

Medical Equipment Procurement Strategy Based on ASPAK Application at MABA District General Hospital, East Halmahera Regency

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Abstract

Medical equipment procurement constitutes a strategic element in improving service quality, yet its implementation at MABA District General Hospital in East Halmahera Regency still confronts substantial structural and technical challenges. This study analyzes medical equipment procurement strategy based on the ASPAK (Application of Facilities, Infrastructure, and Medical Equipment) system across five focal areas: input components, data availability and accessibility in planning, procurement process implementation, training processes related to equipment utilization, and output effectiveness. Employing descriptive qualitative methodology through in-depth interviews with 15 key informants, observations, focus group discussions, and document analysis, the study reveals critical deficiencies: at the input level, absence of comprehensive Standard Operating Procedures for needs assessment, limited Human Resources capacity, and inadequate supporting infrastructure including unstable internet connectivity and insufficient room readiness crucial for ASPAK operations; at the process level, planning not fully based on ASPAK-driven gap analysis resulting in inaccurate prioritization and mismatches between equipment specifications and clinical needs, with acceptance procedures encountering technical verification barriers; at the output level, suboptimal utilization of procured devices due to unprepared facilities, uneven operator competency, and absence of structured post-procurement monitoring and evaluation mechanisms. Synthesis of findings demonstrates that ASPAK effectiveness depends critically on strengthening internal regulations, enhancing human resource capacity, ensuring infrastructural readiness, and implementing systematic monitoring-evaluation frameworks to optimize medical equipment procurement in island region hospitals.

Keywords: Medical Equipment Procurement, ASPAK Application, Hospital Management, Strategic Management, Island Region Healthcare

1. Introduction

The Ministry of Health uses the Application of Facilities, Infrastructure, and Medical Equipment (ASPAK) as an integrated information system for inventorying the needs, availability, and conditions of medical equipment nationwide ([Permenkes No. 31/2018](#)). ASPAK is intended as a strategic instrument to strengthen evidence-based planning in medical equipment procurement and enhance healthcare service quality throughout Indonesia. Nationally, ASPAK utilization demonstrates significant disparity. Dashboard ASPAK 2025 data reveal that only DKI Jakarta Province meets Facilities, Infrastructure, and Equipment (SPA) fulfillment standards for Maternal and Child Health programs above the 60% threshold at

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316%, while 37 other provinces remain below standard, with only 2,170 hospitals (21%) nationwide meeting SPA standards ([ASPAK, 2025](#)).

In North Maluku Province, ASPAK implementation faces various obstacles. Of 129 healthcare facilities, 71.3% utilize ASPAK while 28.7% do not ([Rifaskes, 2019](#)). Inter-regional usage varies substantially: South Halmahera achieves 87.1% utilization, while Taliabu Island records 0%. East Halmahera presents significant challenges: despite only 35.7% of healthcare facilities using ASPAK, 80% experience application difficulties caused by signal constraints and limited human resource competency ([Dinkes Papua Barat, 2020](#)). Medical equipment availability in North Maluku Province, based on December 2022 ASPAK data, stands at 42.89%, substantially below the national average (51.35%) ([Dinkes Maluku Utara, 2021](#)). Insufficient SPA completeness has caused several hospitals in Maluku region to experience class downgrades in 2019 and 2023 reviews, impacting BPJS cooperation and hospital operational sustainability.

Law No. 44 of 2009 mandates hospitals as healthcare service institutions providing comprehensive services, including outpatient, inpatient, and emergency care. To ensure professional, high-quality, and sustainable services, hospitals must possess medical equipment that meets standards. Equipment availability encompasses emergency installations, outpatient and inpatient facilities, intensive care, operating rooms, delivery facilities, radiology, clinical laboratories, blood services, medical rehabilitation, pharmacy, nutrition installations, and morgues ([Permenkes No. 56/2014](#)). Consequently, medical equipment logistics management becomes vital in ensuring appropriate, functional, and optimally utilized equipment provision. Christopher (2016) emphasizes that healthcare supply chain management encompasses strategic processes, including needs planning, procurement, storage, distribution, inventory monitoring, maintenance, and disposal, requiring demand-supply synchronization and visibility across all procurement stages.

MABA District General Hospital, located in East Halmahera Regency with 99,224 population across 10 districts and 102 villages ([Dinkes Maluku Utara, 2021](#)), serves as a referral hospital in the island region. However, based on the researcher's observations and interviews with the IPSRS Chief and the Infrastructure Division Head on July 29, 2025, several issues with medical equipment management emerged. Equipment remains unutilized because rooms fail to meet technical requirements (ICU, Radiology, UTDRS). Some equipment stays stored in warehouses due to unavailable supporting infrastructure, while installed equipment remains unused due to technical and administrative constraints. These problems indicate discrepancies between procurement implementation and sound logistics management principles, resulting in ineffective and inefficient equipment utilization that is misaligned with Kepmenkes No. 04/2003 objectives on medical equipment utilization optimization and Permenkes No. 84/2014 on effective and efficient medical equipment usage.

Previous research has not positioned ASPAK as a strategic instrument for needs formulation and procurement prioritization, focusing instead on technical aspects and failing to make the national information system the foundation for decision-making. Additionally, island geographic contexts with signal limitations, limited distribution access, and minimal technical human resources have never been considered analytical variables, despite substantially affecting data accuracy, ASPAK utilization, and procurement effectiveness. Prior studies have also not examined relationships among ASPAK, SPA values, and hospital class downgrade risks, nor the phenomenon of unutilized medical equipment due to unprepared rooms and infrastructure. The research gap lies in the absence of studies integrating policy, ASPAK data, needs planning processes, priority determination, and procurement outcome alignment within

one comprehensive framework. This study's novelty lies in formulating an ASPAK-based integrated medical equipment procurement strategy from input to output, assessing gaps between ASPAK data and actual service needs at MABA Hospital, incorporating island geographical characteristics as strategic variables in procurement effectiveness analysis, and offering post-procurement evaluation models assessing equipment utilization, SPA values, and hospital class downgrade implications. Thus, this research contributes to the development of logistics management and to the implementation of ASPAK as evidence-based planning foundations for island-region hospitals.

2. Literature Review

Strategic management comprises systematic processes encompassing strategy formulation, implementation, and evaluation to achieve organizational objectives sustainably ([David, 2017](#)). In hospital settings, strategic management plays a crucial role in directing limited resources to deliver effective, efficient healthcare services. [Porter's \(1985\)](#) strategic positioning framework emphasizes competitive advantage through distinctive value creation, applicable to hospital contexts where equipment procurement strategies must align with service differentiation and quality enhancement objectives. As organizational environments evolve dynamically, modern strategic management demands data-based decision-making and organizational adaptive capacity, particularly critical for hospitals in resource-constrained settings navigating budgetary limitations, infrastructure gaps, and workforce shortages ([Homauni et al., 2023](#); [Esmailian et al., 2024](#)). This approach proves relevant for explaining ASPAK-based medical equipment procurement strategy, requiring integration between strategic planning and information systems.

Healthcare supply chain management encompasses strategic processes including needs planning, procurement, storage, distribution, inventory monitoring, maintenance, and disposal. [Christopher \(2016\)](#) emphasizes supply chain management principles in healthcare requiring demand-supply synchronization, visibility across procurement processes, and agility in responding to changing clinical needs. Recent research demonstrates that the healthcare supply chain is complex, involving multiple stakeholders, regulatory compliance requirements, cost management pressures, and risk mitigation challenges ([Adebayo et al., 2024](#)). [Long et al. \(2023\)](#) demonstrate that cooperative healthcare supply chain modes achieve economies of scale through collective bargaining, centralized procurement, and resource sharing, reducing procurement costs while enhancing quality assurance. However, supply chain disruptions, including geopolitical conflicts, pandemic impacts, and infrastructure limitations, pose significant challenges, particularly for hospitals in developing regions ([Sharma & Cotton, 2023](#)). For island-region hospitals like MABA, the complexity of logistics amplifies procurement challenges due to geographical isolation, limited distribution networks, and transportation constraints, requiring adapted supply chain strategies.

Health information systems (HIS) implementation constitutes critical infrastructure for evidence-based healthcare management, yet encounters substantial barriers in resource-constrained settings. [Nascimento et al. \(2023\)](#) systematic review identified infrastructure and technical barriers, psychological and personal issues, organizational challenges, and financial constraints as primary obstacles to digital health technology adoption by healthcare professionals. [Bagherian and Sattari \(2022\)](#) emphasize socioeconomic constraints, inadequate technical infrastructure, lack of clear vision, and poor system integration as challenges more pronounced in developing countries. [Nair et al. \(2024\)](#) comprehensive analysis reveals barriers spanning human factors, technology infrastructure, software constraints, and inadequate

support mechanisms. These findings directly parallel ASPAK implementation challenges at MABA Hospital, where unstable internet connectivity, limited human resource competency, and absent standard operating procedures impede optimal system utilization. The theoretical foundation for ASPAK implementation draws on Evidence-Based Management (Pfeffer & Sutton, 2006), which advocates organizational decision-making grounded in the best available evidence rather than intuition or conventional practice.

Implementation science frameworks provide additional theoretical lenses for understanding ASPAK adoption challenges. [Fixsen et al. \(2005\)](#) identify core implementation components, including staff selection and training, coaching and performance assessment, systems intervention, and facilitative administrative support, all of which are highly relevant to ASPAK implementation success factors. Organizational readiness theory ([Weiner, 2009](#)) suggests that successful innovation implementation requires both organizational members' shared commitment to implementation and collective efficacy beliefs regarding implementation capabilities. These theoretical constructs illuminate why ASPAK effectiveness varies substantially across hospitals, as readiness dimensions encompassing motivated leadership, adequate resources, supportive organizational culture, and staff competencies critically determine implementation outcomes. In island region contexts, geographical isolation amplifies readiness challenges through infrastructure limitations, human resource scarcity, and connectivity constraints, requiring adapted implementation strategies.

Hospital management in resource-constrained settings confronts unique challenges requiring context-specific solutions. [Sheffel et al. \(2024\)](#) analysis across 10 African countries reveals wide variation in human resources performance metrics, with many facilities barely staffed and effective staffing levels falling further when adjusted for health worker absences. [Babawarun et al. \(2024\)](#) emphasize managerial challenges, including resource allocation, infrastructure development, technology integration, policy compliance, and community engagement, requiring innovative problem-solving and strategic planning. [Butt et al. \(2024\)](#) demonstrate that healthcare professionals in developing countries face lower job satisfaction due to inadequate resources, limited funding, insufficient medical equipment and supplies, and constrained infrastructure. These conditions resonate with MABA Hospital's procurement challenges, where equipment remains underutilized due to unprepared facilities, incomplete training, and the absence of systematic monitoring mechanisms. Research emphasizes adaptability, consideration of local context, and stakeholder involvement as critical success factors for healthcare management in resource-limited environments ([Esmaeilian et al., 2024](#); [Homauni et al., 2023](#)).

3. Research Method

This study employs descriptive qualitative methodology using system approaches to comprehensively explore medical equipment procurement at MABA District General Hospital. The qualitative approach was selected to obtain in-depth information regarding ASPAK-based procurement processes, challenges encountered, and stakeholder perspectives involved in procurement activities. Research was conducted at MABA District General Hospital, East Halmahera Regency, North Maluku Province, during March-November 2025. The location was purposively selected based on problem contexts explained in the background: low facility and medical equipment standard fulfillment rates and ASPAK implementation constraints.

Data collection utilized triangulation methods comprising multiple approaches to ensure comprehensiveness and validity. First, in-depth interviews were conducted with 15 key informants purposively selected based on their roles and involvement in medical equipment

procurement processes. Informants included the hospital director, the medical support division head, the planning and program division head, the medical service division head, the infrastructure division head, the commitment-making official, the procurement official, the receiving/inspection team chief and technical personnel, and the installation heads (laboratory, radiology, emergency, operating room, physiotherapy) and the outpatient clinic coordinator. Interview protocols employed semi-structured guidelines allowing flexibility to explore emerging themes while maintaining focus on research objectives. Interviews were audio-recorded with the informant's consent and subsequently transcribed verbatim for analysis.

Second, non-participant observation was conducted to directly observe ASPAK-based medical equipment procurement processes, including planning meetings, equipment acceptance procedures, and equipment utilization in service installations. Observation enabled researchers to identify gaps between stated policies and actual implementation practices. Third, Focus Group Discussions (FGD) were conducted with stakeholders involved in procurement and equipment utilization to facilitate collective dialogue and elicit diverse perspectives on procurement challenges and improvement strategies. Fourth, document analysis examined procurement policies, ASPAK data records, procurement reports, equipment acceptance documents, Standard Operating Procedures (or their absence), and relevant regulatory frameworks. Document analysis provided contextual background and enabled triangulation with interview and observation data. All informants provided informed consent, and research protocols ensured confidentiality, anonymity, and voluntary participation in accordance with ethical research standards.

Qualitative data were analyzed using thematic content analysis following Miles and Huberman's (2014) framework, encompassing data reduction, data display, and conclusion drawing/verification stages. Analysis proceeded iteratively, with initial coding conducted during data collection to identify emerging patterns and refine subsequent data collection. Data reduction involved organizing raw data, coding significant statements, and categorizing codes into preliminary themes. Data display utilized matrices and narrative summaries to facilitate pattern identification and relationship exploration across themes. Analysis focused on five main components corresponding to research questions: input assessment examining policies (SOP), human resources, funding, and supporting infrastructure; data availability and accessibility in planning and priority determination processes; procurement implementation processes based on ASPAK; training processes and impacts on healthcare personnel competency in equipment acceptance and utilization; and output evaluation of equipment utilization effectiveness and efficiency in healthcare service delivery.

Data validity and trustworthiness were ensured through multiple strategies. Source triangulation was achieved by interviewing multiple informants representing different organizational levels and functional roles to capture diverse perspectives and cross-validate findings. Method triangulation combined interviews, observation, FGD, and document analysis to corroborate findings across data sources. Member checking was conducted by sharing preliminary findings with key informants to verify interpretations and ensure findings accurately reflected their experiences and perspectives. Peer debriefing sessions with academic supervisors provided external checks on analysis processes and interpretations. Thick description in reporting provides sufficient contextual detail to enable readers to assess findings' transferability to similar contexts. These methodological rigor strategies enhance confidence that findings authentically represent ASPAK-based medical equipment procurement realities at MABA District General Hospital. This study employs a descriptive, qualitative methodology, using systems approaches, to comprehensively explore medical equipment procurement at MABA

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4. Findings and Discussions

4.1 Findings

Research findings reveal systemic challenges spanning input, process, and output dimensions of ASPAK-based medical equipment procurement at MABA District General Hospital. At the input level, policy analysis reveals that the hospital's medical equipment procurement references Ministry of Health Regulation No. 56/2014 as the primary basis for determining equipment needs in accordance with type D hospital standards, and Permenkes No. 31/2018 regarding ASPAK implementation. However, a critical gap exists: the hospital lacks formally documented Standard Operating Procedures (SOPs) for needs assessment and procurement processes. Multiple informants explicitly confirmed this absence, with one stating: "Documented SOP does not yet exist." Another informant clarified: "Implicitly it exists, but not explicitly documented." This SOP's absence creates inconsistencies in procurement implementation and complicates objective and measurable need assessment processes.

Human resource analysis reveals significant competency limitations in ASPAK management and in the technical understanding of medical equipment. Interview results indicate procurement personnel predominantly possess health administration backgrounds with limited technical training in medical equipment specifications and ASPAK application operations. Informants acknowledged challenges in understanding equipment technical specifications during procurement planning and acceptance processes. One receiving team member stated: "Sometimes we don't fully understand whether the equipment meets specifications." Limited HR competency impacts data entry accuracy in ASPAK systems and the ability to conduct gap analyses to identify actual equipment needs based on service standards and workload. Consequently, planning relies more on user unit requests than objective analyses derived from ASPAK gap analysis data.

Supporting infrastructure constitutes a major obstacle in ASPAK implementation at MABA Hospital. Research identifies three primary infrastructure problems substantially affecting procurement effectiveness. First, unstable internet connectivity hampers routine ASPAK data access and updates, as the hospital location in an island region experiences frequent signal disruptions. This connectivity instability impedes ASPAK's optimal use as a real-time planning tool, forcing personnel to conduct manual recording, which is subsequently uploaded when signals stabilize, creating data gaps and reducing ASPAK's effectiveness as an integrated national system. Second, unpreparedness in the room, including failure to meet technical requirements, prevents certain equipment from being installed and utilized. Observations confirmed that several installations, including ICU, Radiology, and Blood Transfusion Unit, lack rooms that meet electrical, ventilation, and space specifications required for equipment operation. Third, insufficient warehouse storage capacity causes equipment to remain stored

without installation plans. These conditions create situations where procured equipment cannot be immediately utilized despite successful acquisition.

The planning and prioritization process analysis reveals that ASPAK has not been optimally utilized as the primary tool for needs determination and procurement prioritization. Interview results and document analysis indicate that planning processes rely more on user unit proposals and available budget considerations than on systematically generated gap analyses by ASPAK. One informant explained that equipment needs prioritization considers "current needs and budget availability" without systematically referencing ASPAK gap analysis data showing actual equipment shortages relative to type D hospital standards. This approach contradicts evidence-based planning principles that should underpin ASPAK implementation. Document analysis confirms gaps between ASPAK data showing specific equipment category shortages (particularly in intensive care, emergency, and diagnostic installations) and actual procurement, focusing on user-requested items without a comprehensive needs analysis validating requests against ASPAK-identified gaps. Consequently, procurement suffers from priority inaccuracies, equipment specification-clinical needs mismatches, and equipment procurement failing to systematically address actual service provision gaps identified through ASPAK.

Procurement implementation encounters several significant obstacles that affect the quality and timeliness of equipment acquisition. First, technical specification determination processes frequently fail to involve equipment end-users comprehensively, leading to procured equipment specifications that misalign with actual clinical needs and user operational preferences. Procurement officials acknowledged challenges in formulating technical specifications without adequate clinical input, and they relied heavily on supplier proposals rather than detailed clinical requirements. Second, equipment receiving and acceptance procedures are constrained by the limited competency of the receiving team in assessing equipment compliance with technical specifications, safety standards, and operational readiness. Multiple informants described acceptance processes as primarily administrative checks of documentation completeness rather than rigorous technical verification of equipment functionality and specification conformity. Third, equipment installation and commissioning processes encounter substantial delays due to unprepared rooms and unavailable supporting infrastructure, including electrical systems, medical gas installations, and environmental controls. Observations confirmed equipment stored in warehouses for extended periods awaiting infrastructure completion, while some installed equipment remains non-operational awaiting final commissioning steps.

Training and competency development analyses for equipment users reveal inadequate systematic approaches that affect optimal equipment utilization. Equipment acceptance is frequently unaccompanied by comprehensive operator training from suppliers, with training limited to brief demonstrations insufficient for operators to master the equipment's full capabilities and maintenance requirements. Consequently, equipment operator competency develops unevenly across installations, with some installations achieving proficient equipment operation while others struggle with basic functions. One installation head stated: "Training is usually brief, insufficient for us to master all equipment features and troubleshoot problems." Limited initial training is compounded by the absence of structured refresher training mechanisms, leading to competency degradation over time, particularly with complex, high-technology equipment that requires sustained skill maintenance. Limited training also impacts preventive maintenance capabilities, as operators lack sufficient understanding to conduct routine inspections, basic maintenance, and early problem identification, increasing equipment damage risks and reducing operational lifespan.

Output evaluation reveals significant problems with equipment utilization effectiveness and efficiency, contradicting procurement objectives. Research identifies three primary categories of suboptimal equipment utilization. First, equipment stored in warehouses due to unprepared rooms and unavailable supporting infrastructure represents complete utilization failure, as this equipment remains entirely unused despite successful procurement and acceptance. Inventory records and warehouse observations confirmed substantial quantities of equipment awaiting completion of infrastructure, including ICU equipment, advanced radiological devices, and blood bank equipment. Second, installed equipment not yet utilized in service delivery due to incomplete operator training or pending final commissioning steps represents partial utilization failure, as equipment physically present cannot contribute to patient care. Multiple installations reported equipment installed but not operationalized for months, awaiting various prerequisites. Third, underutilized equipment that fails to operate optimally due to technical constraints, incomplete accessories, or inadequate maintenance represents suboptimal utilization, as it operates below design capacity or with reduced functionality.

Critically, the hospital lacks structured post-procurement monitoring and evaluation mechanisms to systematically identify and address obstacles to equipment utilization. Informants indicated the absence of formal procedures for tracking equipment from acceptance through operational deployment and ongoing utilization assessment. Without systematic monitoring, management lacks comprehensive data on equipment utilization rates, identification of underutilized equipment, and root causes of utilization barriers. This monitoring absence prevents timely interventions to address obstacles and optimize equipment contributions to service delivery. The cumulative effect of these utilization problems extends beyond individual equipment to affect the hospital's overall service capacity, SPA value fulfillment, critical for accreditation and class maintenance, and return on investment for substantial procurement expenditures. Several informants expressed concerns that continued underutilization could jeopardize hospital classification and accreditation status.

4.2 Discussion

Synthesis of findings across all components reveals systemic interconnections between input weaknesses, process inadequacies, and suboptimal outputs in ASPAK-based medical equipment procurement at MABA Hospital. The absence of formal Standard Operating Procedures and limited human resource competency at the input level directly impacts planning quality and procurement implementation, leading to inconsistent approaches and subjective decision-making, which are vulnerable to individual interpretation variations. Inadequate supporting infrastructure, particularly unstable internet connectivity and unprepared facilities, exacerbate ASPAK underutilization as evidence-based planning tools, preventing real-time data management and systematic gap analysis utilization for needs prioritization. These input and process weaknesses ultimately manifest as suboptimal equipment utilization, including warehoused, unused equipment; installed, non-operational equipment; and underutilized equipment operating below design capacity, collectively impacting service quality, delivery, and hospital SPA value fulfillment, potentially threatening class downgrade risks.

This finding aligns with contemporary healthcare management research emphasizing comprehensive approaches that encompass human resource development, workflow optimization, facility provision, and budget support to optimize the effectiveness of health information systems ([Nascimento et al., 2023](#); [Bagherian & Sattari, 2022](#)). The systemic nature of the identified problems suggests that piecemeal interventions addressing individual issues will prove insufficient; rather, integrated strategies that simultaneously strengthen multiple

dimensions are required. The island's geographical context, with connectivity limitations, difficult logistics access, and limited technical human resource availability, adds layers of complexity, requiring context-specific strategic solutions that acknowledge unique constraints while leveraging available resources creatively. The implementation science literature demonstrates that health information system effectiveness depends heavily on managing human resource quality, organizational readiness, and leadership support (Weiner, 2009; Fixsen et al., 2005), which aligns with this study's identification of HR competency limitations and the absence of systematic monitoring as critical procurement weaknesses.

From a strategic management perspective, David's (2017) framework suggests that successful strategy implementation requires alignment across organizational structure, systems, resources, and culture. Current ASPAK-based procurement practices at MABA Hospital reflect gaps across these dimensions, necessitating integrated interventions. Structural gaps include absent formal procurement organizational frameworks with clearly defined roles, responsibilities, and coordination mechanisms between planning, procurement, technical, and clinical units. System gaps encompass a lack of documented SOP, the absence of ASPAK integration into routine decision-making processes, and missing post-procurement monitoring mechanisms. Resource gaps span human resource competency limitations, inadequate supporting infrastructure, and misalignment between equipment procurement and facility readiness. Cultural gaps involve procurement approaches that emphasize reactive responses to immediate pressures rather than proactive, data-driven strategic planning.

The study's identification of substantial equipment remaining unutilized despite successful procurement represents significant resource waste, contradicting Kepmenkes No. 04/2003 principles on medical equipment utilization optimization and Permenkes No. 84/2014 requirements for effective and efficient equipment usage. This waste occurs at multiple levels: financial waste through procurement expenditures that fail to generate service-delivery value; opportunity-cost waste as alternative equipment or service improvements are foregone; and strategic waste as hospital classification and accreditation are jeopardized by insufficient SPA fulfillment. Moreover, unutilized equipment represents missed opportunities to enhance service quality, expand service offerings, and strengthen the hospital's competitive positioning in the regional healthcare market. These multilevel wastes underscore the urgency for fundamental procurement approach transformations.

This study extends the existing healthcare management literature by integrating ASPAK as a central analytical focus within comprehensive procurement frameworks tailored for resource-constrained island-region settings. The research contributes novel insights by explicitly examining how health information system implementation (or underutilization) affects procurement outcomes in geographically isolated contexts. By demonstrating how absent standard operating procedures and limited technical capacity specifically impede evidence-based planning through digital health systems, this research advances understanding of barriers to health information technology adoption identified in broader literature (Nascimento et al., 2023; Nair et al., 2024). Furthermore, incorporating island-specific geographical characteristics as analytical variables that affect system implementation and procurement effectiveness provides context-specific insights into challenges that require adapted strategies beyond generic procurement improvement recommendations applicable to mainland urban hospitals.

Based on comprehensive problem analysis, strategic management principles, and regulatory frameworks, this study proposes five priority strategic interventions for optimizing ASPAK-based medical equipment procurement at MABA Hospital and similar island region hospitals.

First, develop and implement comprehensive Standard Operating Procedures that document the entire procurement cycle from needs assessment through post-procurement evaluation, clearly defining roles, responsibilities, decision criteria, approval authorities, and coordination mechanisms between organizational units. SOP should explicitly integrate ASPAK utilization at each procurement stage, specifying how ASPAK data informs needs identification, gap analysis, priority determination, specification development, and utilization monitoring. Second, systematically enhance human resource competency through structured training programs addressing ASPAK operations, medical equipment technical specifications, evidence-based planning methodologies, and procurement management. Training should employ blended approaches combining classroom instruction, hands-on ASPAK practice, mentoring by experienced personnel, and periodic competency assessments, ensuring sustained capability maintenance.

Third, strengthen supporting infrastructure through targeted investments that address connectivity stabilization via alternative internet solutions (satellite, cellular backup), accelerate room preparation through proactive facility planning that synchronizes procurement and infrastructure development timelines, and ensure adequate warehouse capacity with appropriate environmental controls and inventory management systems. Infrastructure improvements should prioritize interventions with the highest impact on ASPAK utilization and equipment deployment. Fourth, integrate ASPAK as the primary tool in needs analysis and procurement prioritization through organizational policy requiring all procurement proposals reference ASPAK gap analysis, establishing procurement approval processes that validate requests against ASPAK data, and developing user-friendly interfaces that facilitate ASPAK consultation during planning activities. Fifth, implement systematic post-procurement monitoring-evaluation mechanisms that track equipment from acceptance through operational deployment, assess utilization rates, identify underutilization causes, and trigger corrective interventions, with regular management reporting on equipment utilization status and SPA value implications.

These strategic interventions require strong leadership commitment, sustained resource allocation, and organizational culture shifts emphasizing data-driven decision-making and accountability for procurement outcomes. Implementation should follow phased approaches with quick-win initiatives building momentum for longer-term systemic changes. Pilot programs testing interventions in specific procurement categories or installations can yield lessons that inform broader rollouts. Cross-functional procurement teams integrating clinical, technical, administrative, and financial expertise can facilitate holistic problem-solving, addressing multiple constraint dimensions simultaneously. Regular stakeholder consultations ensure interventions remain responsive to evolving needs and emerging challenges. External partnerships with technical agencies, other hospitals successfully implementing ASPAK, and academic institutions can provide implementation support, capacity building, and knowledge transfer, accelerating improvement trajectories.

5. Conclusion

This study establishes that ASPAK-based medical equipment procurement at MABA District General Hospital confronts systemic challenges across the input, process, and output dimensions, requiring comprehensive, integrated interventions. Critical deficiencies include the absence of formal Standard Operating Procedures, limited human resource competency in ASPAK management, inadequate supporting infrastructure, particularly unstable internet connectivity and unprepared facilities, planning processes inadequately leveraging ASPAK as evidence-based tools, and significant proportions of procured equipment remaining

underutilized due to unprepared rooms, incomplete operator training, and the absence of systematic monitoring and evaluation. These interconnected challenges demonstrate that ASPAK's effectiveness in island region hospitals depends critically on strengthening internal regulatory frameworks through comprehensive SOP, enhancing human resource capacity through systematic training, ensuring infrastructural readiness by addressing connectivity and facility constraints, integrating ASPAK as a primary evidence-based planning tool, and implementing comprehensive monitoring-evaluation mechanisms. The study contributes by integrating island-specific geographical characteristics as strategic variables that affect procurement effectiveness, thereby extending the strategic management literature in resource-constrained healthcare contexts. Practical implications suggest prioritizing five strategic interventions: developing a comprehensive SOP with explicit ASPAK integration; conducting structured capacity-building programs; investing in infrastructure improvements; establishing cross-functional procurement teams; and implementing systematic post-procurement audits linking equipment utilization to service quality indicators.

Study limitations include a single-site focus, potentially limiting generalizability; a cross-sectional design, preventing assessment of temporal dynamics; and reliance on self-reported data, which is susceptible to social desirability bias. Future research should conduct comparative multi-site studies across island region hospitals to identify context-specific versus common challenges, employ longitudinal designs examining ASPAK implementation trajectories and capacity-building interventions' long-term impacts, develop and validate ASPAK effectiveness measurement instruments incorporating input-process-output dimensions, investigate relationships between ASPAK utilization and hospital performance indicators including accreditation scores and classification maintenance, explore technology solutions addressing connectivity constraints in isolated facilities including offline ASPAK capabilities and mobile applications, and conduct implementation science research examining barriers, facilitators, and effective strategies for introducing and sustaining procurement practice changes to provide actionable guidance for hospital leaders pursuing ASPAK-based procurement optimization in resource-constrained contexts.

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