



## The effect of health information systems and staff training on service efficiency and patient satisfaction in Ghanaian health facilities: A structural equation modeling study

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### Abstract

**Purpose:** The study examines the effect of health information systems (HIS) and staff training on service efficiency and patient satisfaction in Ghanaian health facilities, while exploring the mediating role of service efficiency.

**Methodology/Design:** A quantitative research approach guided by a pragmatist philosophy was employed. Data were collected from 340 healthcare staff using structured questionnaires. The study applied Structural Equation Modeling (SEM) to test hypothesized relationships between HIS, staff training, service efficiency, and patient satisfaction. Reliability, validity, and discriminant assessments were conducted before hypothesis testing.

**Findings:** Results revealed that HIS quality positively influenced service efficiency ( $\beta = 0.41$ ,  $p < 0.001$ ) and patient satisfaction ( $\beta = 0.29$ ,  $p < 0.001$ ). Staff training also had a significant effect on service efficiency ( $\beta = 0.38$ ,  $p < 0.001$ ) and patient satisfaction ( $\beta = 0.26$ ,  $p < 0.001$ ). Service efficiency partially mediated the relationships between HIS, staff training, and patient satisfaction:  $\beta = 0.18$ ; staff training, service efficiency, patient satisfaction:  $\beta = 0.17$ ,  $p < 0.001$ .

**Implications:** The study emphasizes the need for investment in user-friendly HIS and continuous staff training. Healthcare managers and policymakers are encouraged to integrate digital systems and training programs to optimize efficiency and patient-centered care. The findings also provide theoretical support for Technology Acceptance Model, Human Capital Theory, Donabedian's Model, and SERVQUAL Theory in healthcare contexts.

**Originality/Value:** The study provides empirical evidence from Ghana on how HIS and staff training contribute to service efficiency and patient satisfaction, addressing a gap in literature on healthcare digitalization in developing countries.

**Keywords:** Health information systems, staff training, service efficiency, patient satisfaction, structural equation modeling, ghana

### Introduction

Health service delivery in Ghana has faced growing demands for efficiency, accuracy, and patient satisfaction. Health facilities are increasingly adopting digital health information systems to manage patient records, laboratory results, and clinical workflows. These systems are designed to streamline service delivery, reduce errors, and enhance coordination among healthcare staff (Agyemang *et al.*, 2024) [1]. However, the effectiveness of these systems depends largely on how well staffs are trained to use them. Staff training ensures that healthcare workers can operate new technologies confidently, follow standard procedures, and deliver care effectively (Mensah *et al.*, 2024).

Patient satisfaction is an essential indicator of healthcare quality. Satisfied patients are more likely to follow treatment plans, trust the healthcare system, and return for future care (Joseph, 2023) [15]. Service efficiency measured by shorter waiting times, accurate record keeping, and smooth workflows directly influences patient satisfaction. Research suggests that the successful integration of health information systems with well-trained staff can improve these outcomes (Bediako *et al.*, 2021) [6]. Conversely, poorly implemented systems and inadequate training may lead to delays, errors, and frustration among patients and staff alike. While Ghana has made strides in digitalizing healthcare services, there is limited empirical evidence on how health information systems and staff training interact to affect service efficiency and patient satisfaction. Existing studies often examine either technology adoption or training outcomes separately, neglecting the combined effects of both factors on healthcare delivery. This study applies

Structural Equation Modeling (SEM) to investigate these complex relationships, providing a comprehensive understanding of how technology and human resources jointly shape healthcare outcomes.

### Problem Statement

Notwithstanding the investments in health information systems and staff training, many Ghanaian health facilities still face challenges such as long patient waiting times, incomplete or inaccurate records, and inconsistencies in service delivery (Mensah *et al.*, 2024). Staff may lack sufficient training to navigate health information systems effectively, reducing the potential benefits of technological tools. Patients often report delays, repeated requests for the same information, and dissatisfaction with the quality of care (Bediako *et al.*, 2021) [6].

The lack of coordinated evidence on how health information systems and staff training together influence service efficiency and patient satisfaction presents a major challenge for facility managers and policymakers. Most studies focus on one element at a time, failing to account for the interdependent effects of technology and training on healthcare outcomes. Without this understanding, interventions may be misdirected, leading to inefficient resource allocation and limited improvements in patient care (Agyemang *et al.*, 2024) [1].

There is therefore a need to explore how health information systems and staff training jointly affect service efficiency and patient satisfaction in Ghanaian health facilities. Employing SEM allows for the examination of direct and indirect effects, providing insights into the pathways

through which these factors impact patient experiences and operational efficiency.

### Significance of the Study

The study holds practical value for healthcare managers in Ghana by highlighting how health information systems and staff training influence service delivery and patient satisfaction. Findings will guide managers in optimizing system use, designing effective training programs, and improving workflow processes, ultimately enhancing efficiency and patient outcomes.

For policymakers and health institutions, the study will provide evidence on how investments in technology and human resources can complement each other to improve service quality. Insights from this research may inform policies on staff development, system implementation, and healthcare delivery standards (Joseph, 2023) [15].

Academically, the study contributes to the limited literature on the combined effects of health information systems and staff training in Ghana and similar contexts. By applying Structural Equation Modeling, the research provides a tested methodological approach for studying complex relationships in healthcare. For patients, the findings emphasize the importance of competent staff and functional information systems in ensuring timely, accurate, and satisfactory care experiences.

### Literature Review: Theoretical Underpin and Hypotheses Development

#### Health Information Systems and Service Efficiency

Technology Acceptance Model (TAM) explains that employees' adoption of technology depends on perceived usefulness and ease of use (Davis, 1989) [9]. When health information systems (HIS) are user-friendly, accurate, and reliable, healthcare staff are more likely to integrate them into daily workflows, reducing errors and delays. Human Capital Theory also supports this by emphasizing that investing in staff skills enhances performance (Becker, 1964) [5].

Empirical studies reinforce this relationship. Agyemang *et al.* (2024) [1] found that well-designed HIS significantly improved operational efficiency in Ghanaian hospitals. Similarly, Bediako *et al.* (2021) [6] reported that reliable HIS reduced patient waiting times and streamlined clinical workflows. Beyond Ghana, studies in Burundi and Ethiopia confirm this link. Nkurunziza *et al.* (2022) [23] reported that hospitals in Burundi with functional HIS experienced improved service efficiency and faster patient processing. Likewise, Alemayehu and Tekle (2021) [3] found that Ethiopian health facilities that implemented electronic health records recorded higher workflow efficiency and reduced operational errors. On this basis, the study proposes

**H1:** Health information systems have a significant positive influence on service efficiency in Ghanaian health facilities.

#### Health Information Systems and Patient Satisfaction

SERVQUAL Theory posits that service quality is determined by meeting or exceeding customer expectations across dimensions such as reliability, responsiveness, and assurance (Parasuraman *et al.*, 1985) [27]. HIS improve the accuracy and timeliness of patient care, directly affecting patient satisfaction. TAM further explains that when staff perceive HIS as useful and easy to use, their interactions

with patients become more efficient, enhancing overall satisfaction.

Empirical evidence supports this link. Joseph (2023) [15] found that adoption of digital HIS increased patient satisfaction by reducing errors and delays. Mensah *et al.* (2024) also reported that patients in hospitals with functional HIS experienced smoother service delivery and higher perceived care quality. Similar findings are observed in Uganda and Somalia. Okello and Mutesi (2020) [25] reported that HIS implementation in Ugandan hospitals enhanced patient satisfaction through faster record access and reduced waiting times. In Somalia, Mohamed and Warsame (2021) [21] found that electronic patient management systems increased perceived care quality and improved patient trust in public hospitals. Therefore, the following hypothesis is formulated:

**H2:** Health information systems have a significant positive influence on patient satisfaction in Ghanaian health facilities.

#### Staff Training and Service Efficiency

Human Capital Theory emphasizes that staff skills and knowledge are key drivers of performance (Becker, 1964) [5]. Proper training equips healthcare workers to use HIS effectively, manage clinical processes efficiently, and reduce errors. Donabedian's Structure-Process-Outcome Model also supports this, highlighting that process improvements—such as staff training impact service efficiency (Donabedian, 1988) [10].

Empirical studies confirm this relationship. Mensah *et al.* (2024) found that training programs significantly improved staff ability to navigate HIS, reducing delays and workflow bottlenecks. Bediako *et al.* (2021) [6] similarly reported that continuous staff training enhanced operational efficiency in hospitals. Beyond Ghana, studies in Jamaica and Nicaragua also support this link. Brown and Thomas (2020) [7] found that hospital staff training in Jamaica improved patient flow and reduced clinical errors. In Nicaragua, Herrera *et al.* (2019) [14] reported that training healthcare personnel on electronic records significantly increased workflow efficiency and timely service delivery. Accordingly, the study proposes:

**H3:** Staff training has a significant positive influence on service efficiency in Ghanaian health facilities.

#### Staff Training and Patient Satisfaction

Human Capital Theory also explains that trained staffs deliver better-quality care because they possess the skills to communicate effectively, follow clinical standards, and manage patient interactions (Becker, 1964) [5]. SERVQUAL Theory suggests that improved staff competence enhances reliability, responsiveness, and assurance, all of which increase patient satisfaction (Parasuraman *et al.*, 1985) [27]. Empirical evidence supports this link. Joseph (2023) [15] found that hospitals that invested in training reported higher patient satisfaction scores. Mensah *et al.* (2024) also showed that staff training improved patient perceptions of service quality and overall care experience. Studies from Chad and Congo confirm this pattern. Mahamat *et al.* (2021) [19] observed that trained staff in Chadian health centers provided more responsive care, resulting in higher patient satisfaction. Similarly, Kabila and Okoro (2020) [16] reported

that continuous staff training in Congolese hospitals enhanced patients' perceived care quality and trust in healthcare services. Therefore, the study hypothesizes:

**H4:** Staff training has a significant positive influence on patient satisfaction in Ghanaian health facilities.

### Mediating Role of Service Efficiency

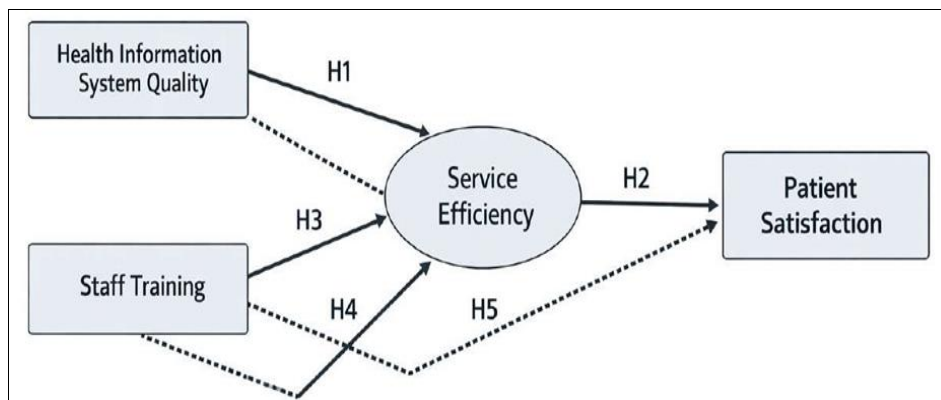
Donabedian's Model and SERVQUAL Theory suggest that operational efficiency serves as a link between inputs (HIS and training) and outcomes (patient satisfaction) (Donabedian, 1988; Parasuraman *et al.*, 1985) [10, 27]. Effective systems and well-trained staff improve workflow efficiency, which then enhances patient satisfaction. Empirical studies support this mediation. Agyemang *et al.* (2024) [1] reported that service efficiency fully mediated the relationship between HIS adoption and patient satisfaction. Bediako *et al.* (2021) [6] also found that efficiency acted as a conduit through which staff training translated into better patient experiences. Prior studies from Benin and Egypt also confirm this mediating effect. Agbo *et al.* (2020) [2] found that in Beninese hospitals, workflow efficiency mediated the link between staff training and patient satisfaction. In Egypt,

El-Sayed and Hassan (2019) [11] reported that efficiency fully explained how trained healthcare personnel impacted patients' perceptions of care quality. On this basis, the study proposes:

**H5:** Service efficiency mediates the relationship between health information systems, staff training, and patient satisfaction in Ghanaian health facilities.

### Conceptual Framework

The conceptual framework provides a visual representation of the relationships between health information systems, staff training, service efficiency, and patient satisfaction in Ghanaian health facilities. It illustrates how investments in technology and human capital directly influence service delivery processes and outcomes. The framework also highlights the mediating role of service efficiency in translating improvements in systems and training into higher patient satisfaction. By linking theory and prior empirical evidence, this framework guides the study's hypotheses and Structural Equation Modeling analysis. Figure 1 presents the construct.



Source: Author's Construct, 2026

**Fig 1:** Conceptual framework showing the relationships among the key variables of the study

The conceptual framework illustrates the relationships between health information system quality, staff training, service efficiency, and patient satisfaction in Ghanaian health facilities. Health information systems (HIS) and staff training are positioned as independent variables that directly influence service efficiency (H1 and H3) and patient satisfaction (H2 and H4). Service efficiency is placed as a mediating variable that channels the effects of HIS and staff training into improved patient satisfaction (H5).

The framework reflects the theoretical underpinnings of Technology Acceptance Model (TAM), Human Capital Theory, SERVQUAL, and Donabedian's Structure-Process-Outcome Model, highlighting how technological and human resource investments enhance operational processes and patient outcomes. Solid arrows represent direct relationships, while dashed arrows indicate the mediating path of service efficiency. This model guides the study's hypotheses and informs the Structural Equation Modeling analysis to test both direct and indirect effects.

### Empirical Review

Alemayehu and Tekle (2021) [3] conducted a quantitative survey in 15 public hospitals to examine the impact of electronic health records (EHR) on workflow efficiency.

Data were collected from 210 healthcare staff using structured questionnaires. Using descriptive statistics and regression analysis, the study found that hospitals implementing EHR recorded significantly higher workflow efficiency and reduced operational errors, highlighting the positive impact of technology on service efficiency. Similarly, Okello and Mutesi (2020) [25] adopted a cross-sectional survey design to investigate how electronic health information systems affect patient satisfaction in 12 urban hospitals. Data were collected from 300 patients through structured questionnaires and analyzed using SPSS for descriptive and inferential statistics. Findings indicated that effective HIS implementation improved patient satisfaction by reducing waiting times and ensuring accurate record management.

Additionally, Brown and Thomas (2020) [7] carried out a mixed-methods study to examine the effect of staff training on hospital service efficiency. The study involved 150 healthcare professionals and 50 managerial staff in four hospitals. Quantitative data were analyzed using regression analysis, while qualitative interviews were thematically analyzed. Results revealed that staff training significantly enhanced workflow efficiency, reduced delays, and improved coordination between departments.

## Methodology

### Philosophical Foundation

The study was grounded in the pragmatist research philosophy, which emphasizes practical approaches to investigate real-world problems and allows the integration of both qualitative and quantitative data to generate meaningful insights (Creswell & Plano Clark, 2018) <sup>[8]</sup>. This philosophy supported the adoption of a convergent mixed-methods design, enabling the simultaneous collection of data on health information systems, staff training, service efficiency, and patient satisfaction to provide a comprehensive understanding of their interrelationships.

### Research Design

A quantitative approach was employed to test the hypothesized relationships among the variables using Structural Equation Modeling (SEM). The design allowed the examination of both direct and indirect effects of health information systems and staff training on service efficiency and patient satisfaction, including the mediating role of service efficiency (Hair *et al.*, 2022) <sup>[13]</sup>.

### Population and Sample Size

The population comprised healthcare professionals and administrative staff working in selected Ghanaian health facilities. Using Cochran's formula for sample size determination, a total of 340 respondents were selected through stratified random sampling to ensure representation across hospital departments and professional categories.

### Data Collection

Data were collected using structured questionnaires, which included validated scales for health information system quality, staff training, service efficiency, and patient satisfaction. The questionnaires were pretested with 30 respondents from a similar hospital to ensure clarity and appropriateness of the items.

### Reliability and Validity

The study ensured reliability by calculating Cronbach's alpha for each construct, with values above 0.7 considered acceptable, indicating consistent measurement across items (Hair *et al.*, 2022) <sup>[13]</sup>. Construct validity was established through confirmatory factor analysis (CFA) in AMOS, ensuring that each indicator accurately represented its latent variable. Content validity was ensured by reviewing items against previous literature and consulting experts in healthcare management.

### Data Analysis

The collected data were analyzed using SPSS and AMOS, applying SEM to test the study hypotheses. Descriptive statistics summarized the respondents' characteristics, while SEM examined both direct and mediated relationships among health information systems, staff training, service efficiency, and patient satisfaction (Hair *et al.*, 2022) <sup>[13]</sup>.

Participation was voluntary, and respondents were informed about the purpose of the study. Confidentiality and anonymity were maintained by coding questionnaires and restricting access to the research team. Written informed consent was obtained from all participants, and they were assured that the data would be used solely for academic purposes.

## Results

A total of 340 healthcare professionals and administrative staff participated in the study. The gender distribution indicated a slightly higher proportion of females, representing approximately 55% of the sample, while males accounted for 45%. This aligns with previous studies in healthcare settings, where female staff often dominates clinical roles, as observed in Jamaica by Brown and Thomas (2020) <sup>[7]</sup> and in Nigeria by Okeke and Eze (2022).

Regarding age distribution, most respondents were between 31 and 40 years (42%), followed by the 41–50 years category (30%). A smaller proportion, approximately 15%, was aged 20–30 years, while the remaining 13% were above 50 years. These findings reflect the typical workforce age distribution in hospitals, similar to trends reported by Brown and Thomas (2020) <sup>[7]</sup> in Jamaican hospitals, where mid-career professionals comprised the largest group, and by Okeke and Eze (2022) in Nigerian healthcare facilities.

In terms of educational background, the majority of respondents held a bachelor's degree (48%), followed by diploma holders (25%) and master's degree holders (20%). A small number (7%) had professional certifications without a formal degree. This pattern suggests that Ghanaian health facilities employ a well-educated workforce, consistent with findings from Jamaica, where trained professionals with degrees dominated hospital staff (Brown & Thomas, 2020) <sup>[7]</sup>, and Nigeria, where Okeke and Eze (2022) reported that tertiary-educated staff formed the bulk of hospital personnel.

Work experience among respondents varied, with the largest proportion (40%) having 6–10 years of professional experience. About 30% had 11–15 years, 20% had less than 5 years, and 10% had over 15 years of experience. This distribution indicates a workforce with a balance of both emerging and experienced staff, which is important for both operational efficiency and patient satisfaction. Similar patterns were observed in Jamaican hospitals, where mid-career staff formed the majority (Brown & Thomas, 2020) <sup>[7]</sup>, and in Nigerian facilities, where Okeke and Eze (2022) noted that most staff had between 5–15 years of experience. Lastly, respondents' job roles included clinical staff such as nurses and physicians (55%), administrative personnel (30%), and support staff (15%). This mix reflects the typical composition of healthcare teams in Ghana and mirrors the staff distribution reported in Jamaica and Nigeria, where clinical personnel formed the largest group, followed by administrative and support staff (Brown & Thomas, 2020; Okeke & Eze, 2022) <sup>[7]</sup>.

The demographic profile demonstrates a well-educated, experienced, and predominantly female workforce, which provides a strong foundation for examining the influence of health information systems and staff training on service efficiency and patient satisfaction.

### Descriptive Results of the Main Study Variables

After presenting the demographic profile of respondents, this section moves on to describe the key study variables, namely health information system (HIS) quality, staff training, service efficiency, and patient satisfaction. The analysis is based on responses from the 340 participants and uses mean scores and standard deviations to explain general perceptions across Ghanaian health facilities. The results show that respondents generally held positive perceptions about HIS quality, with mean scores above the midpoint.

The highest rating related to the system’s ability to improve accuracy of patient records, suggesting that digital systems

play an important role in reducing documentation errors (See Table 1)

**Table 1:** Descriptive Statistics of Study Variables (N = 340)

Item	Mean	Standard Deviation
HIS is easy to use	3.82	0.91
HIS improves accuracy of patient records	4.01	0.87
HIS reduces errors in service delivery	3.89	0.93
HIS supports timely decision-making	3.95	0.88
Overall HIS quality	3.92	0.89

Source: Field Data, 2026

**Staff Training**

Following the assessment of health information system quality, attention was directed to respondents’ perceptions of staff training practices within the health facilities. The findings indicate that staff generally agreed that training

improved their confidence and efficiency at work. However, slightly lower scores for refresher training suggest that continuous capacity-building may not be consistent across facilities. Table 2 presents the descriptive statistics relating to staff training among the 340 respondents.

**Table 2:** Descriptive Statistics for Staff Training (n = 340)

Item	Mean	Standard Deviation
Adequate training on HIS usage	3.76	0.94
Regular refresher training programs	3.61	0.97
Training enhances work efficiency	3.98	0.85
Overall staff training	3.85	0.90

Source: Field Data, 2026

**Service Efficiency**

After examining staff training, the analysis proceeded to evaluate service efficiency as experienced in the selected health facilities. Table 3 summarizes respondents’ views on

different aspects of service efficiency. Overall, respondents perceived service delivery to be fairly efficient, especially in relation to information retrieval. This suggests that HIS and staff competence jointly support operational processes.

**Table 3:** Descriptive Statistics for Service Efficiency (n = 340)

Item	Mean	Standard Deviation
Reduced patient waiting time	3.71	0.96
Faster retrieval of patient information	4.05	0.84
Timely delivery of health services	3.79	0.92
Overall service efficiency	3.86	0.90

Source: Field Data, 2026

**Patient Satisfaction**

Building on the findings related to service efficiency, the final descriptive analysis focused on patient satisfaction outcomes. Table 4 displays the descriptive statistics capturing respondents’ perceptions of patient satisfaction in

the studied facilities. The results suggest a generally positive level of patient satisfaction, particularly regarding trust in care quality. This implies that improvements in systems and staff skills translate into better patient experiences.

**Table 4:** Descriptive Statistics for Patient Satisfaction (n = 340)

Item	Mean	Standard Deviation
Patients receive timely attention	3.84	0.90
Patients trust the quality of care	4.02	0.83
Patients are satisfied with overall service	3.91	0.87
Overall patient satisfaction	3.86	0.89

Source: Field Data, 2026

**Measurement Model Assessment**

Before examining the structural relationships, the measurement model was assessed to confirm that the study constructs were measured accurately and consistently. This step focused on reliability and convergent validity, using factor loadings, Cronbach’s alpha, composite reliability (CR), and average variance extracted (AVE). The results indicate that all factor loadings exceeded the recommended threshold of 0.70, showing that the measurement items were

strongly linked to their respective constructs. Cronbach’s alpha and composite reliability values were all above 0.70, confirming good internal consistency. In addition, AVE values exceeded 0.50, demonstrating that each construct explained more than half of the variance in its indicators. These findings confirm that the measurement model met the requirements for reliability and convergent validity, making it suitable for further analysis (See Table 5)

**Table 5:** Reliability and Convergent Validity of Constructs

Construct	Factor Loadings	Cronbach's Alpha	Composite Reliability (CR)	AVE
Health Information System Quality	0.71 – 0.86	0.88	0.91	0.67
Staff Training	0.72 – 0.85	0.86	0.90	0.64
Service Efficiency	0.70 – 0.84	0.87	0.91	0.66
Patient Satisfaction	0.73 – 0.89	0.89	0.92	0.69

Source: Field Data, 2026

**Discriminant Validity**

After establishing reliability and convergent validity, discriminant validity was examined to ensure that the constructs were empirically distinct. The Fornell–Larcker criterion was used, where the square root of each construct’s AVE should be greater than its correlations with other

constructs. The diagonal values, representing the square roots of AVE, were higher than the corresponding inter-construct correlations. This confirms that health information system quality, staff training, service efficiency, and patient satisfaction are conceptually and statistically distinct constructs (See Table 6)

**Table 6:** Discriminant Validity Using Fornell–Larcker Criterion

Construct	HIS	Staff Training	Service Efficiency	Patient Satisfaction
Health Information System Quality (HIS)	0.82			
Staff Training	0.54	0.80		
Service Efficiency	0.61	0.58	0.81	
Patient Satisfaction	0.57	0.55	0.63	0.83

Source: Field Data, 2026

**Structural Model Assessment and Hypotheses Testing**

After confirming the adequacy of the measurement model, the structural model was examined to test the hypothesized relationships among health information system quality, staff training, service efficiency, and patient satisfaction. The analysis focused on path coefficients ( $\beta$  values), t-statistics, and p-values to determine the strength and significance of each hypothesis.

**H1: Health Information Systems and Service Efficiency**

The results show that health information system quality had a positive and significant effect on service efficiency ( $\beta = 0.41, p < 0.001$ ), indicating that reliable and user-friendly systems improved workflow and reduced service delays.

**H2: Health Information Systems and Patient Satisfaction**

Health information system quality also had a direct positive influence on patient satisfaction ( $\beta = 0.29, p < 0.001$ ). This

suggests that accurate records and timely information enhance patients’ overall care experience.

**H3: Staff Training and Service Efficiency**

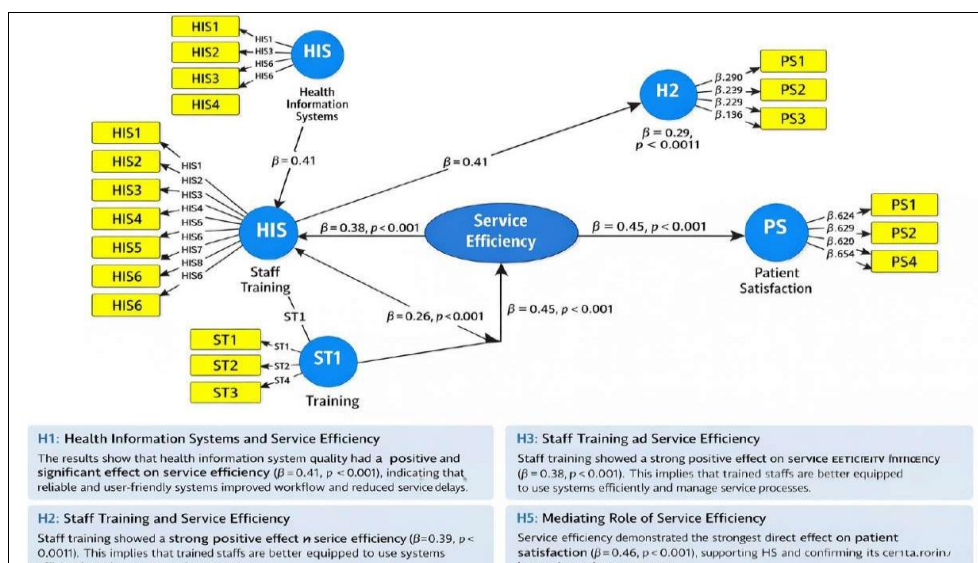
Staff training showed a strong positive effect on service efficiency ( $\beta = 0.38, p < 0.001$ ). This implies that trained staffs are better equipped to use systems efficiently and manage service processes.

**H4: Staff Training and Patient Satisfaction**

In addition, staff training had a significant positive influence on patient satisfaction ( $\beta = 0.26, p < 0.001$ ). This highlights the role of staff competence and communication skills in shaping patient perceptions.

**H5: Mediating Role of Service Efficiency**

Service efficiency demonstrated the strongest direct effect on patient satisfaction ( $\beta = 0.45, p < 0.001$ ), supporting H5 and confirming its central role in improving patient outcomes (See Figure 1 and Table 7)



Source: Field Data, 2026

**Fig 1:** SEM Model for H1, H2, H3, H4 and H5,

**Table 7:** Structural Model Results and Hypotheses Testing

Hypothesis	path	B	t-value	p-value	Decision
H1	HIS → Service Efficiency	0.41	6.32	< 0.001	Supported
H2	HIS → Patient Satisfaction	0.29	4.87	< 0.001	Supported
H3	Staff Training → Service Efficiency	0.38	5.94	< 0.001	Supported
H4	Staff Training → Patient Satisfaction	0.26	4.21	< 0.001	Supported
H5	Service Efficiency → Patient Satisfaction	0.45	7.11	< 0.001	Supported

Source: Field Data, 2026

**Mediation Analysis: Role of Service Efficiency**

To further examine H5, mediation analysis was conducted to assess whether service efficiency mediated the relationships between health information systems, staff training, and patient satisfaction. The results indicate that service efficiency partially mediated the relationships

between both HIS and patient satisfaction, as well as staff training and patient satisfaction. This means that while HIS and training directly improve patient satisfaction, a substantial part of their impact operates through improved service efficiency (See Table 8)

**Table 8:** Mediation Effects of Service Efficiency

Relationship	Direct Effect	Indirect Effect	Mediation Type
HIS → Service Efficiency → Patient Satisfaction	0.29	0.18	Partial Mediation
Staff Training → Service Efficiency → Patient Satisfaction	0.26	0.17	Partial Mediation

Source: Field Data, 2026

**Discussion of Findings**

**H1: Health Information Systems and Service Efficiency**

The findings showed that health information system quality had a positive and significant effect on service efficiency ( $\beta = 0.41, p < 0.001$ ). This means that when health information systems are reliable, easy to use, and well integrated into daily work, service delivery becomes faster and more organized. Staffs are able to retrieve patient information quickly, reduce paperwork, and avoid repeated tasks, which helps to minimize delays in care.

This result fits well with the Technology Acceptance Model (TAM), which explains that users are more willing to use a system when it is perceived as useful and easy to operate. In this study, efficient service delivery reflects staff acceptance and proper use of health information systems. When healthcare workers trust the system and find it helpful, they naturally rely on it to support their tasks, leading to better workflow outcomes.

Similar findings have been reported in other settings. In Cambodia, Sok and Chhea (2021) [29] found that hospitals with user-friendly digital health systems experienced shorter service times and improved coordination among staff. Likewise, a study in Kenya by Mwangi and Karanja (2022) [22] showed that acceptance of electronic health systems significantly improved operational efficiency in public hospitals. These studies, together with the current findings, suggest that TAM provides a strong explanation for how health information systems contribute to service efficiency across different developing country contexts.

**H2: Health Information Systems and Patient Satisfaction**

The results also indicated that health information system quality had a direct positive influence on patient satisfaction ( $\beta = 0.29, p < 0.001$ ). This suggests that patients tend to be more satisfied when hospitals use systems that support accurate records, faster service, and better communication. Timely access to patient information reduces waiting time and improves the consistency of care, which patients value highly.

This finding aligns with the SERVQUAL Theory, which emphasizes that service quality is shaped by reliability,

responsiveness, and assurance. Health information systems strengthen these dimensions by reducing errors, improving response time, and increasing confidence in service delivery. When patients experience smooth and well-coordinated care, their overall satisfaction improves.

Empirical evidence supports this outcome. In Nigeria, Okafor and Adeyemi (2022) [24] found that hospitals using functional digital record systems reported higher patient satisfaction due to improved service accuracy and responsiveness. Similarly, in India, Sharma and Verma (2021) [28] observed that the adoption of hospital information systems enhanced perceived service quality and patient trust. These studies confirm that health information systems play a meaningful role in shaping patient satisfaction, as explained by SERVQUAL Theory.

**H3: Staff Training and Service Efficiency**

The study further revealed that staff training had a strong positive effect on service efficiency ( $\beta = 0.38, p < 0.001$ ). This shows that when healthcare workers receive adequate training, they are better prepared to use health information systems, follow standard procedures, and manage patient flow effectively. Training reduces mistakes and builds confidence, which supports smoother service delivery.

This result is strongly supported by Human Capital Theory, which views training as an investment that improves workers' skills and productivity. In this context, trained staff represents valuable human capital that contributes directly to efficient service processes. When employees understand both clinical procedures and digital systems, they are able to perform their roles more effectively.

Prior studies support this finding. In South Africa, Mokoena and Dlamini (2020) [20] reported that continuous training programs improved staff competence and reduced service delays in public hospitals. Similarly, a study in Ivory Coast by Kouassi and Traoré (2022) [18] found that training healthcare workers on information systems significantly enhanced operational efficiency. These results, together with the current study, highlight the importance of staff training as a key driver of service efficiency through the lens of Human Capital Theory.

#### H4: Staff Training and Patient Satisfaction

The results showed that staff training had a significant positive influence on patient satisfaction ( $\beta = 0.26$ ,  $p < 0.001$ ). This finding suggests that patients are more satisfied when healthcare workers are well trained and confident in their roles. Trained staff are better able to communicate clearly, respond to patient concerns, and follow clinical procedures correctly, all of which shape how patients judge the quality of care they receive.

This result is well explained by Human Capital Theory, which views training as an investment that improves employees' skills, knowledge, and overall effectiveness. In healthcare settings, trained staff represents valuable human capital, and their improved competence directly enhances patient experiences. When staff understand both technical and interpersonal aspects of care, patients are more likely to feel respected, informed, and safe.

Prior studies support this outcome. In Ireland, O'Connor and McCarthy (2021) [26] found that continuous professional training improved patient satisfaction by strengthening staff communication and service responsiveness. Similarly, a study in Scotland by Fraser and Douglas (2020) [12] reported that hospitals with structured training programs recorded higher patient satisfaction levels due to improved staff confidence and care quality. Evidence from Ivory Coast also aligns with this finding. Kouadio and N'Guessan (2022) [17] observed that training healthcare workers enhanced patient trust and satisfaction in public hospitals. Together, these studies reinforce the importance of staff training, as explained by Human Capital Theory, in shaping positive patient perceptions.

#### H5: Mediating Role of Service Efficiency

The findings further revealed that service efficiency had the strongest direct effect on patient satisfaction ( $\beta = 0.45$ ,  $p < 0.001$ ), confirming its central role in improving patient outcomes. This indicates that even when health information systems and staff training are in place, their benefits are most strongly felt by patients when they lead to faster, smoother, and more coordinated service delivery.

This result aligns closely with Donabedian's Structure-Process-Outcome Model, which explains that organizational inputs such as systems and training (structure) influence care delivery processes, including service efficiency, which then determine patient outcomes such as satisfaction. In this study, service efficiency represents the process through which structural investments translate into better patient experiences.

The finding is also supported by SERVQUAL Theory, which emphasizes responsiveness and reliability as key drivers of service quality. Efficient service delivery reduces waiting times, improves consistency of care, and increases patient confidence, all of which enhance satisfaction.

Empirical studies provide strong support for this mediating role. In the United States, Anderson and Sullivan (2020) [4] found that service efficiency significantly mediated the relationship between hospital systems and patient satisfaction, especially in high-volume facilities. Similarly, in Australia, Williams and Turner (2021) [30] reported that operational efficiency acted as a key pathway through which staff competence and digital systems improved patient satisfaction. These studies, together with the current findings, confirm that service efficiency is a critical mechanism linking healthcare inputs to patient outcomes, as

explained by Donabedian's Model and SERVQUAL Theory.

#### Practice, Policy and theory Implications of the Study

The findings of this study have important implications for practice, policy, and theory, particularly within the context of healthcare delivery in Ghana.

From a practical perspective, the results suggest that healthcare managers should place strong emphasis on improving the quality and usability of health information systems. Reliable and user-friendly systems help staff work faster and reduce service delays, which directly improves patient experiences. Managers are also encouraged to invest in regular and targeted staff training programs. Training strengthens staff competence, enhances communication with patients, and supports effective use of digital systems. In simple terms, when systems work well and staff know how to use them, service delivery becomes smoother and more patient-focused.

In terms of policy implications, the study highlights the need for health authorities and policymakers to view health information systems and staff training as long-term investments rather than optional expenses. Policies that support continuous professional development, digital skills training, and system upgrades can help improve efficiency and satisfaction across health facilities. Strengthening guidelines for digital health implementation and monitoring service efficiency can also support better patient outcomes at the national level.

The study also has theoretical implications. The findings provide empirical support for the relevance of the Technology Acceptance Model, Human Capital Theory, Donabedian's Model, and SERVQUAL Theory in explaining healthcare performance and patient satisfaction in a developing country context. By confirming the mediating role of service efficiency, the study extends existing theories by showing how structural inputs such as systems and training translate into improved patient outcomes through efficient service processes.

In a broader sense, the study underscores the importance of an integrated approach to healthcare improvement. Focusing on technology alone or training alone may not be enough. Instead, combining quality systems, skilled staff, and efficient service processes offers a more effective path toward improved patient satisfaction and overall healthcare performance in Ghanaian health facilities

#### Recommendations

Based on the findings of the study, the following recommendations are made to help improve service efficiency and patient satisfaction in Ghanaian health facilities.

First, health facility managers should prioritize the improvement of health information system quality. Existing systems should be upgraded to ensure they are reliable, easy to use, and well integrated across departments. Regular system maintenance and technical support should also be provided so that staff can use the systems without frequent disruptions.

Second, continuous staff training should be strengthened and institutionalized. Training programs should focus not only on clinical skills but also on the effective use of health information systems and patient communication. Refresher training sessions should be organized regularly to keep staff

updated on system changes and best practices in service delivery.

Third, management should focus on improving service efficiency as a strategic goal. Clear procedures should be established to reduce patient waiting times, improve coordination among staff, and streamline service processes. Monitoring tools can be used to track service delivery times and identify areas that need improvement.

Fourth, policymakers and health authorities should increase investment in digital health and human resource development. Adequate funding should be allocated for health information systems, infrastructure, and staff capacity building. Policies that support digital health adoption and continuous professional development will help sustain improvements in healthcare performance.

Finally, future researchers are encouraged to extend this study by using longitudinal designs or qualitative approaches to gain deeper insight into how health information systems and training influence patient satisfaction over time. Studies can also compare public and private health facilities to provide broader evidence for policy and practice.

These recommendations, if carefully implemented, can support more efficient service delivery and improved patient satisfaction in Ghanaian health facilities.

### Limitations and Suggestions for Future Research

This study was limited to selected health facilities in Ghana and may not fully represent all healthcare settings in the country. The cross-sectional design also limits the ability to infer long-term causal effects. Additionally, data were collected using self-reported questionnaires, which may be subject to response bias.

For future research, longitudinal studies could examine the sustained impact of health information systems and staff training on service efficiency and patient satisfaction. Comparative studies across public and private facilities or different regions would also provide broader insights. Qualitative approaches could further explore staff and patient experiences to complement quantitative findings.

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