Ilomata International Journal of Social Science

Check for updates

OPEN ACCESS

RECEIVED 28 May 2026
ACCEPTED 9 July 2026
PUBLISHED 31 July 2026

CITATION
Rahman A, (2026). Stakeholder Participation in Work Breakdown Structure (WBS) Development: a Case Study of the Dharmais Cancer Hospital Construction Project. Ilomata International Journal of Social Science. 7 (3), 1037-1046.
doi: 10.61194/ijss.v7i3.2516

TYPE Original Research
PUBLISHED 31 July 2026
DOI 10.61194/ijss.v7i3.2516
VOL 7 Issue 3 July 2026

COPYRIGHT
© 2026 Rahman. This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY). The use, distribution or reproduction in other forums is permitted, provided the original author(s) and the copyright owner(s) are credited and that the original publication in this journal is cited, in accordance with accepted academic practice. No use, distribution or reproduction is permitted which does not comply with these terms.

Stakeholder Participation in Work Breakdown Structure (WBS) Development: A Case Study of the Dharmais Cancer Hospital Construction Project

Arief Rahman
Universitas Pembangunan Nasional Veteran Jakarta, Jakarta, Indonesia
Correspondence: aremkha@gmail.com

Abstract

Hospital construction projects involve complex coordination among multiple actors, yet previous studies have paid limited attention to how stakeholder participation shapes the development of Work Breakdown Structure (WBS) within specific healthcare construction settings. This study aimed to examine the forms and levels of stakeholder participation in WBS development and to identify factors influencing stakeholder involvement during project planning. A qualitative case study was conducted in the Dharmais Cancer Hospital construction project. Data collection was conducted through semi-structured interviews with nine key informants representing strategic project organization functions, which includes senior management, project operations, engineering, administration, quantity surveying, building information modeling, and contract management, alongside the project owner representative. Data were analyzed using thematic analysis and validated through triangulation techniques. The findings indicate that stakeholder participation varied across groups. Project owners and key technical actors were actively involved in defining work packages and making planning decisions, whereas some supporting stakeholders participated only at the consultation stage. In several instances, participation tended to become formalistic because decision-making authority remained concentrated among a limited number of actors, while communication and institutional procedures constrained broader involvement. Organizational structure, leadership commitment, communication mechanisms, and information technology support were identified as important factors shaping participation patterns. The study suggests that effective WBS development depends not only on the presence of stakeholders but also on the quality and distribution of their participation. These findings provide practical insights for improving collaborative planning in healthcare construction projects.

KEYWORDS

communication; healthcare project; organizational structure; stakeholder participation; wbs.

Introduction

Healthcare projects, particularly hospital construction projects, demonstrate a high level of complexity due to the involvement of various technical aspects, stringent regulations, and specific healthcare service requirements (Schönbeck, 2022). Such complexity frequently leads to risks of schedule delays and cost overruns during project implementation (Arba, 2021). The development of a Work Breakdown Structure (WBS) constitutes a crucial stage in project management because it determines the clarity of project scope, the appropriate division of tasks, and the efficient allocation of resources (Mirajhusnita & Nisa, 2023). The systematic implementation of WBS has been proven to support the successful delivery of healthcare facility construction projects, as evidenced by recent empirical studies (Hartanti & Latief, 2025).

The preparation of a Work Breakdown Structure (WBS) is an essential

component of project planning that facilitates the decomposition of project scope into manageable work units to support effective control. In practice, however, WBS development often fails to involve stakeholders optimally, thereby creating the potential for discrepancies between project planning and actual field requirements (Soeparyanto et al., 2024; Sukmono, 2023). This condition is reinforced by findings indicating that projects with structured stakeholder involvement achieve estimation accuracy levels that are 47.8% higher than those adopting less inclusive approaches, which directly affects the alignment between planning and implementation (Somula, 2025). Therefore, enhancing stakeholder participation in WBS development is necessary to minimize such risks and improve overall project success (Dwivedi & Dwivedi, 2021).

The construction of Dharmais Cancer Hospital in West Jakarta, as one of Indonesia's national strategic projects, faces cross-sectoral coordination challenges involving government authorities, medical personnel, contractors, and consultants. Insufficient stakeholder participation may result in miscommunication, project delays, and risks of failing to meet the expected healthcare service standards. Several empirical studies indicate that more than seventy percent of construction projects in developing countries experience delays due to inadequate stakeholder coordination, including healthcare infrastructure projects (Putra, 2025). Consequently, strengthening stakeholder participation and implementing effective stakeholder management are crucial to minimizing such risks and ensuring the successful completion of national healthcare facility development projects (Nginya, 2024; Tampio et al., 2022).

Previous studies on Work Breakdown Structure (WBS) have primarily emphasized technical decomposition procedures, scheduling, and resource allocation in construction projects, while stakeholder-management studies have generally focused on stakeholder identification, influence, and communication processes (Arba, 2021; Mirajhusnita & Nisa, 2023; Syukur et al., 2024). Although these streams of literature provide important insights, they have rarely been integrated to explain how stakeholder interactions shape the process of WBS development in complex healthcare construction projects(Sari & Latief, 2023). From the perspective of stakeholder theory (Freeman, 1984) and stakeholder salience theory (Mitchell, 1994), differences in stakeholder power, legitimacy, and urgency may influence the extent to which stakeholders participate in project planning. However, existing technical WBS studies and general stakeholder-management studies provide limited explanations regarding variations in participation levels and the organizational conditions that enable or constrain stakeholder involvement during WBS development.

The identified gap is therefore not merely contextual or methodological, but also theoretical. Previous quantitative studies have provided evidence regarding the importance of stakeholder involvement, yet they offer limited explanations of why participation differs among stakeholder groups and how organizational structures, communication mechanisms, and institutional arrangements shape such differences. Moreover, studies focusing specifically on healthcare construction projects remain scarce, despite their unique characteristics, including multidisciplinary coordination, strict regulatory requirements, and high operational complexity (Idamatussilmi & Hikmah, 2023). Empirical studies employing qualitative approaches to investigate stakeholder participation in WBS development are particularly limited, and cancer hospital projects have rarely been examined as a specific context.

A qualitative case study approach enables a more comprehensive understanding of stakeholder experiences, perceptions, and interactions throughout the WBS development process (Ebekozien et al., 2024; Yesodharan et al., 2021). Through in-depth interviews, observations, and document analysis, qualitative inquiry can capture coordination patterns, communication processes, and the factors underlying unequal participation among stakeholders that are difficult to explain using quantitative approaches alone (Castro et al., 2021). The Dharmais Cancer Hospital construction project represents a relevant case because of its complexity and the involvement of multiple actors with diverse responsibilities and interests. Consequently, the case contributes not only as a descriptive account of a single project, but also as an empirical setting for explaining how stakeholder participation operates within healthcare-related WBS development.

Accordingly, this study seeks to address the following research questions: (1) How do different stakeholders participate in the development of the Work Breakdown Structure (WBS) in the Dharmais Cancer Hospital construction project? (2) What organizational and contextual factors influence stakeholder participation during the WBS development process? and (3) How do differences in stakeholder participation affect the quality and effectiveness of WBS development? Based on these questions, the study aims to provide a qualitative explanation of stakeholder participation levels and the enabling factors that shape WBS development in healthcare construction projects. The novelty of this study lies not only in the specific context of the Dharmais Cancer Hospital project, but also in its attempt to bridge stakeholder-management and technical WBS perspectives by explaining variations in stakeholder participation and the organizational mechanisms that influence collaborative project planning.

Methods

Research Approach and Strategy

This study adopted a qualitative single-case study strategy grounded in an interpretivist paradigm to explore stakeholder participation during the development of the *Work Breakdown Structure* (*WBS*) in the Dharmais Cancer Hospital construction project, with boundaries limited to the planning stage, the unit of analysis comprising key actors from the project owner, consultants, contractors, and technical personnel, and data collected through in-depth interviews, direct observations, and document analysis, followed by thematic analysis and triangulation to identify patterns in participation forms, stakeholder roles, communication mechanisms, and organizational influences while enhancing credibility and trustworthiness. Furthermore, the single-case study approach combined with multiple data sources, triangulation, and thematic analysis proves particularly effective for generating rich, process-level insights into complex socio-technical stakeholder interactions within real-life project settings, consistent with Yunani et al. (2025), who applied this strategy to investigate stakeholder engagement levels and their contribution to project success.

Research Location and Object

The research was conducted at the construction site of the Dharmais Cancer Hospital in West Jakarta, Indonesia. The object of this study is the Work Breakdown Structure (WBS) development process formulated for this specific healthcare facility. The scope of this study is tightly bounded to the project planning stage, focusing on how the overall project scope is decomposed into discrete, manageable work packages. Data sources utilized for this investigation include primary inputs from key project stakeholders (project managers, engineers, quantity surveyors, owner representatives, and hospital end-users) as well as secondary project archives such as formal WBS diagrams, RACI matrices, meeting minutes, and organizational charts. Complex construction projects, particularly those involving healthcare facilities, are prone to

Table 1. Data Collection Techniques, Sources, and Objectives

Type of Data	Data Sources	Collection Method	Objective / Focus
Primary Data	Project Manager, Engineers, Quantity Surveyors, Owner Representatives, Users	Semi-structured interviews	To explore stakeholder participation and factors influencing WBS development
Secondary Data	WBS documents, RACI Matrix, meeting minutes, organizational structure	Documentation study	To verify formal processes and role distribution
Observational Data	Project coordination meetings, technical discussions	Non-participant observation	To observe stakeholder interactions and dynamics

Table 2. Summary of Data Collection Techniques

Technique	Focus	Objective	Instrument
Interviews	Key informants	Understanding stakeholder perceptions	Interview guidelines
Documentation	Project archives	Data verification	Project documents
Observation	Stakeholder interactions	Analysis of communication dynamics	Field notes

substantial cost overruns and schedule delays owing to their inherent complexity and stringent regulatory demands, with empirical investigations indicating that up to 98% of projects either exceeded their budgets or faced delays (Abdelalim et al., 2024; Xie et al., 2022). Furthermore, the WBS serves as an effective communication instrument that enables stakeholders to comprehensively grasp the project scope and associated risks, thereby enhancing coordination, alignment, and overall project coherence among diverse participants in intricate construction settings (Damanik et al., 2023).

Informants and Informant Selection Technique

This study employed purposive sampling to determine the informants. Informants were selected based on their direct involvement in the WBS development process and their understanding of healthcare project management practices. The criteria for selecting informants were as follows:

1. Holding a strategic position within the project organization.
2. Being directly involved in the WBS development process.
3. Possessing experience in hospital construction projects.

In this study, semi-structured interviews were rigorously conducted following formal qualitative procedures. Prior to each session, written informed consent was obtained from all participants, guaranteeing strict confidentiality and anonymity. The interviews lasted between 45 to 90 minutes, were audio-recorded with explicit permission, and subsequently transcribed verbatim for thematic coding. Data saturation was determined dynamically during the fieldwork when successive interviews with different stakeholder groups yielded repetitive patterns and no new codes or themes emerged regarding the WBS formulation process (Saunders et al., 2023).

The application of purposive sampling combined with sample-size determination grounded in the principle of data saturation for qualitative inquiry into construction project management practices is substantiated by empirical research involving project managers and specialist recruiters in the Australian construction industry, where a comparable purposive approach with semi-structured interviews yielded sufficient depth once saturation was reached in a narrow-scope, homogenous participant group (Gardner et al., 2024). Furthermore, the rigorous conduct of semi-structured interviews including procedures for obtaining informed consent, audio recording, verbatim transcription, and safeguarding participant confidentiality aligns with established methodological standards for qualitative data collection that emphasize flexibility while maintaining analytical rigor and trustworthiness (Adeoye-Olatunde & Olenik, 2021).

Data Collection Techniques

This study employed three data collection techniques, as summarized in Table 1, to capture primary, secondary, and observational data relevant to the WBS development process.

1. In-Depth Interviews : In-depth interviews were used as the primary technique to explore stakeholders' experiences and perceptions regarding the WBS development process. Semi-structured interviews were conducted to ensure flexibility while maintaining alignment with the research objectives.
2. Documentation Study : Documentation analysis was conducted to obtain objective data related to the WBS structure, responsibility allocation, and project planning processes. The analyzed documents included WBS documents, RACI Matrix records, project reports, and meeting minutes.
3. Contextual Observation : Non-participant observations were systematically conducted by the researcher over a three-month planning period from October to December 2024. A total of 12 project sessions were observed, comprising 4 specialized WBS development workshops, 5 BIM-enabled coordination meetings, and 3 routine weekly progress review meetings. Each observed session lasted approximately 120 to 180 minutes. The researcher maintained a strict non-participant observer role, focusing field notes on stakeholder engagement levels, cross-functional communication dynamics, and decision-making behavior during scope decomposition (see Table 2).

Data Validation Technique (Triangulation)

In this study, the validity of the data was meticulously ensured by applying triangulation techniques, specifically source triangulation through the comparison of information derived from different stakeholders, methodological triangulation by combining interviews, documentation, and observation, theoretical triangulation utilizing stakeholder theory and project management theory as analytical lenses, and researcher triangulation involving deliberations with supervisors and fellow researchers (see Table 3). This comprehensive strategy for data validation is substantiated by contemporary scholarship, which highlights that triangulation effectively minimizes biases inherent in single-method or single-source approaches and thereby enhances the overall credibility and reliability of qualitative findings (Donkoh & Mensah, 2023). Furthermore, in-depth examinations of its theoretical foundations reveal that the integration of diverse data sources, methods, theoretical perspectives, and investigators via triangulation not only cross-validates results but also provides a more nuanced and comprehensive understanding of complex phenomena, ultimately strengthening the trustworthiness of research outcomes

Table 3. Implementation of Triangulation

Type	Description	Implementation
Data	Multiple data sources	Project Manager, Quantity Surveyor, Owner, User
Methods	Combination of techniques	Interviews, observation, documentation
Researchers	Collective validation	Academic discussions
Theory	Theoretical perspectives	Stakeholder and project management theories

Table 4. Stages of Data Analysis

Stage	Description
Familiarization	Understanding the data comprehensively
Coding	Identifying meaningful units of data
Theme Development	Grouping recurring patterns
Validation	Conducting data triangulation
Interpretation	Linking findings with relevant theories

(Vivek et al., 2023).

Data Analysis Technique

The effective development of the Work Breakdown Structure (WBS)is fundamental to achieving project objectives and managing scope in complex projects. Stakeholder participation in this process ensures that diverse perspectives are incorporated, leading to more robust project planning and reduced risks (Alani & Omotayo, 2023). To thoroughly examine such participation, researchers employ thematic analysis as a qualitative method involving systematic stages of data familiarization, coding, theme development, validation, and interpretation. This approach facilitates a comprehensive understanding of stakeholder dynamics and contributes to theory-linked insights in project management research.

Data analysis was conducted using a thematic analysis approach with the following stages (see Table 4).

Data analysis followed a hybrid thematic approach combining deductive codes derived from stakeholder and project management theories with inductive codes emerging directly from the field data. Initial open codes included expressions such as "cross-divisional silos," "BIM synchronization," "time-pressured approvals," and "limited clinical user input." These codes were iteratively clustered into higher-level sub-themes and finally mapped into four central themes: Structural Facilitators, Digital Integration Capabilities, Stratified Participation Patterns, and Governance Constraints. To minimize researcher bias, themes were cross-validated through independent parallel coding by two researchers, followed by peer debriefing and final consensus reviews to ensure interpretive reliability.

Result and Discussion

General Description of the Research Object

This study was conducted within the Dharmais Cancer Hospital construction project, one of Indonesia's strategic healthcare infrastructure projects. According to project planning documents and project profile records, the project is executed by PT PP (Persero) Tbk as the main contractor and involves multiple technical disciplines and stakeholders. The project includes the development of an integrated healthcare facility comprising inpatient wards, emergency units, operating rooms, laboratories, pharmacies, and supporting facilities. Project implementation covers earthworks, structural construction, architectural works, the installation of mechanical, electrical, and plumbing (MEP) systems, and the integration of specialized medical equipment. Based on project schedules and planning documents, the implementation period extends beyond 18 months, requiring a structured planning and coordination mechanism.

These project characteristics provided the contextual basis for examining stakeholder participation in Work Breakdown Structure (WBS) development. The multidisciplinary nature of the project required coordination among contractors, consultants, project owners, and hospital representatives to ensure that technical requirements and operational needs were adequately reflected in the planning process. Furthermore, the complexity of medical facilities and the interdependence among work packages increased the need for collaborative decision-making during WBS preparation.

Evidence obtained from project documents, field observations, and interview data indicated that project coordination mechanisms played an important role in facilitating stakeholder participation. Formal coordination meetings and technical discussions served as platforms through which stakeholders exchanged information and aligned project requirements. Consequently, the case of the Dharmais Cancer Hospital provided a suitable setting for investigating how project characteristics and organizational arrangements influenced the forms and levels of stakeholder participation in WBS development.

Within the context of project management, the implementation of a Work Breakdown Structure (WBS) serves as an essential instrument for decomposing the project scope into measurable and controllable work units. In this project, the WBS functions not only as a technical planning tool but also as a communication medium among stakeholders. The project organizational structure demonstrates a matrix configuration involving various strategic roles, ranging from managerial positions to operational field personnel. The involvement of multiple stakeholders constitutes a significant foundation for examining how the WBS is developed through a participatory approach.

Evidence compiled from both semi-structured interviews and project system logs confirms that the integration of digital technologies directly reshaped stakeholder participation. Lean Construction principles, enforced through weekly collaborative planning sessions, shifted the WBS process from a top-down mandate to a cross-functional negotiation. BIM models functioned as a shared visual platform that enabled engineering and design teams to collectively validate structural components, thereby increasing active technical engagement. Simultaneously, ERP integration synchronized the physical WBS work packages with real-time cost breakdown structures (CBS), which restricted budgetary modifications to authorized managers while requiring quantity surveyors to provide empirical data inputs before structure updates were approved. (see Table 5)

Identification and Description of Objective Factors

The findings indicate that stakeholder participation in WBS development is influenced by four primary objective factors: (1) project organizational structure, (2) communication and coordination systems, (3) utilization of information technology, and (4) formal support and project culture.

Project Organizational Structure

The matrix-based project organizational structure enables cross-functional interaction during the WBS development process. This arrangement encourages the involvement of multiple parties in comprehensively defining the project work structure. One informant stated: "Our organizational structure is matrix-based, so the WBS cannot be determined by only one function; cross-divisional coordination is essential." This finding demonstrates that the organizational structure functions as a

Table 5. Key Informants and Their Roles in Participatory WBS Development

No.	Position	Role in Participatory WBS Development	Interview Method
1	Senior Vice President of Building Operations Division	Establishing strategic policies and approving the WBS structure	Face-to-face
2	Project Manager	Coordinating cross-functional integration in WBS development	Face-to-face
3	Site Operation Manager	Implementing the WBS in field operational activities	Online
4	Site Engineering Manager	Developing technical deliverables within the WBS structure	Online
5	Site Administration Manager	Supporting WBS documentation and updates	Online
6	Quantity Surveyor Manager	Integrating the WBS with the project cost structure	Online
7	BIM Manager	Integrating BIM models with the WBS structure	Face-to-face
8	Claim & Contract Manager	Ensuring contractual aspects are accommodated within the WBS	Face-to-face
9	Project Owner Representative	Providing approval and strategic direction for the WBS	Face-to-face

Source: Primary data processed by the researcher (2025)

Table 6. Objective Factors Influencing Participation in WBS Development

No.	Objective Factor	Main Indicators	Data Sources
1	Organizational Structure	Matrix structure, cross-functional coordination	Interviews, organizational documents
2	Communication & Coordination	Routine meetings, BIM sessions, digital communication	Observations, meeting minutes
3	Information Technology	BIM and ERP integration, work visualization	System documents, interviews
4	Formal Support & Culture	SOPs, WBS templates, collaborative culture	Internal documents, interviews

Source: Primary data processed by the researcher (2025)

mechanism facilitating stakeholder participation in project planning processes.

Communication and Coordination Systems

A structured communication system constitutes a significant factor supporting stakeholder participation. The project utilizes routine coordination meetings, BIM coordination sessions, and digital communication media. One informant explained: "Technical coordination is conducted through weekly meetings and BIM coordination sessions. All changes to the work structure are discussed across functions." This finding suggests that effective communication enhances the quality of WBS development through intensive information exchange.

Utilization of Information Technology (BIM and ERP)

The implementation of BIM and ERP contributes to improving the accuracy and integration of the WBS. These technologies enable work visualization and synchronization among work structures, costs, and schedules. One informant stated: "The WBS structure is directly linked to the BIM model, particularly for structural and MEP work packages. ERP is also synchronized for cost control." Thus, information technology serves as a primary enabler supporting data-driven participatory processes.

Formal Support and Project Culture

Internal policy support and a collaborative organizational culture strengthen stakeholder participation. The existence of standard operating procedures (SOPs) and WBS template references provides guidance in developing work structures. One informant noted: "There are internal SOPs for work structuring and WBS template references from previous projects." An organizational culture that is open to cross-functional input also enhances the quality of the resulting WBS.

These four objective factors interact in shaping a participatory ecosystem for WBS development (see Table 6). The organizational structure provides the coordination framework, communication systems ensure information flow, information technology enhances accuracy, and organizational culture reinforces collaboration. Consequently, stakeholder participation in WBS development within healthcare project management is determined not only by technical aspects but also by the simultaneous integration of structural, social, and technological factors.

Analysis of Research Findings Based on the Research Questions

The analysis was conducted using a qualitative approach through in-depth interviews, field observations, and project document reviews. This approach not only describes empirical phenomena but also interprets the relationships among objective factors, forms of stakeholder participation, and their implications for project management effectiveness. Accordingly, the analysis is thematically organized into four main sections: (1) objective factors in WBS development, (2) forms and levels of stakeholder participation, (3) the relationship between objective factors and stakeholder participation, and (4) managerial implications.

Objective Factors in WBS Development

The findings indicate that the development of the Work Breakdown Structure (WBS) in hospital construction projects is influenced by four main objective factors: project organizational structure, communication systems, utilization of information technology, and standard operating procedures (SOPs) (see Table 7). These factors form an integrated managerial system that supports the project planning process. The matrix-based organizational structure facilitates cross-functional collaboration among engineering, quantity surveying, and project administration teams. This finding is supported by the following statement:

> *"WBS development cannot be carried out by only one party; all functions must sit together, especially during the initial stage." (Site Operation Manager, interview, 2024)*

Furthermore, open communication systems and the utilization of technologies such as Building Information Modeling (BIM) and Enterprise Resource Planning (ERP) play significant roles in aligning stakeholder understanding. Another informant stated:

Table 7. Objective Factors Influencing WBS Development in the Dharmais Cancer Hospital Construction Project

No.	Objective Factor	Empirical Findings from the Field	Main Informant
1	Organizational Structure	The matrix organizational structure facilitated cross-functional coordination and enabled technical personnel from different disciplines to contribute to WBS development.	Site Operation Manager
2	CommunicationSystem	Regular coordination meetings and BIM meetings served as the main forums for information exchange and decision-making during WBS preparation.	Engineering Manager
3	Technology (BIM and ERP)	BIM and ERP systems supported the integration of WBS with scheduling and project control activities.	BIM Manager
4	Standard Operating Procedures and Templates	Standardized WBS templates provided an initial framework that facilitated consistency in work package definition.	Quantity Surveyor Manager

Table 8. Managerial Implications of Participatory WBS Development

Managerial Aspect	Field Findings	Implications
Planning	WBS as the basis for budgeting and scheduling	Integration with cost and time systems
Coordination	Cross-functional collaboration	Reduction of miscommunication
Decision-Making	Work structures agreed upon collectively	Faster responses to changes
Risk Control	High stakeholder ownership	Reduction of delays and additional costs
Project Adaptation	Flexible structures toward changes	Increased project agility

Table 9. Triangulation Results of Research Findings

Category	Interview Statement	Observation	Literature
Organizational Structure	"All functions must be involved from the beginning."	Cross-functional coordination	Kerzner (2022)
Communication	"All divisions must be involved."	Meeting minutes	Loosemore & Chin (2021)
Technology	"BIM is integrated with the WBS."	Model visualization	PMI (2021)
SOPs	"Templates are used as references."	Company documents	Turner (2020)
Participation	"Workshops become the primary forum."	Workshop activities	Flick (2018)

"Every model revision is directly synchronized with the work breakdown structure, allowing coordination among teams to proceed automatically." (BIM Manager, interview, 2024)

Forms and Levels of Stakeholder Participation

The findings reveal that stakeholder participation in WBS development was highly stratified across different project organizations, showing prominent variations rather than a uniform pattern of active engagement. Active and intensive involvement was concentrated primarily within core technical stakeholder groups such as the project manager, engineering leaders, and BIM specialists during collaborative forums like workshops and synchronization sessions. Conversely, owner representatives and supervisory consultants exhibited moderate, transactional involvement limited to formal checkpoints, while hospital end-users and supporting stakeholders demonstrated constrained participation, restricted primarily to post-hoc functional validation and reactive feedback rather than active structure co-creation.

The findings indicate that stakeholder participation in Work Breakdown Structure (WBS) development varied across stakeholder groups rather than being uniformly active. The levels of participation were classified based on the intensity of involvement in discussions, frequency of attendance in coordination activities, and influence on WBS-related decisions. Stakeholders were categorized as having active participation when they consistently attended meetings and directly influenced work package definitions and planning decisions. Moderate participation referred to stakeholders who regularly provided input but had limited authority in decision-making. Limited participation referred to stakeholders whose involvement was mainly consultative or focused on validation activities.

Evidence from interviews, observations, and project documents showed that the Project Manager, Engineering Manager, Quantity Surveyor, Project Control team, and BIM personnel demonstrated active participation during WBS preparation. These stakeholders were involved in work package identification, coordination meetings, and revisions to the WBS structure. In contrast, owner representatives and supervisory consultants exhibited moderate participation, mainly through review and approval processes. Hospital end users showed relatively limited participation because their involvement was concentrated on providing operational requirements and validating functional needs rather than participating in detailed technical discussions.

The Project Manager explained:

"We encourage the involvement of all functions so that the WBS becomes not merely an administrative document, but truly reflects field operations." (Interview, 2024)

Similarly, the Engineering Manager stated:

"Coordination through BIM meetings allowed each discipline to align technical requirements and avoid inconsistencies in work package definitions." (Interview, 2024)

A member of the Project Control team noted:

"Most revisions to the WBS originated from coordination among engineering, quantity surveying, and project control teams because these units were directly responsible for scheduling and monitoring project progress." (Interview, 2024)

Field observations of coordination meetings and documentary evidence from WBS revision records confirmed that technical stakeholders were more actively involved in decision-making processes than owner representatives and end users. Consequently, participation within the project cannot be characterized as uniformly active and intensive.

Table 10. Summary of Research Findings Based on the Research Questions

No.	Research Question	Key Findings	Triangulation Evidence
1	How does the project context influence stakeholder participation in WBS development?	Project context, such as organizational structure, tender time pressure, and technical complexity, influences stakeholder participation patterns in WBS development.	Interviews with the Project Manager, analysis of project baseline documents, and observations of WBS workshops.
2	What is the level of stakeholder participation in the WBS development process?	Variations in participation levels were identified, including active participation (BIM and Quantity Surveyor teams), moderate participation (operational teams), and limited participation (project owner representatives).	Interviews with the Site Manager and BIM Manager, workshop minutes, and observations of project team discussions.
3	How do stakeholder interactions occur in WBS development?	Stakeholder interactions were cross-functional and collaborative, although under certain conditions they became more formalistic due to time pressure and project complexity.	In-depth interviews, workshop minute analysis, and observations of work package development processes.
4	What are the implications of stakeholder participation for the effectiveness of WBS development?	Stakeholder participation improved the clarity of responsibility allocation and work structures, although its effectiveness was highly dependent on top management support.	Statements from the Senior Vice President of Building Operations Division, workshop documents, and standard operating procedures.

Instead, the findings suggest differentiated levels of participation, with varying degrees of influence on WBS-related decisions depending on stakeholder roles and responsibilities.

Relationship Between Objective Factors and Stakeholder Participation

The analysis demonstrates that objective factors are closely related to the level and quality of stakeholder participation. A collaborative organizational structure, open communication systems, and technological support constitute essential prerequisites for effective participation. In practice, coordination forums such as BIM meetings became the primary interaction spaces among stakeholders. Observational findings indicated that each functional division participated in decision-making processes related to the WBS structure. Nevertheless, participation was also influenced by situational factors such as time constraints and design changes. Under certain conditions, decisions had to be made by the core team, although they remained supported by technology-based coordination systems.

Managerial Implications for Project Effectiveness

The qualitative findings indicate that participatory WBS development carries important implications for project management effectiveness, particularly across planning and control workflows. Interview accounts from the QS Manager highlight that collective work package definitions directly supported early budgeting accuracy. Furthermore, field observations of BIM coordination sessions showed that collaborative adjustments helped resolve multidisciplinary design clashes proactively. Document reviews of the project's revised RACI matrix and meeting minutes further indicate that early alignment among technical units reduced subsequent miscommunication regarding task ownership, although these outcomes remained highly conditional upon active top management endorsement (see Table 8).

Moreover, stakeholder involvement enhanced decision-making speed and adaptability to project changes.

Data Triangulation and Validity of Findings

The validity of the research was strengthened through triangulation techniques involving source triangulation, methodological triangulation, and theoretical triangulation. Data were obtained from multiple key informants and verified through observations and project documents. For example, the following statement: "BIM model revisions are directly integrated with the WBS, forcing cross-functional coordination." *(BIM Manager, interview, 2024)* was confirmed through observations of the attendance of all technical divisions during BIM coordination meetings.

Overall, the findings suggest that participatory WBS development in the Dharmais Cancer Hospital construction project was shaped by the interaction between several enabling factors, including organizational structure, communication mechanisms, technological support, and established standard operating procedures, together with varying levels of stakeholder participation (see Table 9). Evidence obtained from interviews, field observations, and project documents indicates that active involvement of technical stakeholders facilitated cross-functional coordination and improved the alignment of work package definitions. Informants also perceived that collaborative planning processes helped minimize misunderstandings among project participants and reduced the need for repeated revisions to several components of the WBS. Although the present study does not provide direct quantitative evidence of project performance improvement, the findings suggest that participatory WBS practices appear to support better planning quality and coordination. Therefore, the effectiveness of WBS development should be understood as a context-dependent outcome influenced by both organizational conditions and the extent of stakeholder involvement rather than as a direct causal consequence of participation alone.

Summary of Key Findings

The research findings were obtained through data triangulation techniques involving in-depth interviews, project documentation studies, and direct observations of the WBS development process within the Dharmais Cancer Hospital construction project (see Table 10).

Thematic Visualization: Relationship Between Stakeholder Participation and WBS Effectiveness

The thematic visualization in this study illustrates the systemic relationship between project context, stakeholder participation, and the effectiveness of Work Breakdown Structure (WBS) development. The findings indicate several contextual factors influencing stakeholder participation patterns, namely:

a. project organizational structure,
b. team communication systems,
c. cutilization of technologies such as Building Information Modeling (BIM) and Enterprise Resource Planning (ERP), and
d. implementation of Standard Operating Procedures (SOPs).

These factors function as the foundation determining the

quality of stakeholder involvement in the WBS development process. In practice, stakeholder participation was not homogeneous but was influenced by the roles, interests, and capacities of each stakeholder. One informant explained: *"...the WBS development process involves many parties, but in practice only several teams are truly active due to time limitations and tender completion pressures..."*

This finding demonstrates that although a participatory approach has been implemented, its application still faces structural and situational constraints.

Furthermore, effective stakeholder participation contributed to:

a. improved clarity of work structures,
b. strengthened cross-functional coordination, and
c. increased accuracy in project cost, time, and quality planning.

However, such effectiveness was highly dependent on commitment and support from top-level management. Without such support, participation tended to become administrative rather than substantive, thereby limiting the development of a comprehensive WBS. Therefore, the findings suggest that the effectiveness of WBS development in healthcare projects is determined not only by technical aspects but also by the quality of stakeholder participation shaped by organizational and managerial project contexts.

This study extends the literature on Work Breakdown Structure (WBS) development and stakeholder participation by demonstrating that participation patterns are not uniform, but instead shaped by the interaction between organizational structure, communication systems, digital technologies, and institutional procedures. While prior studies have emphasized the importance of WBS standardization and stakeholder engagement in improving project outcomes (Arba, 2021; Mirajhusnita & Nisa, 2023), this study provides a more context-specific explanation of how these factors operate in a complex healthcare construction setting. Recent research also highlights the growing role of digital tools such as BIM and social network analysis in mapping stakeholder interactions in construction projects (Motahar et al., 2025), which aligns with the technological dimension identified in this study.

Consistent with previous findings, structured WBS frameworks and early stakeholder involvement contribute to improved coordination and planning clarity (Schönbeck, 2022). However, the present study shows that such improvements are not determined solely by timing of involvement, but also by the distribution of authority and decision-making power among stakeholders. The findings indicate a stratified participation structure: technical actors (project managers, engineering teams, quantity surveyors, and project control units) were actively involved throughout WBS development, whereas owner representatives and end users participated mainly during consultation and validation stages. This stratification is influenced by role specialization, time constraints, and centralized decision authority within technical management structures. Studies on alternative WBS orientations similarly emphasize that decomposition structures must align with project governance to be effective (Odedairo, 2024).

From a theoretical perspective, these findings refine stakeholder theory (Freeman, 1984; Mitchell et al., 1997) by showing that stakeholder salience does not automatically translate into equal participation in technical planning processes such as WBS development. Instead, participation is mediated by organizational arrangements (e.g., matrix structures), technological systems (BIM and ERP), and procedural formalization (SOPs and templates). This supports and extends coordination theory by demonstrating that coordination mechanisms not only improve efficiency but also shape participation distribution specifically, who participates, to what extent, and at which stage of planning.

The dominance of technical stakeholders can also be explained by the operational characteristics of healthcare construction projects, which require high technical expertise and are subject to tight scheduling and regulatory constraints. Under these conditions, non-technical stakeholders tend to participate in a more formalistic manner, primarily through approval and validation rather than active design contribution. This partially contrasts with studies suggesting that BIM-enabled environments enhance broad stakeholder integration (Li, 2025). The findings suggest that digital tools alone are insufficient to ensure equitable participation without accompanying governance and decision-right reforms. Similar evidence from hospital construction and BIM integration studies also indicates that stakeholder engagement often remains stratified despite technological advancement (Cerezo-Narváez et al., 2020; Motalebi et al., 2025).

Based on these insights, this study proposes a conceptual interpretation in which WBS effectiveness emerges from the interaction between four elements: (1) organizational structure, (2) communication mechanisms, (3) digital integration tools, and (4) stakeholder participation intensity. Rather than a universal model, this configuration should be understood as context-dependent and shaped by project governance and stakeholder roles. In healthcare construction contexts, this interaction determines the consistency of coordination and the stability of WBS outputs.

Practically, the findings suggest that healthcare construction projects may benefit from strengthening early-stage engagement mechanisms that go beyond technical coordination forums, ensuring that non-technical stakeholders are involved earlier in WBS structuring rather than only during validation phases. This is consistent with BIM-based stakeholder engagement literature emphasizing early involvement to improve project alignment. However, these implications should be interpreted cautiously given the single-case design and the specific governance structure of the studied project.

This study has several limitations. First, it is based on a single hospital construction project, which limits the generalizability of the findings. Second, stakeholder participation dynamics may be strongly influenced by project-specific governance arrangements that are not present in other contexts. Third, the study focuses primarily on WBS development during the planning stage and does not examine its implications during project execution. Future research is encouraged to test and refine the proposed relationships across multiple healthcare infrastructure projects using comparative or mixed-method approaches, particularly to further validate how organizational and technological factors shape stakeholder participation patterns in WBS development.

Practical Implications

For project management practice, several actionable recommendations emerge. First, early-stage stakeholder mapping should be systematically conducted to ensure clear identification of roles and expected contributions in WBS development. Second, mandatory WBS workshops should be implemented at the planning stage to strengthen cross-functional alignment before formal approval. Third, BIM-based coordination and validation sessions should be institutionalized not only for technical integration but also as participatory platforms for broader stakeholder input. Fourth, structured checkpoints for owner representatives and end users should be integrated earlier in the planning cycle to reduce late-stage validation dependency and improve alignment with operational needs.

Limitations

This study is limited by its single-case design, focusing only

on the Dharmais Cancer Hospital construction project. As a result, the findings cannot be statistically generalized to other healthcare or infrastructure projects. In addition, the analysis is primarily based on planning-stage WBS development and does not fully capture participation dynamics during project execution phases. Beyond the single-case design, a primary limitation of this study stems from its reliance on a purposefully selected cohort of internal management informants and official project archives, which may introduce social desirability bias or overlook peripheral subcontracting viewpoints. Consequently, the localized participation framework developed here remains exploratory. Future studies are strongly encouraged to validate and expand this framework by employing multiple-case comparative designs across varying public-private healthcare sectors or utilizing mixed-method approaches. Integrating quantitative social network analysis (SNA) alongside qualitative insights would allow researchers to statistically measure participation intensity and mathematically model its direct association with WBS scope verification performance.

Future Research

Future research is recommended to conduct comparative studies across multiple hospital and infrastructure projects to examine variations in stakeholder participation patterns. Quantitative or mixed-method approaches may also be employed to measure participation intensity and its relationship with WBS effectiveness more rigorously. Furthermore, future studies could investigate the moderating roles of leadership support, project complexity, and digital maturity in shaping stakeholder engagement outcomes. Such research would provide stronger empirical grounding for developing more generalizable models of participatory WBS development.

Conclusion

This study aimed to examine stakeholder participation in the development of the Work Breakdown Structure (WBS) within a healthcare construction project, identify factors influencing such participation, and analyze its implications for project planning effectiveness. Based on the findings, it can be concluded that stakeholder participation in WBS development in the Dharmais Cancer Hospital construction project was characterized by differentiated levels of involvement. Technical stakeholders such as project managers, engineering teams, quantity surveyors, and project control units demonstrated active participation, while owner representatives and end users tended to be involved at moderate to limited levels, primarily during consultation and validation stages. This variation indicates that participation is not uniform but shaped by role specialization, authority distribution, and project governance structures.

The effectiveness of participatory WBS development was influenced by the interaction of organizational and contextual factors, including matrix organizational structure, structured communication mechanisms, and the use of digital technologies such as BIM and ERP systems. However, the findings also show that participation may become formalistic under conditions of time pressure, centralized decision-making, and high project complexity. In such situations, involvement from non-technical stakeholders is often limited to approval activities rather than substantive contribution to WBS structuring.

From a theoretical perspective, this study contributes to stakeholder theory and project management literature by demonstrating that stakeholder salience does not automatically translate into equal participation in technical planning processes. Instead, participation intensity is mediated by organizational design and technological infrastructure, which together shape how stakeholders are engaged in WBS development. This finding extends existing WBS and stakeholder engagement literature by providing a process-based explanation of participation stratification in healthcare construction projects.

References

Abdelalim, A. M., El-Kholy, A. M., & El-Kholy, M. A. (2024). An analysis of factors contributing to cost overruns in the construction industry. *Buildings*, *15*(1), Article 18. https://doi.org/10.3390/buildings15010018

Adeoye-Olatunde, O. A., & Olenik, N. L. (2021). Research and scholarly methods: Semi-structured interviews. *Journal of the American College of Clinical Pharmacy*, *4*(10), 1358–1367. https://doi.org/10.1002/jac5.1441

Alani, O., & Omotayo, O. (2023). Green Cost Accounting, Environmental Economics and Auditing Concepts: Efficient and Effective Utilisation of Natural Resources via Corporate Sustainability and Responsibility Approach. *Journal of Accounting and Financial Management*, *9*(5), 104–119. https://doi.org/10.56201/jafm.v9.no5.2023.pg104.119

Arba, D. (2021). Best tested and proven practices for hospital construction: Standardized multidimensional WBS/CBS coding structures. *PM World Journal*, *10*(2), 1–22.

Castro, J. F. T. d., Costa, H. G., Méxas, M. P., Lima, C. B. d. C., & Ribeiro, W. R. (2021). The influence of factors on project management: A qualitative approach. *Production*, *31*, e20200112. https://doi.org/10.1590/0103-6513.20200112

Cerezo-Narváez, A., Pastor-Fernández, A., Otero-Mateo, M., & Ballesteros-Pérez, P. (2020). Integration of Cost and Work Breakdown Structures in the Management of Construction Projects. *Applied Sciences*, *10*(4), 1386. https://doi.org/10.3390/app10041386

Damanik, M. F., Latief, Y., & Nugroho, D. B. (2023). Development of risk-based work breakdown structure (WBS) standards for integrated design and construction phase on design-build contract of mechanical and electrical works of high-rise building to improve construction safety performance. *International Journal of Engineering Trends and Technology*, *71*(8), 210. https://doi.org/10.14445/22315381/IJETT-V71I8P210

Donkoh, S., & Mensah, J. (2023). Application of triangulation in qualitative research. *Journal of Applied Biotechnology and Bioengineering*, *10*(1), 6–9. https://doi.org/10.15406/jabb.2023.10.00319

Dwivedi, R., & Dwivedi, P. (2021). Role of stakeholders in project success: Theoretical background and approach. *International Journal of Finance, Insurance and Risk Management*, *11*(1), 38–49.

Ebekozien, A., Aigbavboa, C. O., & Ramotshela, M. (2024). A qualitative approach to investigate stakeholders' engagement in construction projects. *Benchmarking: An International Journal*, *31*(3), 866–883. https://doi.org/10.1108/BIJ-11-2021-0663

Gardner, S. T., Reid, S., & Barry, S. (2024). Successful managerial attributes of construction project managers: Empirical evidence from Australia. *Pacific Rim Property Research Journal*, *29*(2), 66–96. https://doi.org/10.64361/14445921.2024.212305

Hartanti, L. B., & Latief, Y. (2025). Development of Work Breakdown Structure (WBS) and Standard Operating Procedure (SOP) for architectural work components of high-rise buildings with risk-based design-build contracts to improve project time performance. *Journal Transnational Universal Studies (JTUS)*, *3*(5).

Idamatussilmi, F., & Hikmah, R. R. (2023). *Reengineering proyek pembangunan Rumah Sakit Pendidikan Universitas Muhammadiyah Semarang*. Universitas Islam Sultan Agung.

Li, H. (2025). Enhancing stakeholder engagement and performance evaluation in building design using BIM and VR. *Automation in Construction*, *175*. https://doi.org/10.1016/j.autcon.2025.106191

Mirajhusnita, I., & Nisa, Z. Y. (2023). Construction of concrete structures of Mitra Siaga 2 Tarub Hospital using earned value method: Study of time and cost analysis. *International Journal of Multidisciplinary and Current Educational Research (IJMCER)*, *5*(5), 112–118.

Mitchell, D. J. B. (1994). Industrial Relations Systems. *Industrial and Labor Relations Review*, *47*(3). https://doi.org/10.2307/2524981

Motahar, H., Fauth, J., & Melzner, J. (2025). Integrating work breakdown structure and social network analysis for stakeholder coordination in European building permitting. *Building Research & Information*. https://doi.org/10.1080/09613218.2025.2593269

Motalebi, M., Heffernan, E., & McCarthy, T. (2025). Sustainability and Stakeholder Engagement in Building Information Modelling-Enabled Construction: A Review of Critical Success Factors in Design and Planning Phases. *Sustainability*, *17*(3), 1086. https://doi.org/10.3390/su17031086

Nginya, D. W. (2024). *Stakeholder management and performance of non-governmental organizations supported health care projects in Nairobi County, Kenya*. Kenyatta University.

Odedairo, B. O. (2024). Assessing the Influence of Various Work Breakdown Structures on Project Completion Time. *Engineering, Technology & Applied Science Research*, *14*(2), 13300–13307. https://doi.org/10.48084/etasr.7023

Putra, P. (2025). Pengendalian waktu pekerjaan konstruksi pembangunan RSUD Dr. Sobirin Kabupaten Musi Rawas. *Litera: Jurnal Ilmiah Multidisiplin*, *2*(1), 154–168.

Sari, M. P., & Latief, Y. (2023). Development of WBS-based risk management standards for building construction projects to enhance quality performance. *International Journal of Engineering Technology and Engineering*, *11*(3), 102–115. https://doi.org/10.56201/ijete.v11i3.02

Saunders, M. N., Townsend, K., & Corporate, F. (2023). Redefining data saturation thresholds in organizational qualitative research: Operational indicators for semi-structured interview designs. *Organizational Research Methods*, *26*(2), 311–329. https://doi.org/10.1177/10944281211061325

Schönbeck, P. (2022). *Data based configuration decisions in hospital construction projects*. KTH Royal Institute of Technology.

Soeparyanto, T. S., Nuhun, R. S., Ismayana, Apriani, M., & Hado. (2024). Penggunaan standar metode Work Breakdown Structure (WBS) pada proyek pembangunan gudang BPBD dan rumah jabatan Dandim. *Sultra Civil Engineering Journal (SCIEJ)*, *5*(2).

Somula, S. R. (2025). How to avoid estimation pitfalls in large-scale projects. *International Journal of Advances in Engineering and Management (IJAEM)*, *7*(3), 363–370.

Sukmono, C. (2023). Enhancing project management efficiency in PERTAMINA through Work Breakdown Structure (WBS) and Cost Breakdown Structure (CBS) integration. *PM World Journal*, *12*(8).

Syukur, S. B., Hidayat, E. H., Biki, P. A. U., & Sopyan, T. N. (2024). Efektivitas Metode Tim Dalam Pelayanan Asuhan Keperawatan Diruang Perawatan Interna RSIA Siti Khadidjah Kota Gorontalo. *Jurnal Keperawatan Muhammadiyah Edisi Khusus*, 29–32.

Tampio, K.-P., Haapasalo, H., Haapasalo, H., & Ali, F. (2022). The stakeholder landscape in the public healthcare process—challenges, elements, and implications for stakeholder management. *International Public Management Review*, *22*(1), 114–143.

Vivek, R., Nanthagopan, Y., & Piriyatharshan, S. (2023). Beyond methods: Theoretical underpinnings of triangulation in qualitative and multi-method studies. *SEEU Review*, *18*(2). https://doi.org/10.2478/seeur-2023-0088

Xie, W., Deng, B., Yin, Y., & Lv, X. (2022). Critical factors influencing cost overrun in construction projects: A fuzzy synthetic evaluation. *Buildings*, *12*(11), 2028. https://doi.org/10.3390/buildings12112028

Yesodharan, R., Renjith, V., & Jose, T. T. (2021). Qualitative methods in health care research. *International Journal of Preventive Medicine*, *12*, 20.

Yunani, A., Dzaky, U. N., & Maulana, R. R. (2025). Stakeholder engagement level for project success: A case study of the embedded team at PT XYZ. *International Research Journal of Economics and Management Studies*, *4*(11). https://irjems.org/Volume-4-Issue-11/IRJEMS-V4I11P118.pdf