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Research Article

Management Optimization of Hospital Health Examination Centers: A Healthcare Management Perspective

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Abstract

With the growing emphasis on preventive healthcare and health management, hospital health examination centers have become an essential component of modern hospital service systems. Beyond their public health functions, these centers also play an increasingly important role in hospital operations and service competitiveness. However, due to their dual characteristics of administrative dependence and market orientation, hospital health examination centers often face complex management challenges that affect operational efficiency and service quality.

This study examines the management issues of hospital health examination centers from a healthcare management perspective. Adopting a conceptual, literature-based research design, the study synthesizes and analyzes common management problems related to operational processes, human resource allocation, service quality management, information system integration, and organizational governance. Secondary data, including academic literature and hospital management documents, are systematically reviewed and analyzed within an integrated management framework. (No single hospital case is presented; the study is positioned as a conceptual synthesis rather than an empirical case study.)

The findings indicate that fragmented service processes, inadequate performance evaluation mechanisms, limited customer-oriented management practices, insufficient information system support, and constrained organizational autonomy are key factors that hinder the effective management of hospital health examination centers. These issues not only reduce service efficiency and client satisfaction but also limit the sustainable development of hospital health examination services.

Based on the identified challenges, this study proposes a set of management optimization strategies, including process redesign, enhancement of human resource and performance management systems, strengthening of service quality and customer-oriented management, improvement of information management and digital integration, and adjustment of organizational structure and governance mechanisms. These strategies aim to align management practices with the service-oriented nature of health examination services and to support data-driven and systematic management improvement.

This study contributes to the healthcare management literature by providing a structured analysis of hospital health examination centers from a managerial perspective. The findings offer practical insights for hospital administrators seeking to improve operational efficiency, service quality, and the long-term sustainability of health examination services within hospital systems.

Keywords

Hospital health examination centers, Healthcare management, Operational management, Service quality management, Management optimization

1. Introduction

With the transformation of modern healthcare systems, hospitals are increasingly expanding their functions beyond traditional diagnosis and treatment to include preventive and health management services (Donabedian, 1988). Hospital health examination centers have become an important component of hospital service systems, playing a key role in early disease detection, health risk assessment, and population health management. At the same time, health examination services have developed into a significant source of operational revenue, making their effective management an important concern for hospital administrators.

Despite their strategic importance, hospital health examination centers face a series of management challenges (Porter & Teisberg, 2006). Unlike clinical departments, these centers must simultaneously comply with hospital administrative systems and respond to market-oriented demands such as service efficiency, customer satisfaction, and cost control. This dual operational logic often leads to problems including inefficient service processes, unclear performance evaluation mechanisms, and limited customer-oriented management practices, which negatively affect operational performance and service quality (Shortell & Kaluzny, 2016). As argued by Shortell and Kaluzny (2016) and Mosadeghrad (2014), management models developed for clinical departments are not directly transferable to high-volume, market-oriented service units such as health examination centers, where service efficiency and client experience are primary outputs.

From a management perspective, issues related to operational efficiency, human resource allocation, service quality management, and information system integration are particularly prominent. Long waiting times, fragmented service procedures, and inadequate coordination among departments

reduce service capacity and weaken client experience (Lega et al., 2013). In addition, traditional hospital management models tend to prioritize clinical outcomes over service efficiency and customer satisfaction, making it difficult to motivate staff involved in health examination services and to improve overall management effectiveness (Arah et al., 2006).

Given these challenges, there is a growing need to analyze hospital health examination centers from a healthcare management perspective. Existing studies have paid relatively limited attention to managerial optimization strategies in this field (Andaleeb, 2001). Therefore, this study aims to examine common management problems in hospital health examination centers and propose practical optimization strategies to improve operational efficiency and service quality, thereby contributing to the sustainable development of hospital management systems (Dabholkar et al., 2000).

2. Literature Review

Existing studies on hospital health examination services mainly originate from the fields of healthcare management and service management. Early research focused on the functional role of health examinations in disease prevention and population health management, emphasizing their contribution to early detection and risk control (Parasuraman et al., 1988). As healthcare systems became more market-oriented, scholars gradually began to examine health examination services from an organizational and managerial perspective, particularly in relation to operational efficiency and resource utilization within hospitals (Griffith & White, 2007).

A substantial body of literature has explored hospital management issues using service operations and quality management theories. Studies indicate that inefficient process design, fragmented service delivery, and weak interdepartmental coordination are common problems in hospital-based service units (Burns et al., 2011). In high-volume service settings such as health examination centers, poor workflow management often leads to long waiting times and reduced service capacity, which negatively affects both organizational performance and client experience. These findings highlight the importance of applying operations management principles to healthcare service contexts (Alexander & Hearld, 2009). Building on Donabedian's (1988) structure–process–outcome framework and operations management theory (Alexander & Hearld, 2009), the literature shows that workflow design is a core determinant of service performance in healthcare settings.

Service quality management has also received considerable academic attention. Research drawing on service quality models, such as SERVQUAL and patient-centered care frameworks, suggests that perceived service quality is strongly associated with customer satisfaction and loyalty in healthcare settings. Unlike traditional clinical services, health examination services involve relatively healthy individuals who place greater emphasis on service efficiency, communication quality, and overall experience (Green et al., 2007). However, several studies note that hospital management systems tend

to prioritize clinical outcomes over service experience, resulting in insufficient attention to customer-oriented management practices in health examination centers (McLaughlin & Olson, 2012). Patient-centered care frameworks further indicate that service experience, not only clinical outcome, should guide management of such units (McLaughlin & Olson, 2012).

Human resource management represents another important research theme. Previous studies emphasize that effective staff allocation, performance evaluation, and incentive mechanisms are essential for improving service efficiency and quality. In many hospitals, personnel involved in health examination services are shared with clinical departments, leading to role ambiguity and workload conflicts (Poksinska, 2010). Scholars argue that traditional hospital performance management systems are often inadequate for evaluating service-oriented work, thereby limiting staff motivation and organizational effectiveness in health examination units. This is consistent with contingency and performance-management perspectives suggesting that incentive structures must reflect the actual outputs of the unit being managed (Lega et al., 2013).

In recent years, information management and digitalization have emerged as critical factors in healthcare management research. The literature suggests that integrated information systems can significantly enhance workflow coordination, data management, and decision-making efficiency (Luxford et al., 2011). However, existing hospital information systems are frequently designed with a primary focus on clinical care, providing limited support for the high-throughput and standardized nature of health examination services. This mismatch has been identified as a key barrier to management optimization in hospital health examination centers (Mosadeghrad, 2014). Recent digital-health literature stresses that system interoperability, not mere system presence, determines management value (Menachemi & Collum, 2011).

Overall, the existing literature provides valuable insights into hospital management, service quality, and operational efficiency, but relatively limited research has specifically addressed the integrated management optimization of hospital health examination centers (Dagger et al., 2007). Most studies focus on isolated aspects such as service quality or process efficiency, lacking a comprehensive management framework tailored to the unique characteristics of health examination services. This research gap underscores the need for a systematic analysis of management challenges and optimization strategies in hospital health examination centers from a healthcare management perspective.

The novelty of this study lies in integrating four previously separate management lenses—operations, human resources, service quality, and information systems—into one framework purpose-built for hospital health examination centers, an area historically examined only in fragmented ways. This integration, rather than any single dimension, constitutes the study's original contribution to the literature.

3. Methodology

This study adopts a conceptual, literature-based research design (positioned as a narrative review/conceptual paper) to examine management issues and optimization strategies in hospital health examination centers. No single hospital case is analyzed; instead, the study synthesizes secondary evidence to build a management framework tailored to health examination centers. A conceptual approach is appropriate because the research focuses on organizational processes, management practices, and operational challenges rather than on clinical outcomes or statistical hypothesis testing, and because no primary empirical case data were collected.

The research is based on secondary data and document analysis. Relevant data sources include existing academic literature, hospital management reports, policy documents, and publicly available materials related to hospital health examination services. These sources provide valuable information on operational structures, service processes, human resource arrangements, and information management practices commonly observed in hospital health examination centers. The use of secondary data allows for a comprehensive analysis without relying on sensitive patient-level information. Literature was identified through searches in PubMed, Web of Science, Scopus, and Business Source Complete using terms such as “health examination center,” “hospital service management,” “operational efficiency,” “service quality,” and “patient-centered care.” Inclusion criteria required peer-reviewed or authoritative management documents published in English addressing hospital or health-examination service management; exclusion criteria removed studies focused solely on clinical treatment outcomes without a management dimension. Documents were screened by title/abstract and then full-text reviewed.

To structure the analysis, this study employs a management analysis framework that integrates key dimensions identified in the literature, including operational management, human resource management, service quality management, and information management. Each dimension is examined to identify common management problems and their underlying causes. This framework enables a systematic comparison between existing management practices and recommended management principles in healthcare management research.

Data analysis is conducted through qualitative content analysis. Relevant materials are reviewed and coded according to the predefined management dimensions. Patterns and recurring themes related to inefficiency, coordination problems, and service quality gaps are identified and analyzed. This analytical approach follows a directed qualitative content analysis: codes were derived from the four a priori management dimensions and refined inductively as new themes (e.g., autonomy, interoperability) emerged, allowing the study to synthesize insights from multiple sources and to develop practical management recommendations grounded in existing evidence.

To enhance the credibility of the research, triangulation is applied by comparing findings across different types of sources, including academic studies and managerial documents. This process helps to reduce potential bias associated with single-source analysis and strengthens the validity of the conclusions. In addition, the analytical framework is derived from well-established healthcare management theories, ensuring theoretical consistency.

Although this study does not involve primary data collection, several limitations should be acknowledged. The reliance on secondary data may restrict the ability to capture context-specific operational details of individual hospitals. Consequently, the findings are interpretive rather than empirically verified, which may affect internal validity and limits generalization across hospitals that differ in size, ownership, or information-system maturity. Nevertheless, the case-based qualitative approach provides valuable insights into common management challenges and optimization strategies applicable to a wide range of hospital health examination centers. Future research may build upon this study by incorporating empirical data or comparative case analyses.

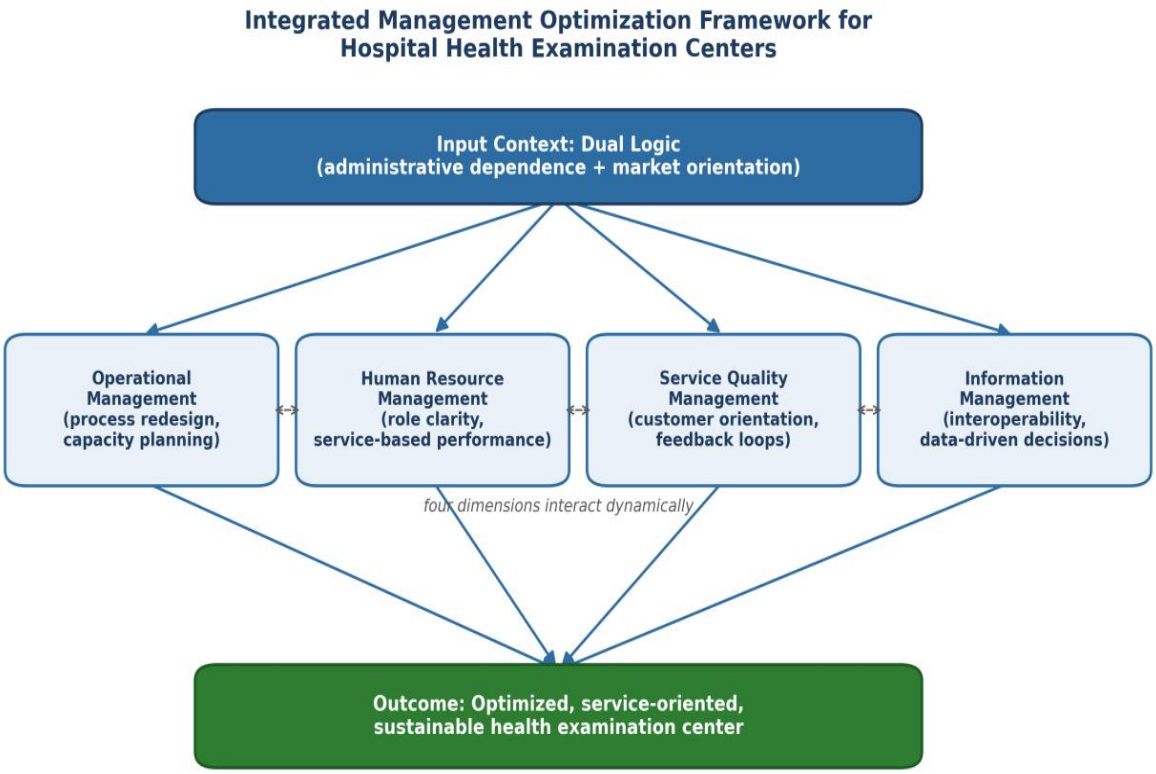
4. Analytical Framework

Based on the literature review and the methodological approach adopted in this study, an integrated analytical framework is developed to examine management issues in hospital health examination centers. This framework is grounded in healthcare management theory and focuses on key managerial dimensions that directly influence operational performance and service quality. By applying this framework, the study seeks to systematically identify management problems and propose targeted optimization strategies. Figure 1. Integrated management optimization framework for hospital health examination centers. The framework integrates four interrelated management dimensions—operational, human resource, service quality, and information management—under the dual-logic context of health examination centers, producing optimized, service-oriented, and sustainable examination services.

Figure 1

Integrated management optimization framework for hospital health examination centers

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The analytical framework consists of four interrelated dimensions: operational management, human resource management, service quality management, and information management. Operational management refers to the design and coordination of service processes, including appointment scheduling, examination flow, and interdepartmental collaboration. Efficient operational management is essential for reducing waiting times, improving resource utilization, and enhancing service capacity in high-volume health examination settings. Theoretically, this dimension draws on Donabedian's (1988) process element and operations management principles (Alexander & Hearld, 2009).

Human resource management focuses on staff allocation, role clarity, performance evaluation, and incentive mechanisms. In hospital health examination centers, effective human resource management is particularly important due to the multidisciplinary nature of service delivery and the frequent sharing of personnel with clinical departments. Inappropriate staffing arrangements or inadequate performance management systems may lead to reduced employee motivation and inconsistent service quality. This dimension is grounded in human-resource and performance-management theory (Lega et al., 2013).

Service quality management emphasizes customer-oriented management practices, including communication quality, service responsiveness, and overall client experience. Unlike traditional clinical services, health examination services involve clients who actively evaluate service efficiency and experience. Therefore, service quality management plays a critical role in client satisfaction and

retention, as well as in the competitive positioning of hospital health examination centers. This dimension builds on SERVQUAL and patient-centered care frameworks (Green et al., 2007; McLaughlin & Olson, 2012).

Information management refers to the integration and utilization of information systems to support service delivery and managerial decision-making. This includes appointment systems, examination data management, report generation, and information sharing across departments. Effective information management can enhance workflow coordination, reduce administrative burdens, and provide data support for continuous management improvement. This dimension reflects digital-health and health-information-systems literature (Menachemi & Collum, 2011; Mosadeghrad, 2014).

These four dimensions are not independent but interact dynamically within hospital health examination centers. For example, inefficient information systems may hinder operational coordination, while inadequate human resource management may weaken service quality. By examining the interactions among these dimensions, the analytical framework enables a comprehensive understanding of management challenges and provides a structured basis for developing optimization strategies in subsequent sections.

It should be noted that, while this paper proposes an integrated management framework, the four dimensions need not always be operated as a single integrated unit. Because the value of a health examination center differs from that of clinical departments, hospitals may also manage certain functions (e.g., appointment scheduling or reporting) separately, provided coordination mechanisms remain in place. The framework therefore supports both integrated and selectively separated arrangements.

5. Management Issues in Hospital Health Examination Centers

5.1. Operational inefficiency and process fragmentation

Operational inefficiency is one of the most prominent management issues in hospital health examination centers. In many hospitals, health examination services are organized through fragmented processes involving multiple departments, such as registration, diagnostic testing, imaging, and report interpretation (Bradley et al., 2012). The lack of integrated process design often results in repeated procedures, poor coordination, and extended waiting times. During peak periods, service congestion becomes particularly evident, reducing examination capacity and negatively affecting client experience.

Unlike clinical services, health examination services are characterized by high service volumes and relatively standardized procedures. However, insufficient attention to process optimization and capacity planning leads to suboptimal resource utilization. Equipment and personnel may remain

underutilized during off-peak periods, while service bottlenecks occur during high-demand hours. These inefficiencies increase operational costs and limit the overall performance of health examination centers.

5.2. Human resource allocation and performance management problems

Human resource management poses significant challenges in hospital health examination centers (Goes & Zhan, 1995). In many cases, medical staff involved in health examinations are shared with clinical departments, resulting in unclear role definitions and competing workload demands. This arrangement often leads to inconsistent service quality and reduced operational stability, particularly during periods of high clinical workload.

Furthermore, traditional hospital performance evaluation systems tend to focus primarily on clinical outcomes, research output, and inpatient services. Service-oriented activities such as health examinations receive relatively limited recognition in performance appraisal and incentive systems. As a result, staff motivation and engagement in health examination services may be weakened, affecting service efficiency and client satisfaction.

5.3. Limitations in service quality and customer-oriented management

Service quality management remains underdeveloped in many hospital health examination centers (Kaplan & Norton, 2001). Management practices are often provider-centered, emphasizing internal administrative procedures rather than customer needs and service experience. Clients frequently encounter problems such as insufficient communication, unclear examination guidance, and delays in report delivery, which reduce perceived service quality.

Health examination clients differ from traditional patients in that they actively evaluate service efficiency, comfort, and overall experience. However, many hospitals lack systematic mechanisms to collect and utilize customer feedback. The absence of structured service quality management frameworks and continuous improvement processes limits the ability of health examination centers to respond effectively to client expectations and market competition.

5.4. Information management and system integration issues

Although hospitals generally possess advanced information systems, these systems are often not fully adapted to the operational characteristics of health examination services (Young & McClean, 2008). Appointment scheduling, examination data management, and report generation are frequently managed through separate systems with limited interoperability. This fragmentation increases administrative workload and reduces workflow efficiency.

Inadequate information integration also restricts the use of data for management decision-making. Without timely and accurate operational data, managers may find it difficult to monitor service

performance, identify bottlenecks, or implement targeted improvements. Consequently, information management deficiencies represent a critical barrier to management optimization in hospital health examination centers.

5.5. Organizational coordination and management structure constraints

Organizational structure and governance mechanisms further influence the management effectiveness of hospital health examination centers (Lega & De Pietro, 2005). In many hospitals, health examination units lack sufficient managerial autonomy and remain embedded within complex administrative hierarchies. Decision-making processes may be slow, and responsibility for management outcomes may be unclear.

Limited coordination between health examination centers and other hospital departments can exacerbate operational problems. The absence of clear management authority and cross-departmental coordination mechanisms restricts the ability of health examination centers to implement integrated management strategies (Meyer et al., 2013). These structural constraints highlight the need for organizational adjustments to support more flexible and efficient management practices.

Compared with earlier studies that examine hospital management primarily through clinical quality or public-health outcomes (Dagger et al., 2007; Parasuraman et al., 1988), the present analysis shifts the unit of analysis to the service-oriented, market-exposed character of health examination centers. Where prior operations research emphasizes process efficiency in clinical units (Alexander & Hearld, 2009), this study finds that the same inefficiencies are amplified here by dual administrative–market pressures, explaining why generic clinical management models underperform in this setting. This contrast clarifies both the similarity (process logic) and the difference (value basis) between health examination centers and traditional departments.

6. Optimization Strategies and Management Implications

6.1. Process optimization and operational management improvement

To address operational inefficiency and process fragmentation, hospital health examination centers should adopt systematic process optimization strategies. Standardizing service workflows and redesigning examination processes can help reduce unnecessary steps and improve coordination among departments. Appointment-based scheduling and capacity management should be strengthened to balance service demand across different time periods, thereby reducing congestion during peak hours and improving overall resource utilization.

From a management perspective, the application of operations management tools, such as process mapping and continuous improvement mechanisms, can enhance service efficiency. Establishing dedicated coordination roles or teams responsible for workflow integration may further improve

operational stability and service capacity in high-volume health examination settings.

6.2. Human resource management and performance system enhancement

Optimizing human resource management is essential for improving the performance of hospital health examination centers. Clear role definitions and workload allocation mechanisms should be established to reduce conflicts arising from shared staffing arrangements with clinical departments. Where possible, hospitals may consider forming relatively stable teams dedicated to health examination services to ensure service continuity and accountability.

In addition, performance evaluation systems should be adjusted to reflect the service-oriented nature of health examination work. Indicators related to service efficiency, customer satisfaction, and teamwork should be incorporated into performance appraisal and incentive mechanisms. By aligning performance management with service objectives, hospitals can enhance staff motivation and improve service quality.

6.3. Strengthening service quality and customer-oriented management

Improving service quality requires a shift from provider-centered management to a more customer-oriented approach. Hospital health examination centers should establish systematic service quality management frameworks that emphasize communication, responsiveness, and overall client experience. Standardized service guidelines and communication protocols can help reduce variability in service delivery and improve perceived service quality (Choi et al., 2005).

Moreover, hospitals should implement structured mechanisms to collect and analyze customer feedback, such as satisfaction surveys and follow-up evaluations. Integrating feedback into continuous improvement processes enables health examination centers to better understand client needs and adapt services accordingly, thereby enhancing client satisfaction and loyalty. thereby enhancing client satisfaction and loyalty (Powell et al., 2024).

6.4. Enhancing information management and digital integration

Effective information management is a key enabler of management optimization in hospital health examination centers. Hospitals should promote the integration of appointment systems, examination data management, and reporting platforms to support streamlined workflows. Improved system interoperability can reduce administrative workload and enhance coordination across departments (Ozcan, 2014).

From a managerial perspective, data-driven management should be encouraged. By utilizing operational data to monitor service performance and identify bottlenecks, managers can implement targeted improvements and support evidence-based decision-making. Digital tools also provide opportunities to enhance transparency and service efficiency, contributing to long-term management

improvement. contributing to long-term management improvement (Santy & Harris, 2023).

6.5. Organizational adjustment and governance improvement

Organizational structure and governance mechanisms play a critical role in supporting management optimization. Hospitals should consider granting appropriate managerial autonomy to health examination centers, allowing them to make timely decisions regarding operations, staffing, and service improvement. Clear management authority and accountability mechanisms can enhance responsiveness and management effectiveness.

Strengthening cross-departmental coordination mechanisms is equally important. Establishing formal communication channels and collaborative management arrangements can improve resource sharing and operational alignment. These organizational adjustments contribute to a more flexible and integrated management system, supporting the sustainable development of hospital health examination services.

7. Conclusion

Hospital health examination centers have gradually evolved into a vital component of modern hospital service systems. With the growing emphasis on preventive healthcare, early disease detection, and population health management, these centers now play a dual role: supporting public health objectives while contributing to hospital operational sustainability. From a management perspective, the effective organization and operation of hospital health examination services have become increasingly important in the context of healthcare system transformation and intensified competition among healthcare providers.

This study examined hospital health examination centers through a healthcare management lens, focusing on their unique operational characteristics and management challenges. Unlike traditional clinical departments, health examination centers are service-oriented units that must simultaneously comply with hospital administrative systems and respond to market-driven demands such as efficiency, service quality, and customer satisfaction. This dual operational logic creates complex management environments that require specialized management strategies rather than the direct application of conventional clinical management models.

Through a comprehensive review of the existing literature and a case-based qualitative analysis, this study identified several critical management issues commonly faced by hospital health examination centers. These issues include operational inefficiency caused by fragmented service processes, challenges in human resource allocation and performance evaluation, limitations in service quality and customer-oriented management practices, inadequate information system integration, and constraints related to organizational structure and governance mechanisms. Together, these issues significantly affect service efficiency, client experience, and overall management effectiveness.

Operational inefficiency emerged as a central challenge in the management of hospital health examination centers. The findings suggest that insufficient process integration and coordination among departments often result in long waiting times, uneven resource utilization, and reduced service capacity. Given the high-volume and standardized nature of health examination services, such inefficiencies not only increase operational costs but also undermine the perceived professionalism and competitiveness of hospital-based examination services. These findings highlight the necessity of adopting operations management principles to redesign service workflows and improve capacity management.

Human resource management was identified as another critical factor influencing management performance. The reliance on shared staffing arrangements with clinical departments often leads to role ambiguity, workload conflicts, and inconsistent service quality. Moreover, traditional hospital performance evaluation systems tend to prioritize clinical outcomes and research output, providing limited incentives for service-oriented work. As a result, staff motivation and engagement in health examination services may be insufficient. These findings underscore the importance of developing performance management systems that reflect the specific characteristics and objectives of health examination services.

Service quality management and customer-oriented practices also play a decisive role in the success of hospital health examination centers. Unlike clinical patients, health examination clients actively assess service efficiency, communication quality, and overall experience. However, many hospitals continue to adopt provider-centered management approaches that focus on internal administrative procedures rather than client needs. The lack of systematic service quality management frameworks and structured feedback mechanisms limits the ability of health examination centers to respond effectively to changing client expectations and competitive pressures.

Information management and digital integration were found to be essential enablers of management optimization. Although hospitals generally possess advanced information systems, these systems are often designed primarily for clinical care and are not fully adapted to the operational requirements of health examination services. Fragmented appointment systems, examination data management platforms, and reporting processes increase administrative workload and reduce operational transparency. From a management perspective, improving information system integration is critical for enhancing workflow coordination and supporting data-driven decision-making.

Organizational structure and governance mechanisms further influence management effectiveness in hospital health examination centers. Limited managerial autonomy and complex administrative hierarchies can delay decision-making and reduce organizational responsiveness. Insufficient cross-departmental coordination exacerbates operational challenges and restricts the implementation of integrated management strategies. These findings suggest that organizational adjustments and

governance improvements are necessary to support flexible and efficient management practices.

Based on the identified management issues, this study proposed a set of optimization strategies aimed at improving the performance and sustainability of hospital health examination centers. These strategies include process optimization and workflow integration, enhancement of human resource and performance management systems, strengthening of service quality and customer-oriented management practices, improvement of information management and digital integration, and adjustment of organizational structure and governance mechanisms. Together, these strategies provide a comprehensive management framework that aligns managerial practices with the service-oriented nature of health examination services.

From a theoretical perspective, this study contributes to the healthcare management literature by extending management analysis to hospital health examination centers, a relatively underexplored area in existing research. While previous studies have often focused on clinical quality or public health outcomes, this research emphasizes managerial processes and organizational mechanisms. By integrating concepts from operations management, service quality management, and organizational theory, the study offers a structured analytical framework that can be applied to similar service-oriented units within hospitals.

From a practical perspective, the findings provide actionable insights for hospital administrators and healthcare managers. The proposed optimization strategies highlight the importance of adopting systematic management approaches rather than relying on ad hoc solutions. By redesigning service processes, aligning performance evaluation with service objectives, and enhancing customer-oriented management practices, hospitals can improve both operational efficiency and client satisfaction. These improvements not only enhance the competitiveness of health examination centers but also contribute to the overall performance and reputation of hospitals.

Despite its contributions, this study has several limitations that should be acknowledged. First, the analysis is based primarily on secondary data and qualitative case-based methods, which may limit the ability to capture detailed operational variations across different hospital contexts. Second, the absence of primary empirical data restricts the ability to quantitatively assess the impact of specific management interventions. Third, differences in healthcare systems, regulatory environments, and organizational cultures may affect the generalizability of the findings. Because the analysis relies on secondary sources rather than primary measurement, causal claims about specific interventions cannot be made, and the strength of evidence is therefore indicative rather than conclusive.

Future research may address these limitations by incorporating empirical data through surveys, interviews, or quantitative performance analysis. Comparative studies across different types of hospitals, such as public and private institutions, may provide further insights into context-specific management practices. In addition, future research may explore the long-term effects of digital

transformation and data-driven management on the performance of hospital health examination centers.

In conclusion, hospital health examination centers represent a critical and growing domain within hospital management. Effective management of these centers requires a comprehensive understanding of their unique operational characteristics and service-oriented objectives. By identifying key management challenges and proposing practical optimization strategies, this study provides a valuable contribution to both healthcare management theory and practice. The findings offer a foundation for future research and serve as a reference for hospital administrators seeking to improve the efficiency, quality, and sustainability of health examination services.

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Author contributions

Conceptualization, Shuai Wang, Linzhong Zhou; methodology, Peilin Li, Sai-Keong Chan; validation, Dongmei Li, Qian Li; formal analysis, Shuai Wang, Linzhong Zhou; investigation, Peilin Li, Sai-Keong Chan; resources, Dongmei Li; data curation, Qian Li; writing—original draft preparation, Shuai Wang; writing—review and editing, Linzhong Zhou; visualization, Peilin Li; supervision, Sai-Keong Chan; project administration, Dongmei Li. All authors have read and agreed to the published version of the manuscript.

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Data availability

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Declarations

Conflict of interest

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Ethics approval

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Consent to participate

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Consent for publication

Not applicable.

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