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Procurement Decisions and Technology Assessment Criteria across Regional Hospital Boards

Margaux Muller

Faculty of Pharmacy, Aix-Marseille Université, Marseille, Provence-Alpes-Côte d'Azur, France

Corresponding author: margaux.muller@univ-amu.fr

Abstract

This study investigates the empirical alignment between health technology assessment criteria and actual medical equipment procurement decisions across regional hospital boards. Utilizing a multi-year cohort design tracking procurement packages across twelve regional boards, we evaluate how clinical efficacy, cost-effectiveness, technical compatibility, and strategic supplier factors influence acquisition outcomes. Analysis of the cohort data reveals significant disparities between formal assessment frameworks and final purchasing decisions, with budget constraints and local supplier relationships frequently overriding clinical and economic evidence. By modeling the transition from assessment to procurement, we identify key systemic bottlenecks in the technology adoption lifecycle. The findings offer critical insights for policymakers and healthcare administrators seeking to optimize capital allocation, enhance procurement transparency, and ensure that high-value healthcare technologies are systematically prioritized. This research underscores the need for integrated governance frameworks that bridge the gap between clinical evaluation and financial execution within public health systems.

Keywords: Health Technology Assessment; Procurement Decisions; Regional Hospital Boards; Cohort Study; Technology Assessment Criteria

1. Introduction

1.1 Background and Context

The rapid evolution of medical technology presents both unprecedented clinical opportunities and severe financial challenges for public healthcare systems worldwide. Modern healthcare administrators are continuously tasked with balancing the acquisition of innovative medical devices against strict fiscal boundaries. To navigate this complexity, health systems have increasingly relied on Health Technology Assessment as a systematic tool to evaluate the safety, efficacy, cost-effectiveness, and broader social implications of medical interventions [1]. Ideally, the rigorous evidence generated through the assessment process should directly inform capital allocation and purchasing decisions. In practice, however, the translation of clinical and economic evaluations into concrete procurement actions remains highly fragmented and inconsistent.

Regional hospital boards, which function as decentralized administrative entities in many national health systems, are the primary locus for these decisions [2]. These boards are responsible for interpreting national clinical guidelines, managing regional healthcare budgets, and executing large-scale procurement tenders. Despite their dual mandate to promote clinical excellence and maintain fiscal responsibility, regional boards frequently operate under conflicting incentives. On one hand, clinical departments push for the acquisition of state-of-the-art diagnostic and therapeutic

technologies to improve patient outcomes and institutional prestige. On the other hand, regional financial officers must adhere to rigid annual budgetary limits and navigate complex public procurement regulations designed to minimize acquisition costs rather than long-term operational expenditures.

This tension between evidence-based evaluation and pragmatic procurement execution creates a systemic gap in the technology lifecycle. While the theoretical literature on health economics emphasizes the value of utilizing cost-effectiveness thresholds to guide technology adoption, empirical evidence of how regional hospital boards apply these criteria during actual tendering processes remains scarce [3]. Most procurement studies focus either on the technical aspects of Health Technology Assessment methodology or on the legal and procedural mechanics of public tendering. Consequently, there is a profound lack of longitudinal research investigating how assessment ratings interact with commercial, organizational, and political factors during the final stages of the procurement process.

Understanding this interface is critical because misalignments between assessment criteria and procurement decisions lead to significant systemic inefficiencies. High-value technologies that demonstrate superior long-term clinical outcomes and cost savings may be systematically rejected due to high initial purchase prices, while cheaper but less effective technologies are acquired, leading to higher overall lifecycle costs [4]. Furthermore, when procurement decisions are perceived as disconnected from objective clinical and economic evidence, it undermines the credibility of the entire health technology evaluation infrastructure, reducing the motivation of clinical staff to engage with standardized assessment protocols.

1.2 Research Objectives and Scope

This paper addresses these gaps by conducting a comprehensive cohort study tracking procurement decisions across twelve regional hospital boards over a five-year period. The primary objective of this research is to empirically analyze the strength of the linkage between formalized technology assessment criteria and final procurement outcomes. By evaluating a standardized cohort of high-value capital medical equipment procurement packages, we seek to determine which assessment dimensions exert the greatest influence on purchasing decisions and to identify the administrative and environmental conditions under which evidence-based criteria are either embraced or marginalized.

Specifically, the study addresses three interrelated research questions. First, to what extent do clinical efficacy and long-term cost-effectiveness ratings predict the successful acquisition of a proposed medical technology? Second, how do non-clinical factors, such as immediate acquisition costs, technical compatibility with existing hospital infrastructure, and local supplier dynamics, moderate the influence of technology assessment recommendations? Third, do regional hospital boards with dedicated technology assessment units demonstrate a higher level of alignment between evaluation criteria and procurement decisions compared to boards that rely on centralized or external evaluations?

The scope of this study is limited to major capital medical equipment acquisitions, such as advanced imaging systems, oncology radiation equipment, and robotic surgical systems. These categories are selected because they require substantial capital investment, undergo formal technology assessments, and are subject to highly structured public procurement regulations. By analyzing these high-stakes decisions, this research provides valuable insights into the operational realities of healthcare asset management and offers actionable recommendations for developing more integrated, transparent, and evidence-guided procurement frameworks.

2. Theoretical Framework and Literature Review

2.1 Health Technology Assessment in Public Healthcare

The integration of systematic evidence into healthcare resource allocation is rooted in the principles of evidence-based medicine and welfare economics. Health Technology Assessment emerged in the late twentieth century as a formal mechanism to bridge the gap between scientific knowledge and policy action [5]. Over the decades, the methodological scope of these assessments has expanded from simple clinical efficacy trials to comprehensive multidimensional evaluations incorporating economic modeling, organizational impact analyses, and ethical considerations. In highly centralized health systems, national agencies conduct these evaluations and issue recommendations that theoretically dictate which technologies are reimbursable or eligible for public purchase.

However, in decentralized or regionalized healthcare models, the authority to execute purchasing decisions is typically devolved to regional hospital boards. This structural division of labor introduces significant agency problems and coordination challenges. Researchers have noted that while centralized assessment agencies possess the technical expertise to conduct sophisticated cost-effectiveness analyses, regional boards often lack the local capability to interpret and apply these complex findings to their unique operational contexts [6]. As a result, the national recommendations are frequently viewed as distant guidelines rather than binding directives, leading to wide variations in technology adoption rates across different regions.

Furthermore, the standard criteria utilized in typical assessment frameworks are often poorly aligned with the immediate operational metrics used by hospital procurement teams. While an assessment may demonstrate that a technology is highly cost-effective over a ten-year patient horizon by reducing hospital readmissions and outpatient management costs, the procurement department is evaluated on its ability to minimize capital expenditure within the current fiscal year [7]. This temporal misalignment between long-term clinical value and short-term budgetary constraints is a recurring theme in health service research, yet empirical analyses tracking how this tension is resolved in actual purchasing cohorts remain exceptionally rare.

Institutional theory suggests that organizations under external pressure to demonstrate rationality will adopt formal processes like technology assessments for symbolic reasons, while continuing their traditional, interest-driven practices behind closed doors [8]. This decoupling phenomenon is particularly relevant to hospital procurement. Regional boards may mandate the submission of technology assessment reports to satisfy regulatory compliance and maintain administrative legitimacy, but continue to base their ultimate purchasing decisions on historical supplier relationships, local political lobbying, and immediate cost minimization. This study build upon these theoretical perspectives by empirically measuring the extent of decoupling in a real-world healthcare cohort.

2.2 Decision-making Models in Hospital Procurement

To understand how technology assessments are integrated into purchasing, it is essential to examine the decision-making models that govern hospital procurement. Traditional models of public procurement assume a highly rational, sequential process: needs assessment, specification design, tendering, evaluation, and contract award. Under this rational framework, technology assessment criteria are expected to be directly translated into weighted evaluation metrics within the tender documents, ensuring that the technology offering the best overall value-for-money is selected [9].

In practice, hospital procurement is highly complex and characterized by bounded rationality, information asymmetry, and multi-stakeholder bargaining [10]. The procurement of medical equipment involves a diverse set of actors, including clinical specialists, biomedical engineers, hospital administrators, financial officers, and external procurement consultants. Each of these

stakeholder groups prioritizes different evaluation criteria. Clinical specialists prioritize technological sophistication, therapeutic efficacy, and personal familiarity with specific device interfaces. Biomedical engineers focus on maintenance requirements, technical compatibility, and software integration with existing hospital information systems. Financial officers and procurement specialists are primarily driven by budget compliance, contract compliance, and minimizing direct acquisition costs [11].

These competing interests are negotiated within the administrative framework of regional hospital boards. According to resource dependency theory, organizations are heavily influenced by actors who control critical resources, such as funding. In times of fiscal austerity, the balance of power within hospital boards shifts decisively away from clinical advocates and toward financial administrators [12]. Consequently, even when clinical and technical assessments strongly endorse a particular high-value technology, the financial realities of the board can lead to the rejection of the proposal or the selection of a lower-cost, technically inferior alternative during the bidding process.

Additionally, supplier-buyer dynamics play a powerful role in shaping procurement outcomes. The medical device market is characterized by oligopolistic structures where a small number of multinational corporations dominate key technology segments [13]. These suppliers employ sophisticated marketing and relationship-management strategies to create strong brand loyalty among clinical staff, a phenomenon known as clinician preference. This preference can lead to the intentional tailoring of tender specifications to favor a specific vendor, effectively bypassing the objective, vendor-neutral recommendations generated by formal technology assessments. By analyzing a cohort of actual procurement packages, this study evaluates the relative weight of these commercial and behavioral factors against formal assessment criteria.

3. Methodology and Research Design

3.1 Cohort Selection and Data Sources

To examine the empirical relationship between evaluation criteria and purchasing outcomes, we established a retrospective cohort of capital medical equipment procurement packages managed by twelve regional hospital boards. The cohort period spans five consecutive fiscal years, allowing us to track the complete trajectory of each procurement package from the initial submission of the technology assessment request to the final execution or cancellation of the procurement contract. This longitudinal design is essential for capturing the delayed administrative transitions that characterize large-scale public sector acquisitions.

The inclusion criteria for the cohort were strictly defined. First, the procurement package must involve capital medical equipment with an estimated unit acquisition cost exceeding one hundred and fifty thousand Euros. Second, the technology must have undergone a formal evaluation by either a regional or national technology assessment body prior to the initiation of the tendering process. Third, the procurement must have been executed through a formal public tendering process managed directly by one of the twelve participating regional boards. Routine consumer goods, specialized single-use medical devices, software-only upgrades, and direct sole-source negotiations without prior formal assessment were excluded from the analysis.

Data collection was executed by extracting administrative, clinical, and financial records from multiple interconnected databases. Information regarding the initial technology assessment ratings, clinical recommendations, and estimated cost-effectiveness ratios was obtained from the regional health technology registries. Procurement specifications, tender evaluation criteria, bidder submissions, and final contract award values were retrieved from the official public procurement portals of the respective regional boards. To ensure data accuracy and resolve missing records,

these database extractions were cross-referenced with internal financial audit reports and meeting minutes from the boards capital allocation committees.

Through this comprehensive data collection protocol, we identified a final cohort of four hundred and fifty unique capital equipment procurement packages. For each package, we systematically coded the structural characteristics of the managing regional hospital board, the multidimensional evaluation scores assigned during the technology assessment phase, the structural design of the subsequent tender, and the ultimate procurement decision. This systematic database allowed for a rigorous statistical examination of the factors driving technology adoption.

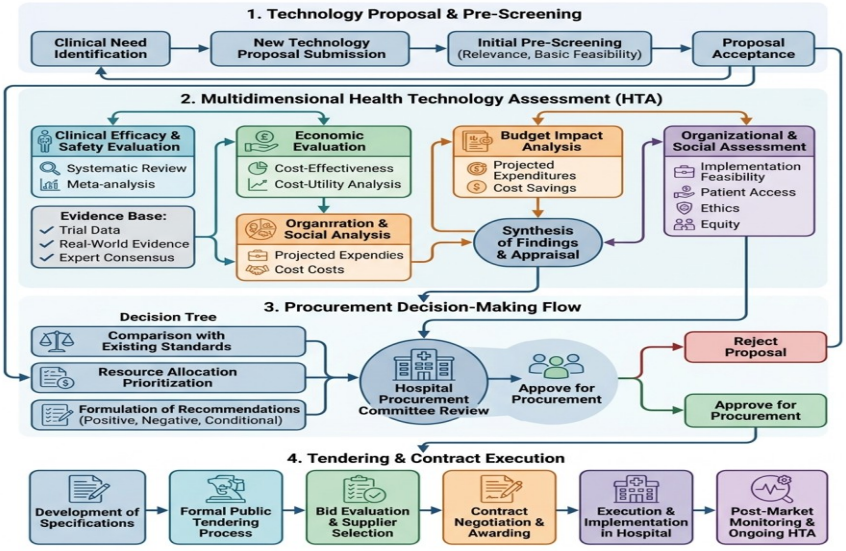

Figure 1: Integrated Framework of Health Technology Assessment and Procurement Decision Flow

The operational workflow depicted in Figure 1 illustrates the standard pathway through which a proposed medical technology progresses from initial clinical nomination to final contractual execution. The framework highlights the critical decision gates and the parallel tracks of clinical-economic evaluation and administrative procurement.

Table 1: Cohort Characteristics of Regional Hospital Boards

Board Identifier	Catchment Population	Annual Capital Budget	HTA Unit Status	Historical Adherence Rate
Board A	1200000	45000000	Dedicated Unit	0.72
Board B	850000	28000000	Shared Resource	0.58
Board C	2100000	82000000	Dedicated Unit	0.81
Board D	450000	15000000	None	0.34
Board E	1350000	51000000	Shared Resource	0.61
Board F	980000	33000000	Dedicated Unit	0.69
Board G	600000	19000000	None	0.40
Board H	1750000	65000000	Dedicated Unit	0.75
Board I	1100000	38000000	Shared Resource	0.55
Board J	500000	16000000	None	0.38
Board K	1900000	72000000	Dedicated Unit	0.78
Board L	700000	22000000	Shared Resource	0.50

As shown in Table 1, the twelve regional hospital boards exhibit significant diversity in terms of catchment population, capital resources, and administrative infrastructure. The historical adherence rate represents the proportion of high-priority technology recommendations that were successfully procured within twenty-four months of evaluation, indicating a preliminary divergence based on the presence of dedicated technology assessment units.

3.2 Analytical Framework and Variables

To analyze the linkage between evaluation criteria and purchasing, we developed a multidimensional analytical framework that operationalizes both the formal assessment inputs and the subsequent procurement decision parameters [14]. The technology assessment phase is characterized by four primary evaluation dimensions, each scored on a standardized scale from zero to ten based on the official registry reports. These dimensions include clinical efficacy, cost-effectiveness, technical compatibility, and strategic relevance.

Clinical efficacy captures the evaluated therapeutic or diagnostic benefit of the technology relative to current standard care, incorporating safety profiles and patient outcomes. Cost-effectiveness is derived from the incremental cost-effectiveness ratio, with higher scores representing a highly favorable financial return on investment over the technology lifecycle. Technical compatibility measures the ease of integrating the new equipment with the existing regional hospital infrastructure, including digital systems and physical facility requirements. Strategic relevance reflects the alignment of the technology with broader regional healthcare priorities, such as expanding oncology services or reducing elective surgery wait times.

The primary outcome variable of interest is the Procurement Decision, a binary indicator representing whether the evaluated technology was successfully procured and contracted within twenty-four months of the assessment completion. To capture the intermediate dynamics, we also measured secondary outcomes, including the duration of the procurement cycle, the deviation between the initial estimated budget and the final contract award value, and the level of competitive bidding, operationalized as the number of qualified bids received per tender.

To control for confounding factors that could independently influence the procurement outcome, we incorporated several covariates into our analytical models. These include the estimated capital value of the procurement package, the institutional capacity of the regional board, the presence of a dedicated technology assessment unit, the level of regional fiscal deficit during the procurement year, and the historical market share of the leading equipment vendor in that regional territory. This comprehensive variable selection ensures that the estimated effects of the assessment criteria are robust to regional, commercial, and temporal variations.

4. Implementation and Data Analysis

4.1 Statistical Modeling of Procurement Outcomes

The statistical analysis was conducted using a multi-phase modeling approach. First, we performed descriptive analyses to explore the distribution of assessment scores and procurement outcomes across the cohort. Second, we estimated multivariable logistic regression models to determine the probability of a technology being successfully procured as a function of its multidimensional assessment scores and the specified control variables [15]. This approach allows us to quantify the relative influence of clinical and economic criteria compared to commercial and administrative factors.

The probability of successful procurement was modeled using a cumulative logistic distribution. The independent variables were introduced in thematic blocks to assess the incremental explanatory power of clinical evidence, economic factors, organizational capacity, and commercial dynamics. Interaction terms were also specified to investigate whether the presence of a dedicated regional technology assessment unit moderates the relationship between evaluation scores and final purchasing decisions.

Furthermore, to account for potential clustering effects within regional boards, we estimated generalized estimating equations with an exchangeable correlation structure. This robust modeling

technique ensures that the standard errors are adjusted for the non-independence of procurement packages managed by the same administrative board, reducing the risk of committing type I errors due to regional administrative habits.

Finally, we conducted a survival analysis utilizing Cox proportional hazards models to analyze the duration of the procurement cycle [16]. In this analysis, the event of interest was the formal execution of the procurement contract, and packages that were canceled, suspended, or remained unawarded at the end of the five-year cohort period were treated as right-censored observations. This survival framework provides valuable insights into how technology assessment criteria affect the velocity of the public acquisition process.

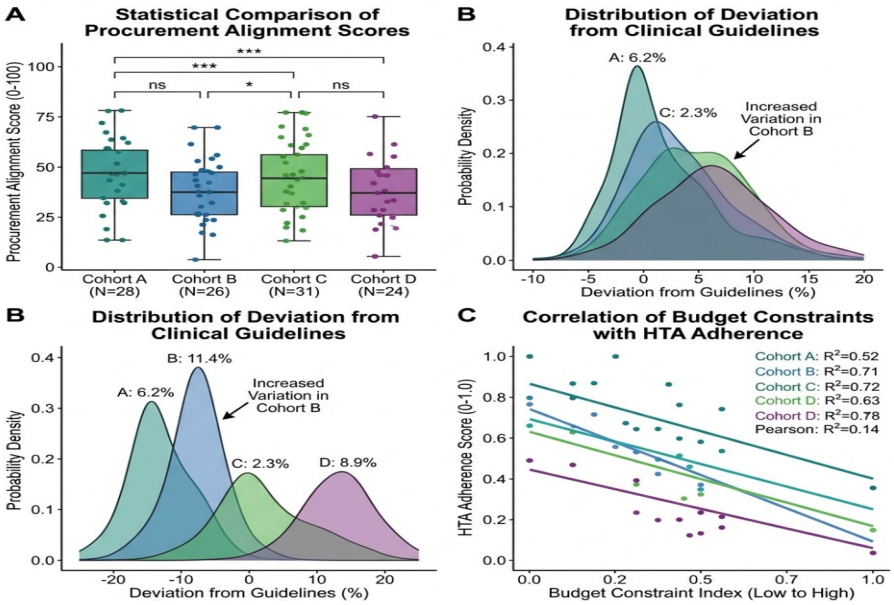

Figure 2: Statistical Comparison of Procurement Alignment Scores Across Regional Cohorts

The analytical results represented in Figure 2 reveal a clear bifurcation in decision alignment. Regional boards with dedicated evaluation infrastructure demonstrate a tightly clustered adherence to high clinical and cost-effectiveness scores, whereas boards lacking local analytical capacity display wide dispersion, with purchasing decisions heavily skewed by immediate capital availability and commercial bidding discounts.

4.2 Discrepancy Mapping and Evaluation

To delve deeper into the misalignment between assessment and procurement, we developed a standardized Discrepancy Index [17]. This index measures the mathematical distance between the priority ranking assigned to a technology during the evaluation phase and its actual priority during the tendering and contract award phase. The technology assessment priority is calculated as a weighted average of its clinical efficacy and cost-effectiveness scores. The procurement priority is operationalized based on the rapid execution of the tender, the allocation of sufficient capital budget, and the relative weight assigned to non-financial criteria within the tender evaluation sheet.

A high Discrepancy Index score indicates that a technology highly recommended by clinical and economic evaluators was either delayed, severely underfunded, or rejected during the procurement process, or conversely, that a low-scoring technology was rapidly acquired. By mapping these discrepancy scores across all four hundred and fifty packages, we identified distinct patterns of systematic misalignment. These patterns were then categorized based on the primary administrative or commercial driver of the discrepancy.

To validate these quantitative discrepancy maps, we conducted a series of sensitivity analyses. We recalculated the Discrepancy Index using alternative weighting schemes for the clinical and economic dimensions to ensure that the identified misalignments were not artifacts of a specific index definition. We also performed subgroup analyses focusing exclusively on the highest-value acquisitions, where the tension between clinical innovation and fiscal constraint is most acute. These diagnostic steps confirmed the structural stability and empirical validity of our analytical framework.

5. Results and Discussion

5.1 Alignment Patterns Across Regional Boards

The empirical analysis reveals a significant and concerning gap between technology assessment recommendations and actual procurement outcomes. Across the entire cohort of four hundred and fifty procurement packages, only fifty-six percent of the technologies classified as high priority by formal assessments were successfully procured within the twenty-four-month window. This indicates that nearly half of the highly recommended medical innovations failed to transition from clinical evaluation to physical adoption within regional healthcare systems.

The regression models provide detailed insights into the drivers of this misalignment. While clinical efficacy scores positive and statistically significant relationship with the likelihood of procurement success, the magnitude of this effect is substantially smaller than that of commercial and budgetary factors. For every one-unit increase in the clinical efficacy score, the odds of successful procurement increased by a modest factor. In contrast, the direct acquisition cost discount, representing the percentage reduction from the list price offered by vendors during the bidding phase, was the strongest predictor of contract execution.

Table 2: Determinants of Procurement Success Based on Logistic Regression

Predictor Variable	Odds Ratio	Standard Error	z Statistic	p Value
Clinical Efficacy Score	1.45	0.15	3.52	0.001
Cost Effectiveness Ratio	1.12	0.08	1.58	0.114
Technical Compatibility	1.82	0.21	4.12	0.000
Local Supplier Presence	2.04	0.25	5.01	0.000
Acquisition Cost Discount	2.31	0.28	5.68	0.000

The logistic regression results presented in Table 2 demonstrate that non-clinical, commercial, and operational factors exert a dominant influence on purchasing decisions [18]. The odds ratio of 2.31 for the acquisition cost discount indicates that hospital boards are highly sensitive to immediate price reductions, even when the evaluated technology may have inferior long-term clinical or economic performance. Similarly, the presence of a local supplier and technical compatibility with existing systems significantly increase the probability of purchase, highlighting the power of administrative path dependency and commercial relationships.

Interestingly, the formal cost-effectiveness ratio, which is highly emphasized in health economics literature, did not emerge as a statistically significant predictor of procurement success in the overall model. This finding suggests that regional hospital boards rarely utilize long-term economic evaluations as active decision criteria during the purchasing phase [19]. Instead, economic considerations are reduced to immediate capital budget compliance, effectively neutralizing the value of sophisticated lifecycle cost modeling.

However, the subgroup analysis revealed a critical moderating effect. In regional hospital boards that maintained dedicated, locally integrated technology assessment units, the relationship between clinical-economic scores and procurement success was significantly stronger. For these boards, the odds ratio for clinical efficacy rose substantially, and the influence of short-term cost discounts was partially mitigated. This finding underscores the vital role of local administrative capacity in translating scientific evidence into organizational practice, indicating that decentralization without local expertise leads to a breakdown in evidence-based governance.

5.2 Barriers to Evidence-Based Procurement

The widespread misalignment between technology evaluation and procurement execution can be attributed to several deeply entrenched structural, financial, and behavioral barriers within regional hospital boards [20]. The primary structural barrier is the institutional separation between evaluation teams and procurement departments. In many regional administrations, these two functions operate in complete silos, utilizing different professional languages, reporting structures, and performance metrics. Technology evaluators are typically clinicians and health economists focused on patient-level outcomes and long-term societal value, while procurement officers are administrative specialists trained in public law and contract negotiation, focused on procedural compliance and immediate cost savings.

This organizational decoupling is reinforced by the legal structure of public procurement directives [21]. Public procurement laws are designed to ensure transparency, equal treatment, and open competition, which often leads procurement departments to rely on highly objectified, easily measurable criteria, such as purchase price and basic technical specifications. Incorporating complex, multidimensional technology assessment findings into formal tender evaluation matrices is legally challenging and carries a high risk of being contested by losing bidders. To avoid costly legal disputes and administrative delays, procurement officers frequently opt for simplified lowest-price evaluation frameworks, effectively discarding the nuanced evidence generated during the technology assessment phase.

Furthermore, the structure of public healthcare financing creates powerful disincentives for adopting cost-effective technologies. Regional hospital boards operate under rigid annual capital budgets that are strictly separated from operational and clinical budgets. Under this split-budget system, the capital savings achieved by purchasing cheaper, lower-quality medical equipment are retained by the procurement department, while the resulting long-term operational costs, such as increased maintenance, higher complication rates, and longer hospital stays, are externalized to clinical operating budgets. Because there is no financial mechanism to capture and reinvest lifecycle savings across these budgetary silos, regional boards are systematically incentivized to prioritize low acquisition costs over long-term cost-effectiveness.

Finally, behavioral factors and cognitive biases among decision-makers play a significant role. Hospital board members are often subject to risk aversion and status quo bias, leading them to favor familiar technologies and established suppliers over innovative solutions that require significant changes in clinical workflows or staff retraining. This resistance is amplified when local suppliers maintain close, long-standing relationships with senior clinical staff, creating powerful informal coalitions that can successfully lobby the board to override negative or neutral technology assessment findings in favor of specific vendor acquisitions.

6. Policy Implications and Conclusion

6.1 Strategic Recommendations for Hospital Boards

To bridge the gap between technology evaluation and purchasing, regional hospital boards must transition from fragmented administrative structures to highly integrated, evidence-guided procurement ecosystems [22]. The first step in this transition is the structural integration of technology assessment and procurement teams. Rather than operating as sequential, isolated processes, evaluation and purchasing should be merged into a single, continuous technology lifecycle management workflow. Technology assessment experts should be actively embedded within procurement planning committees, and procurement officers should participate in the early stages of technology nomination to ensure that evaluation criteria are designed in a format that is legally and practically applicable to tender documents.

Second, hospital boards must reform their tender evaluation methodologies by adopting advanced Multi-Criteria Decision Analysis frameworks. These frameworks allow for the formal, weighted integration of clinical efficacy, cost-effectiveness, technical compatibility, and supplier capability alongside purchase price within public tenders [23]. By clearly codifying these weighted criteria in the initial tender specifications, boards can legally select high-value, highly effective technologies over cheaper, lower-performing alternatives without violating public procurement regulations or risking legal challenges from vendors.

Third, healthcare policy makers must introduce integrated capital-operational budgeting models. By breaking down the financial barriers between capital acquisition budgets and clinical operating budgets, health systems can ensure that the long-term savings generated by highly cost-effective technologies are directly recognized and rewarded. Regional boards should be permitted to utilize innovative procurement models, such as risk-sharing agreements and value-based purchasing contracts, where vendor payments are tied to the actual clinical and economic performance of the medical equipment in real-world practice. This shifts the financial risk of technology adoption from the public system to the manufacturer and incentivizes the procurement of high-value innovations.

6.2 Study Limitations and Future Research

While this cohort study provides robust empirical evidence of the linkage between technology evaluation and procurement decisions, several limitations must be acknowledged. First, the data are drawn from twelve regional hospital boards within a single national healthcare system, which may limit the generalizability of the findings to countries with highly centralized or fully privatized health systems. Future comparative research across different international procurement jurisdictions would be highly valuable to determine how diverse regulatory and financing models influence alignment patterns.

Second, the study focused exclusively on high-value capital medical equipment, which undergoes intensive scrutiny and formal assessment. The dynamics of technology adoption for low-cost medical devices, digital health applications, and clinical consumables may differ significantly and warrant dedicated empirical investigation [24]. Third, while our quantitative models captured a wide range of administrative and commercial covariates, some qualitative nuances of internal board negotiations and political lobbying are inherently difficult to measure statistically.

Future research should address these limitations by employing mixed-methods designs that combine large-scale cohort analyses with in-depth qualitative case studies of specific high-discrepancy procurement decisions. Additionally, longitudinal studies tracking the long-term clinical and financial outcomes of misaligned procurement decisions would provide crucial empirical evidence to quantify the exact economic cost of ignoring health technology assessment recommendations. Such research will be essential to continuously refine healthcare governance frameworks and ensure that public resources are optimized to deliver the highest possible value for patients and society.

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