and staff must participate in briefings to suggest specifications and to request alternatives when making decisions and managing participants. Considering this, clients and practitioners were able to actively utilize each other's collective knowledge (as depicted in Figure 7).

To evaluate client satisfaction, we collected subjective opinions using a five-point scale. The questionnaire consisted of 30 questions (detailed in the Appendix) covering aspects: the management of schedules, budgets, claims, quality, and risk. Most of the one-on-one questionnaires received minimum scores of four, making it challenging to discern meaningful distinctions. As a result, we conducted interviews following the questionnaire survey. During the interview, the primary issues identified in Project *F* were the transition of project participants and the management of subcontractors by the designer. These problems led to delays in completing the project, as they affected the production of design documents and the construction process. We provided an explanation of the KATs and framework during the interview, which revealed the need for pre-existing training on knowledge sharing through methods: manuals, workshops, and seminars. These measures would facilitate the knowledge-acquisition process.

6. Conclusion: Embracing the knowledge-acquisition for effective decision-making

The clients required knowledge to achieve strategic objectives, by considering the key factors affecting decision-making (Section 2.1) for a construction project to make more rational decisions. This is because the client's decisions influence the behavior of project participants. From the perspective of clients, the purpose of this study is to (1) increase awareness of the factors influencing client decision-making in building projects. The results of the literature review are presented in Table 1. These are the project itself (strategic goals, client needs), client (characteristics, experience, management capabilities), organization (organizational capabilities), and environment (risk management, relevant regulations). In Section 2.4, considering the perspective of clients, to (2) accumulate knowledge of the client from the research results according to the framework indicated the substitutional knowledge (KAT4), that can be utilized in knowledge-based decision-making for the problem-solving. Interestingly, despite limited prior experience, clients in projects *A–E* acquired the KAT during project execution by engaging with knowledgeable practitioners. They sought guidance, asked relevant questions, and utilized practitioner expertise for effective problem-solving and alternative selection. The practitioners were able to use abilities of client and organizational members to derive detailed requirements for client's satisfaction (Table 2). In Section 5.1, we compared new clients of projects *A–E* (EG) with the clients of projects *F–J* (CG) by directly participating in briefings with the intent to confirm the KAT.

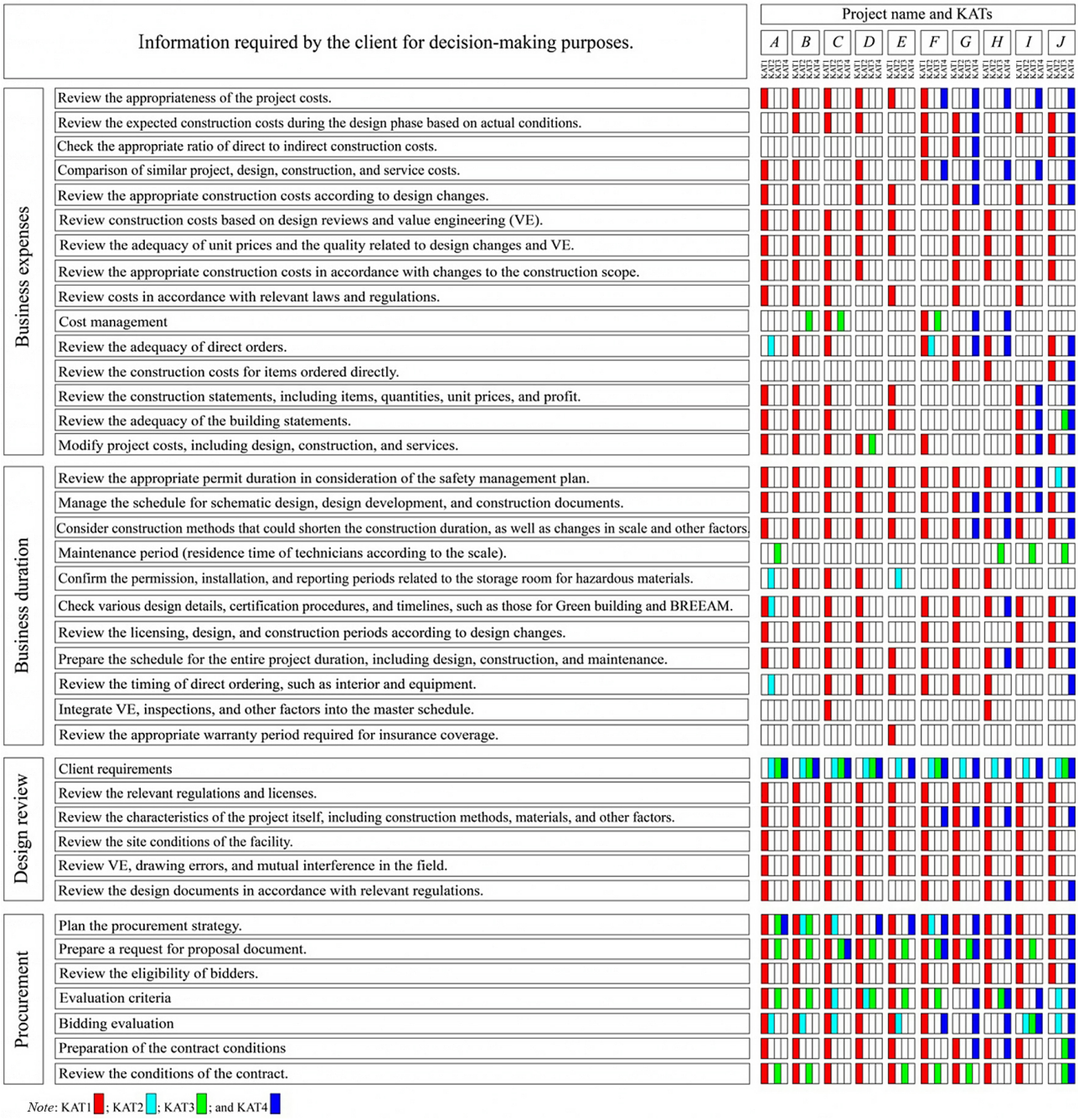


Figure 7. Client requirements for decision-making, categorized by the knowledge-acquisition approach

Subsequently, we summarized the results reflecting a framework of the knowledge-acquisition (Figures 3 and 5). As the researchers planned and implemented the framework, the facilitator sought to achieve the research purpose with the organizational clients from the perspective of the participant making decisions through the framework. We intended to present the knowledge and knowledge sources in each field, and share them with clients, project participants, and stakeholders having different perspectives. After making decisions, clients wanted to achieve the strategic goals by acting on the plans with the organizational members. Then, by evaluating the outcomes of decisions for validation, the client and organizations learned and acquired the domain knowledge for the building projects (Section 5.2).

The research objectives from the facilitator's perspective are (1) the KATs to utilize collective intelligence (Section 2.2). Organizational clients are classified into types of knowledge-acquisition depending on experience of building projects and their perspectives of clients, staff, and experts. The organizational members have knowledge structure, and share not only data, information, knowledge but also knowledge structure. The domain knowledge of organizational clients consists of: expertise flows from construction professionals to clients (KAT1), administrative knowledge from the client's business management (KAT2),

facility knowledge from maintaining and operating existing ones (KAT3), and process knowledge as a substitutability for construction expertise (KAT4). KATs are intended to foster effective and coordinated knowledge sharing among individuals and organizations. This was to promote (2) knowledge sharing within the organization for group decision-making to support organizational clients from diverse perspectives based on collective intelligence. In Section 3.2, Action Research can reveal internal awareness externally, and the client was able to recognize the importance of utilizing the knowledge of all practitioners during the Action Research process. Through Action Research, this study built a framework based on the internal decision-making processes of organizational clients and KATs, which are affected by their respective knowledge structure formed according to the characteristics of each group, and to investigate them in ongoing building projects *A–J* (Figure 3). By mutually sharing the knowledge, clients were able to facilitate organizational management by accurately grasping the scope of each member's work, details, and procedures, and reduce time required for decision-making, secure objectivity, and build trust. It also aimed to (3) accumulate knowledge by repeating decision-making procedures as a framework based on a conceptual model (Figure 6) for clients and practitioners, and to secure logical consistency for rational decision-making. The client required knowledge to achieve strategic objectives for a construction project to make more rational decisions (Section 2.3). Although clients of projects *A–E* were inexperienced, they were able to acquire the KAT4 during project performance (Figure 7).

This is because clients directly asked questions to practitioners having information and knowledge for decision-making of building projects, and client's knowledge can be utilized by the practitioners for problem-solving and alternative selections. To conclude, our research proposes a robust decision-making framework rooted in the concept of knowledge-acquisition. This framework empowers clients to make strategic and knowledge-based decisions, resulting in successful project outcomes. By embracing knowledge-acquisition and actively engaging with practitioners, clients can unlock their full potential and judgement (capabilities), contributing to efficient decision-making, client satisfaction, and overall project success.

Data availability statement

Some or all data, models, or code generated or used during the study are proprietary or confidential in nature and may only be provided with restrictions.

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APPENDIX

Questionnaire assessing performance through the knowledge-acquisition

Division	Questionnaire	5-point scale
Schedule Management	Was the schedule managed properly?	
	Was there a response to schedule changes?	
Budget Management	Was the project supported within budget?	
	Has budget management efficiency been achieved?	
Claims Management	Was communication with stakeholders smooth and effective?	
	Have appropriate solutions been derived in situations of conflict?	
Quality Management	Has sufficient support been provided for quality control?	
	Were the problems properly dealt with?	
Risk Management	Has the project been given the support it needs to manage risk?	
	Are advance preparations for risk situations appropriately addressed?	
Expertise Utilizing	Did the expertise contribute to the success of the project?	
	Was knowledge required for the project possessed?	
Reactions	Were the resolutions to the problem situations satisfactory?	
	Were the responses to unexpected situations appropriate?	
Leadership	Were the project management and leadership roles fulfilled?	
	Was there an effort to improve performance?	
Provision Methods of Information	Was important information provided in a timely manner?	
	Were the necessary plans or instructions provided accurately?	
Knowledge Creation	Was the necessary information conveyed to team members?	
	Were team members able to acquire the necessary knowledge?	
Education& Training	Have team members received the necessary training?	
	Did the training help increase understanding of the project?	
Experience Sharing	Was experience shared with team members?	
	Did sharing success stories contribute to team learning?	
Communications	Did communication with team members proceed smoothly?	
	Were questions answered in a timely manner?	
Collaboration	Was the problem solved through collaborating with team members?	
	Has a collaborative atmosphere for knowledge sharing been fostered?	
Evaluation & Feedback	Has the effectiveness of knowledge sharing been evaluated?	
	Were suggestions made to improve the knowledge sharing process implemented?	