Key Success Factors for Smart Healthcare Adoption in Offshore Primary Clinics: An MDM-AHP Approach

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Abstract

As aging populations increase pressure on global healthcare systems, smart healthcare technologies have become essential for enhancing operational efficiency. However, primary clinics in geographically isolated regions face unique challenges that distinguish their adoption strategies from those of urban hospitals. This study employs the Modified Delphi Method (MDM) and Analytic Hierarchy Process (AHP) to construct a decision-making model for smart healthcare adoption specifically for Kinmen's primary clinics. Data collected from 21 local physicians reveal that System Quality is the most influential criterion (weight 0.308), followed by Organization and System Functionality. These findings suggest that technical stability and reliability are prioritized over other factors in the early stages of adoption. The insights offered here serve as a guide for stakeholders to mitigate adoption barriers and promote the effective digitalization of healthcare in offshore environments.

Keywords: Smart Healthcare, Offshore Medicine, Modified Delphi Method (MDM), Analytic Hierarchy Process (AHP), Key Success Factors (KSF)

1. Introduction

The demographic transition toward an aging society is a global phenomenon presenting formidable challenges to healthcare sustainability. As highlighted in the World Population Ageing 2020 report by the United Nations, the convergence of declining fertility rates and extended life expectancy is accelerating population aging, thereby imposing a substantial burden on medical systems worldwide (Gianfredi et al., 2025). Taiwan is not immune to this trend; projections by the National Development Council indicate that the nation is on the precipice of becoming a "Super-aged society" by 2025, a threshold where individuals aged over 65 will constitute more than 20% of the total population (Jeng et al., 2022). This demographic shift, combined with the comprehensive coverage of the National Health Insurance (NHI) and the growing prevalence of chronic illnesses, has led to a surge in demand for medical services and a corresponding escalation in healthcare expenditures (Huang & Yang, 2021). Concurrently, the healthcare sector is grappling with a critical shortage of nursing professionals. This deficit has intensified workplace pressure and increased the workload on medical staff, creating a vicious cycle that threatens to compromise the overall quality of care (Kao, 2011).

In response to these systemic pressures, the integration of Artificial Intelligence (AI) and Information and Communication Technology (ICT) into medical services has emerged as a pivotal solution. For healthcare practitioners, the adoption of Smart Healthcare technologies offers a pathway to enhance productivity and streamline nursing workflows. By alleviating administrative redundancies and clinical burdens, these technologies enable medical staff to extend superior care to a broader demographic (Chen, 2018). Moreover, recent scholarship suggests that automation and intelligent systems can effectively mitigate the risk of physician burnout while simultaneously augmenting the precision and quality of clinical decision-making (Mache et al., 2025).

Regarding the development of smart healthcare in Taiwan, the government is aggressively pursuing initiatives to accelerate the interoperability of electronic medical records. Projects such as the Taiwan Health Cloud aim to fortify the national health ICT infrastructure, thereby leveraging cloud-based services to enhance public health outcomes (Lee, 2023). The trajectory of Taiwan's medical industry is currently pivoting from a focus solely on disease treatment to one that emphasizes holistic health prevention. Consequently, the convergence of smart healthcare with ICT to create mobile and ubiquitous healthcare products has become a defining trend for the future (Lin, 2022).

Within this evolving landscape, primary care clinics occupy a strategic position. As the medical units closest to the community, they are instrumental in executing a two-way referral system that effectively decongests large medical centers (Su & Kuo, 2024). However, a significant disparity exists in resource allocation; current smart healthcare investments are predominantly concentrated in urban tertiary hospitals. In contrast, rural areas and outlying islands often lack large-scale medical centers and suffer from a scarcity of medical resources, exacerbating the digital divide (Haleem et al., 2021). Therefore, the advancement of smart healthcare should not merely be a competition of high-end equipment specifications. Instead, it requires the formulation of differentiated promotion strategies tailored to institutions of varying levels. For primary clinics, the imperative is to actively integrate smart healthcare applications into the daily lives of the population. Specifically, "Telemedicine" represents a vital domain where ICT-based support systems—through video conferencing, image transmission, and remote monitoring—allow providers to transcend traditional geographical limitations (Chen & Li, 2017).

Kinmen, an outlying island region, presents a unique case study due to its geographic isolation and lower medical accessibility compared to Taiwan's main island, relying on a single district hospital to serve its entire population. Given Kinmen's relatively high proportion of elderly residents, there is an immense demand for chronic disease management. Despite the absence of medical centers, the region's dense network of local clinics and pharmacies offers an ideal environment for fostering "community-based" smart healthcare. This approach aims to shift the locus of care from hospitals directly into the community, embedding health management into the daily routine of residents.

Promoting smart healthcare is an inevitable trend, yet it is a process that cannot be accomplished instantaneously. It mandates a pragmatic consideration of current medical realities, acknowledging that primary clinics require development plans distinct from those of large hospitals. Accordingly, this study adopts the perspective of "physicians in primary clinics on outlying islands" as its core focus. By systematically identifying and organizing the critical decision-making criteria for adopting smart healthcare in these specific settings, this research aims to facilitate a smoother digital transformation for offshore primary care.

2. Literature Review

2.1 Smart Healthcare

Smart Healthcare, frequently referred to as e-Health, represents a burgeoning interdisciplinary field that merges public health, business administration, and medical informatics. Broadly defined, it entails the deployment of the Internet and associated Information and Communication Technologies (ICT) to bolster the delivery and quality of public health services and information (Chilunjika et al., 2024). As Artificial Intelligence (AI) and the Internet of Things (IoT) mature, the fundamental value of smart healthcare has transcended mere information digitization. It now emphasizes leveraging technology to refine medical practices, thereby rationalizing the circulation of personnel, capital, material resources, data, and knowledge. By maximizing benefits and rationalizing costs, the ultimate objective is to realize universal health coverage and comprehensive holistic care (Yang et al., 2021).

Amidst the sector's rapid expansion and varying definitions, Shaw et al. (2017) delineated a tangible "e-Health Model," classifying the field into three primary domains. The first, "m-Health" (Mobile Health), utilizes mobile technology and wearable devices for the monitoring, tracking, and instant feedback of personal health metrics. The second, "Interactive Health," employs digital tools to fortify the bidirectional communication channels between clinicians and patients. The third, "Data-based Health," harnesses the aggregation of massive medical datasets to enhance the precision and robustness of information infrastructure and clinical decision-making. This tripartite structure has served as a foundational classification framework for later academic inquiries (Tian et al., 2019).

From the perspective of demand, shifting global demographics act as the primary catalyst for smart healthcare advancement. United Nations statistics project that, driven by extending life expectancies and falling fertility rates, individuals aged over 65 will constitute one-sixth of the global population by 2050. Confronted with the dual pressures of an aging society and shrinking medical workforces, nations have been aggressively investing in digital health solutions to mitigate these structural deficits (Yang et al., 2024). The scenario in Taiwan mirrors this urgency. Surveys indicate that as early as 2015, 86.3% of the elderly population self-reported diagnoses of chronic conditions, such as hypertension and diabetes, resulting in a precipitous rise in the need for medical services and long-term care (Fu & Li, 2016). Consequently, deploying technology to facilitate the continuous, long-term tracking and management of chronic diseases has become an imperative priority (Rahman et al., 2022).

In terms of industrial capability, Taiwan benefits from a globally competitive ICT sector, a comprehensive National Health Insurance system, and high-standard medical services, creating a robust foundation for smart healthcare innovation (Chiou, 2021). Nevertheless, obstacles persist. Lo et al. (2021) observed that past developments in Taiwan's medical industry were often siloed efforts by individual hospitals or technology firms. The lack of cross-disciplinary collaboration has historically impeded market expansion. Moreover, given that medical products directly impact patient safety, navigating regulatory certifications and managing digital transformation remain critical hurdles to overcome in the path toward industrialization.

2.2 Primary Care

Primary Care serves as the fundamental bedrock of national healthcare infrastructures. As authoritatively defined by the Institute of Medicine (IOM), this discipline entails "the provision of integrated, accessible health care services by clinicians who are accountable for addressing a large majority of personal health care needs, developing a sustained partnership with patients, and practicing in the context of family and community" (Starfield et al., 2010). Consequently, primary care operates not simply as a venue for pathology treatment, but as a critical nexus for fostering enduring physician-patient relationships and safeguarding community well-being.

Within the framework of Taiwan's medical system, regulations established by the Ministry of Health and Welfare classify institutions into Academic Medical Centers, Regional Hospitals, District Hospitals, and Primary Clinics. Each tier is assigned specific care responsibilities commensurate with its operational scale and technological capabilities (You & Hsieh, 2024). Among these, primary care clinics occupy the vanguard position, serving as the units with the highest proximity to and frequency of interaction with the general populace. Characterized by their accessibility, comprehensiveness, and continuity, these clinics function as the initial point of contact for patients, acting as essential "outposts" that filter needs before engagement with larger hospital systems is required (Lin & Kuo, 2018).

The effective implementation of primary care functions exerts a decisive influence on the distribution of medical resources. Lin et al. (2017) emphasized that a robust primary care network significantly curtails patient transit and waiting times for large hospitals, thereby preventing treatment delays. Furthermore, through efficient triage mechanisms, it minimizes the utilization of critical care resources in medical centers by patients with minor conditions, effectively mitigating emergency department overcrowding and elevating the quality of acute care. From a macroeconomic standpoint, with primary care physicians acting as health gatekeepers, National Health Insurance resources can be optimized, significantly reducing redundant expenditures. This approach is widely recognized as the most effective strategy for ensuring the long-term sustainability of the healthcare system (Tsai et al., 2021).

Amid the escalating prevalence of chronic illnesses, the burden placed upon primary care is intensifying. This challenge is particularly acute in rural or outlying island regions devoid of large hospitals, where primary clinics must assume a wider array of medical duties. Consequently, bolstering the service capacity of primary care has been identified by the World Health Organization (WHO) as the paramount strategy for advancing Universal Health Coverage (UHC) (Hone et al., 2017).

2.3 Decision Criteria

Decision criteria serve as the fundamental benchmarks guiding decision-makers in the assessment of alternatives. To formulate an evaluation framework appropriate for the deployment of smart healthcare in primary clinics, this research conducted a comprehensive synthesis of 12 relevant academic studies. Following a rigorous review, existing literature was primarily classified into three investigative dimensions: "Organization and Environment," "System and Service Quality," and "Resources and Functionality."

Initially, regarding Organizational and Environmental dimensions, the Technology-Organization-Environment (TOE) framework frequently serves as the theoretical bedrock. Dwivedi (2007) and Lin et al. (2013) utilized the TOE perspective to investigate critical success factors for hospital information system integration and cloud care adoption, respectively, both underscoring the significance of "Organization" and "Environment" criteria. Expanding on this, Nilashi et al. (2016) applied the Analytic Network Process (ANP) to assess Hospital Information Systems (HIS), broadening the scope of influencing factors to encompass technology, organization, environment, and stakeholders. In specific contexts like telemedicine and cloud services, Hung et al. (2012) and Wolff et al. (2021) identified "organizational culture," "leadership capability," and "industrial planning capability" as determinants of implementation success. Furthermore, Lin and Chen (2019) offered a supply-side analysis, asserting that "leader support," "policy guidelines," and "user feedback" are indispensable for smart healthcare advancement.

Secondly, concerning System Quality and Service Quality, scholarly attention has predominantly centered on reliability and user experience. Büyüközkan and Çifçi (2012) integrated Fuzzy AHP and TOPSIS to evaluate e-Health service quality, identifying six pivotal elements: tangibility, responsiveness, reliability, information quality, assurance, and empathy. Similarly, Lotfi et al. (2020) and Lin (2022), in their respective examinations of m-Health and cloud integration platforms, consistently highlighted "System Quality" and "Service Quality" as core performance indicators. In the specific domain of m-Health application assessment, Rajak and Shaw (2019) emphasized "user satisfaction," "compatibility," "security," and "responsiveness" as essential evaluation criteria.

Finally, regarding Resource Investment and specific functional requisites, Liao and Qiu (2016) utilized AHP to assess cloud computing systems, with a particular focus on "cloud service delivery" and "management issues." Addressing resource-constrained environments, Su et al. (2024) investigated the establishment of telemedicine systems in medically underserved regions, proposing four key dimensions: "government regulations," "remote technology," "System Functionality," and "clinical feedback." Additionally, Lin and Chen (2019) and Lin (2022) noted that "Resource Investment" and "cost" represent practical constraints that exert a significant influence on operational feasibility.

By systematically synthesizing the aforementioned literature, this study distilled the key decision criteria. Following the exclusion of low-frequency indicators, the final framework was consolidated into five primary criteria: Resource Investment, System Functionality, System Quality, Organization, and Environment.

3. Methodology

3.1 Problem Definition

Despite the absence of large-scale medical centers, Kinmen benefits from a substantial density of primary care clinics. These facilities serve as the vanguard of public health protection and provide an optimal setting for delivering continuous medical attention. Nevertheless, conventional diagnostic and treatment frameworks are currently confronting severe bottlenecks due to structural impediments. These challenges include a swiftly aging demographic, the inherent geographical constraints of outlying islands, and an escalating demand for high-quality medical services. Consequently, it is imperative for primary clinics to innovate and transform their service models to augment operational efficiency and adequately address the substantial care requirements.

Given that the requirements for smart healthcare systems vary considerably across different tiers of medical institutions, identifying the pivotal conditions that facilitate the smooth adoption and benefit maximization of such technologies in offshore primary clinics is a critical issue requiring immediate exploration. Predicated on this necessity, this study systematically categorizes the essential considerations for "introducing smart healthcare in primary clinics on outlying islands." The primary objective is to isolate influential decision criteria, thereby empowering clinic administrators to navigate the decision-making landscape accurately, facilitate objective assessments, and devise optimal implementation strategies.

3.2 Defining Criteria Evaluation Standards

By synthesizing findings from the literature review with the Modified Delphi Method (MDM), this research constructed an assessment framework tailored for offshore primary clinics. The resulting model encompasses five primary dimensions and 25 specific evaluation indicators. The operational definitions for each criterion are detailed as follows:

1.Resource Investment:

This dimension encompasses the requisite tangible and intangible capital for smart healthcare deployment. Specifically, "Cost Budget" pertains to the upfront expenditures for hardware and software acquisition, whereas "Financial Budget" addresses the long-term fiscal planning necessary for subsequent maintenance and system upgrades. Furthermore, "Personnel Training" represents a critical investment, covering both the time and financial resources dedicated to staff education. Finally, "Cost-Benefit" serves as a metric for Return on Investment (ROI); if the projected advantages do not outweigh the implementation costs, it compromises the clinic's sustainable operations and long-term willingness to promote the system.

2.System Functionality:

This criterion evaluates the alignment between system design, user requirements, and operational logic. Key considerations include "User Interface" and "User Experience"; systems must offer intuitive clarity to minimize cognitive load and accelerate the learning process ("Ease of Use and Learning"). Secondly, "Compatibility" and "Integration" are essential, ensuring stable operation alongside existing clinic equipment and offering cross-platform capabilities to prevent functional fragmentation. The system must also demonstrate "Scalability" to accommodate business growth, while maintaining a balance to avoid excessive "Complexity." Lastly, "Security and Privacy" acts as a core function, guaranteeing the confidentiality and protection of medical data during collection, storage, and utilization.

3.System Quality:

This factor directly dictates medical service efficiency and data trustworthiness. Priority is placed on "Accuracy" and "Data Integrity" to ensure that system-generated data remains error-free and complete. "Timeliness" and

"Real-time Response" are also vital, requiring the system to update status instantly and provide immediate feedback. Additionally, "Robustness" and "Availability" (Reliability) are critical assessment points, ensuring sustained operation under high-intensity usage to realize the objectives of manpower savings and enhanced operational "Efficiency."

4.Organization:

This dimension investigates both internal and external organizational dynamics. Internally, factors include "Staff Technical Capability" (associated with Employee Acceptance), reflecting the attitude of administrative and medical personnel toward new technology, and "Top Management Support," which gauges the leadership's resolve to drive digital transformation. Externally, the partnership with "Vendor Support" is scrutinized. Furthermore, the adequacy of existing "Hardware Infrastructure" and the alignment of the implementation plan with the clinic's "Strategic Objective" are pivotal variables determining execution success.

5.Environment:

This criterion addresses external forces impacting clinical decision-making. First, "Government Policy and Regulation" is considered; a sound regulatory framework protects physician and patient rights, while supportive "Welfare Policies" can lower adoption barriers. Second is "External Competitive Pressure"; amidst peer competition, smart healthcare adoption serves as a differentiation strategy to expand market share via innovative service models. Finally, the "Competitive Advantage" (Relative Advantage) yielded by the system—such as labor cost reductions and expanded service capacity—constitutes a significant driver within the environmental context.

3.3 Modified Delphi Method

To quantify the relative importance of the proposed criteria, this study utilized a 5-point Likert scale as the primary assessment instrument. Experts were invited to rate items based on their professional judgment and practical experience. The expert panel assembled for this phase consisted of six specialists—three practicing physicians and three university professors—ensuring a balanced synthesis of clinical insights and academic research perspectives. During the initial round of questionnaire analysis, the two indicators receiving the lowest scores—"Strategic Objective" and "External Competitive Pressure"—were eliminated to guarantee the high representativeness of the final criteria. A second round of the survey was subsequently administered. Statistical results demonstrated that the mean scores for all retained indicators met or exceeded 4.0, reflecting a strong consensus within the panel regarding the critical nature of these factors.

To further verify the stability of expert opinions, Quartile Deviation and Mode were applied as validity benchmarks. The analysis indicated that the Quartile Deviation for every indicator was less than or equal to 1, signifying minimal data dispersion and a medium-to-high level of consistency. Concurrently, all Mode values were 4 or higher, evidencing a high degree of agreement among experts concerning each decision indicator. The finalized decision indicators resulting from the MDM screening are detailed in Table 1.

Table 1. Statistical Results of the Second Round Expert Questionnaire (MDM)

Main Criteria	Sub-criteria	Mean	Quartile Deviation	Mode
Resource Investment	Cost-Benefit	4.38	1	4
	Financial Budget	4.13	0.25	4
	Personnel Training	4.38	1	4
System Functionality	Ease of Use and Learning	4.86	0	5
	Compatibility	4.57	1	5
	Complexity	4.43	1	4
	Scalability	4.43	1	4
	Security and Privacy	4.71	0.25	5
System Quality	Accuracy	4.86	0	5
	Timeliness	4.57	1	5
	Robustness	4.57	1	5
	Availability	4.57	1	5
	Efficiency	4.38	1	4
	Data Integrity	4.50	1	5

Organization	Staff Technical Capability	4.13	0.25	4
	Top Management Support	4.50	1	4
	Vendor Support	4.38	1	4
	Hardware Infrastructure	4.25	0.25	4
Environment	Government Policy and Regulation	4.25	0.25	4
	Competitive Advantage	4.13	0	4

3.4 Establishing the Hierarchical Structure

Grounded in the theoretical framework of the Analytic Hierarchy Process (AHP), this research dismantles the complex decision-making challenge into a structured hierarchy comprising three distinct levels. The primary tier designates the overall research objective, while the secondary tier encompasses five major criteria: Resource Investment, System Functionality, System Quality, Organization, and Environment. The tertiary tier contains the specific sub-criteria stemming from each of these main categories.

Regarding the questionnaire design and weight calculation, a systematic top-down approach is employed for sequential evaluation. The process initiates with pairwise comparisons of the five main criteria at the second level, necessitating 10 distinct assessments. Subsequently, pairwise comparisons are conducted for the sub-criteria within the third level. The specific comparison frequencies are distributed as follows: 3 for the Resource Investment criterion, 10 for System Functionality, 15 for System Quality, 6 for Organization, and 1 for the Environment criterion. In aggregate, the AHP questionnaire entails a total of 45 pairwise comparisons to establish the relative weights of all criteria. The comprehensive hierarchical structure of the research goal is illustrated in Figure 1.

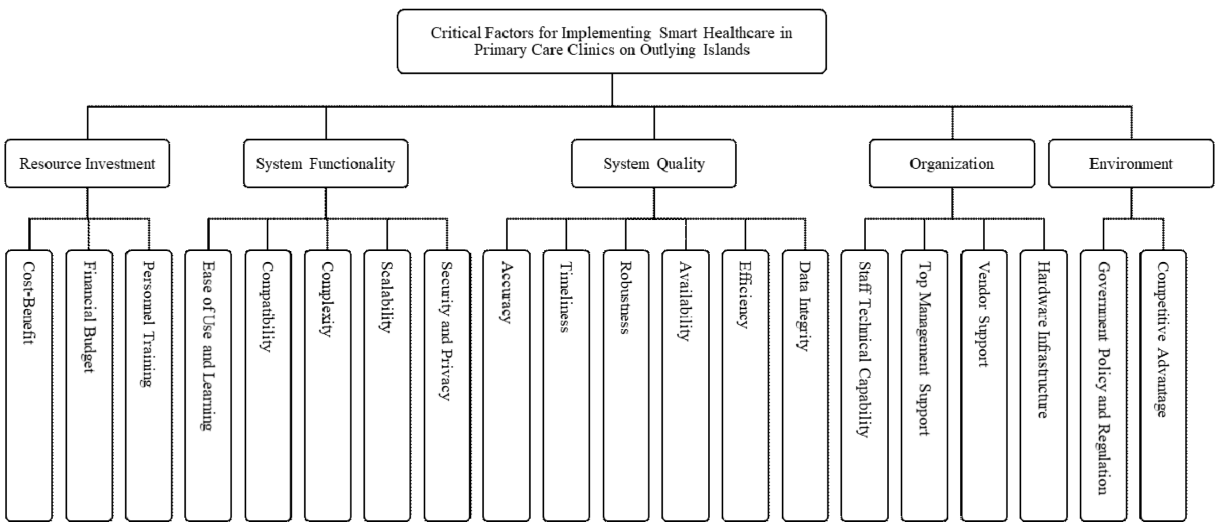

Figure 1. The Goal Hierarchy Structure

4. Research Results

4.1 Sample Structure Analysis

This research focused on primary care physicians practicing within the Kinmen region, to whom a total of 26 questionnaires were administered. All surveys were successfully retrieved, achieving a 100% initial return rate. Following a meticulous review of the response quality, five questionnaires were disqualified due to incomplete data or logical inconsistencies. Consequently, the study yielded 21 valid responses, resulting in an effective response rate of 80.8%.

The demographic profile of the valid sample was subjected to statistical analysis (as detailed in Table 2). In terms of gender composition, the group consisted of 14 male physicians (66.7%) and 7 female physicians (33.3%). Regarding professional specialization, Western medicine practitioners constituted the majority with 13 individuals (61.9%), followed by 5 dentists (23.8%) and 3 Chinese medicine practitioners (14.3%). The age structure demonstrated a relatively balanced distribution: the 41–50 and 51-and-above age brackets each contained 8 physicians (38.1%), while the remaining 5 physicians (23.8%) fell within the 31–40 range. This demographic composition suggests that the respondents possess substantial clinical experience, ensuring that the opinions collected are of high reference value.

Table 2. Statistics of Questionnaire Retrieval

Variable	Category	Frequency	Percentage
Gender	Male	14	66.7%
	Female	7	33.3%
Specialty	Chinese Medicine	3	14.3%
	Western Medicine	13	61.9%
	Dentistry	5	23.8%
Age	31-40 years old	5	23.8%
	41-50 years old	8	38.1%
	51 years old and above	8	38.1%

4.2 Consistency Test

To validate the logical coherence of the expert responses, this research utilized the Consistency Ratio (C.R.) metric introduced by Saaty (1980). A C.R. value of 0.1 or lower is generally accepted as evidence that the pairwise comparison matrix exhibits a satisfactory level of consistency.

Data calculations were executed using the Expert Choice software package. The verification outcomes (presented in Table 3) demonstrate that the C.R. values for the overall hierarchy, as well as for the individual criteria—Resource Investment, System Functionality, System Quality, Organization, and Environment—uniformly fall below the 0.1 threshold. This confirms that the judgment logic across all interviewed experts is highly consistent, thereby establishing the credibility of the subsequent weight analysis.

Table 3. Results of Consistency Test

Item	CI	RI	C.R.
Overall Hierarchy	0.02	1.12	0.02
Resource Investment	0.01	0.58	0.02
System Functionality	0.10	1.12	0.09
System Quality	0.06	1.24	0.04
Organization	0.05	0.90	0.06
Environment	0.00	0.00	0.00

4.3 Criteria Weight Results

Upon aggregating the expert consensus via AHP computational analysis, the weighted results for each hierarchical tier are detailed in Table 4.

Within the second tier's five primary dimensions, "System Quality" emerged as the dominant factor with a weight of 0.308, signifying it is the paramount concern for offshore primary clinics initiating smart healthcare. This is succeeded by "Organization" (0.221), "System Functionality" (0.212), and "Environment" (0.165), whereas "Resource Investment" (0.094) registered the lowest priority. This hierarchy suggests that for independent primary care practitioners, operational attributes such as stability, precision, and reliability—encapsulated by System Quality—take precedence over implementation costs. Moreover, the prominence of the "Organization" criterion in the second position underscores the decisive influence of internal team synergy and managerial commitment on project outcomes.

In terms of the third-tier sub-criteria, a global ranking across all indicators reveals the three most critical factors: "Security and Privacy" (0.091), "Accuracy" (0.082), and "Data Integrity" (0.066). These findings illuminate that, amidst digital transformation, physicians regard the safeguarding of patient privacy and the veracity of medical records as non-negotiable prerequisites.

Synthesizing these empirical results offers several insights. The placement of "Resource Investment" at the bottom implies that in the nascent stages of decision-making, clinics may view costs as an unavoidable capital expenditure or lack precise pricing models, rendering them less price-sensitive relative to performance. Conversely, the supremacy of "System Quality" suggests that supplier capability to deliver robust, high-precision products is the primary driver of adoption willingness. Regarding "System Functionality," its utility is contingent upon a foundation of superior system quality; functions can only operate soundly on a stable base. The high ranking of "Organization" reflects the lean operational structure of primary clinics; since most staff must interact directly with the system, internal acceptance and collaboration are naturally elevated to critical status. Finally, the "Environment" criterion encapsulates the dual consideration of internal readiness evaluations and external governmental policy support.

Table 4. Overall Results of Criteria Weights

Main Criteria	Weight	Sub-criteria	Weight	Overall Weight	Rank
A. Resource Investment	0.094	A1.Cost-Benefit	0.372	0.035	16
		A2.Financial Budget	0.227	0.021	19
		A3.Personnel Training	0.401	0.038	14
B. System Functionality	0.212	B1.Ease of Use and Learning	0.113	0.024	18
		B2.Compatibility	0.189	0.040	11
		B3.Complexity	0.078	0.017	20
		B4.Scalability	0.189	0.040	11
		B5.Security and Privacy	0.431	0.091	2
C. System Quality	0.308	C1.Accuracy	0.265	0.082	3
		C2.Timeliness	0.122	0.038	14
		C3.Robustness	0.111	0.034	17
		C4.Availability	0.159	0.049	9
		C5.Efficiency	0.128	0.039	13
		C6.Data Integrity	0.215	0.066	6
D. Organization	0.221	D1.Staff Technical Capability	0.335	0.074	4
		D2.Top Management Support	0.198	0.044	10
		D3.Vendor Support	0.233	0.051	8
		D4.Hardware Infrastructure	0.234	0.052	7
E. Environment	0.165	E1.Government Policy and Regulation	0.437	0.072	5
		E2.Competitive Advantage	0.563	0.093	1

4.5 Discussion of Research Results

By leveraging the Analytic Hierarchy Process (AHP) for empirical analysis, this research successfully prioritized the critical decision factors governing digital transformation within offshore primary healthcare settings. The data reveal that "System Quality" obtained the paramount weight, substantially outranking "Resource Investment". This outcome diverges from conventional wisdom in general management studies, which frequently posit that cost efficiency is the preeminent concern for small businesses implementing new technologies. However, in the medical domain, practitioners demonstrate profound risk aversion; technical failures—such as system crashes, latency, or data corruption—pose immediate threats to patient safety and the integrity of diagnostic and treatment protocols. This issue is exacerbated in primary clinics, where physicians often multitask without the support of dedicated onsite IT staff. Therefore, system stability and reliability are not merely features but essential prerequisites for sustaining the quality of clinical services. For medical professionals, the hidden costs associated with low-cost but unstable systems—including potential malpractice disputes and repair expenses—far outweigh the initial savings on acquisition price.

Beyond technical specifications, the elevation of the "Organization" criterion to the second rank highlights that smart healthcare adoption represents a fundamental organizational restructuring. In resource-constrained primary clinics, deploying new systems necessitates substantial overhauls of Standard Operating Procedures (SOPs), spanning registration, consultation, and prescription workflows. Insufficient technical proficiency or low acceptance among nursing and administrative personnel can precipitate significant internal resistance. This finding resonates with the Technology-Organization-Environment (TOE) framework, which asserts that successful technology implementation is contingent upon adequate internal organizational readiness.

5. Conclusion

This research successfully established a Key Success Factors (KSF) framework tailored for the implementation of smart healthcare in primary care clinics located on outlying islands. By utilizing the Modified Delphi Method (MDM) to define evaluation criteria and the Analytic Hierarchy Process (AHP) to synthesize expert feedback from 21 physicians in Kinmen, the study quantified the critical determinants of adoption. The empirical results demonstrate that among the five primary dimensions, "System Quality" (weight 0.308) is the paramount indicator, followed by "Organization" (0.221) and "System Functionality" (0.212). This hierarchy clearly signals that for offshore primary clinics—which typically operate independently and face resource constraints—operational attributes such as stability, rapid response, and interface usability are non-negotiable prerequisites. Physicians in these settings cannot afford clinical interruptions caused by system instability. Moreover, the secondary ranking of the "Organization" criterion highlights that adopting smart healthcare is not merely a technological procurement but a complex organizational change requiring process reengineering and extensive staff collaboration.

Drawing from these empirical insights, this study offers strategic recommendations for clinic managers, system suppliers, and policymakers. First, regarding adoption decisions, primary clinics are advised to prioritize system stability and operational smoothness over cost minimization. Concurrently, they must bolster organizational readiness through enhanced internal communication and comprehensive personnel training. Second, system suppliers should tailor their marketing strategies to highlight product efficiency and reliability, while crucially establishing localized maintenance support mechanisms to mitigate the geographical challenges of outlying islands. Finally, government authorities are encouraged to facilitate digital transformation in small-scale clinics through project subsidies or preferential financing. Furthermore, the continuous optimization of broadband infrastructure in offshore regions is indispensable for ensuring the uninterrupted operation of smart healthcare systems.

In summary, while this study focuses specifically on the Kinmen region, the evaluation model constructed herein possesses significant reference value for similar contexts. Future research should aim to extend the geographical scope to include other outlying islands, such as Penghu and Matsu, and broaden the participant base to incorporate the perspectives of nursing and administrative staff. Such expansions would contribute to a more holistic strategy for promoting smart healthcare across medically underserved offshore regions.

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