

Assessment of the Effectiveness of the E-Government System in Camarines Norte Provincial Hospital

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Abstract.

The research focuses on evaluating the effectiveness of the e-government system at Camarines Norte Provincial Hospital. It assesses the system's performance using the System Evaluation Questionnaire aligned with the ISO 25010-2011 system/software quality model indicators, which include functionality, reliability, usability, performance efficiency, compatibility, portability, and security. The study's findings indicate that iHOMIS performs exceptionally well at Camarines Norte Provincial Hospital, particularly excelling in functionality, reliability, usability, and security. This suggests that the system is robust, user-friendly, and meets users' needs effectively, with users expressing confidence in the system's data protection and privacy measures.

However, the results for performance efficiency, compatibility, maintainability, and portability are satisfactory but suggest areas for improvement. Overall, the findings point to a positive user experience at Camarines Norte Provincial Hospital, although there is potential for further enhancements to achieve consistent excellence across all evaluated criteria. The study concludes that iHOMIS is well-suited to meet the e-governance needs of government facilities like Camarines Norte Provincial Hospital. The successful implementation of iHOMIS at CNPH demonstrates the significant impact of the Department of Health's initiative in improving hospital operational efficiency and patient outcomes. CNPH's digital transformation journey serves as a model for other government healthcare facilities aiming to enhance patient outcomes through digital means. The insights from this study are expected to be pivotal in advancing e-government initiatives nationwide.

Keywords:

E-government system/e-governance; healthcare;iHOMIS,patient outcome

1. Introduction

In this digital era, e-government system has been widely used due to its numerous benefits in the government daily operations, business community including its impact on human activity. "Electronic Government" (E-GOV) refers to the government's use of online tools and digital technology to improve how the public, other agencies, and government branches access and receive information and services. This can lead to better government operations, including greater effectiveness, efficiency, improved service quality, or significant changes in how government functions.[1]

In today's society, where trust in government is at a low point, leveraging digital government services can enhance transparency and foster a better connection between the community and its governing institutions.[2]

E-government nowadays is indispensable in business daily activities. It became increasingly vital strategic assets for providing e-Government-to-Business (e-G2B) services.[3] Online services are found to be very useful to the business as transactions are easier, more accurate, and faster [4]. Automation of services for SPs and LLCs (Limited Liability Companies) make the process of starting a business more efficient and reduce the paperwork volume due to digitalization.[5] E-government also facilitates better communication between governments and businesses, creating a more open market and a stronger economy.[6]

In view of the identified benefits of having a digital transaction, different countries including the Philippines are allocating government funds for the development of their online presence through e-government platforms.

E-government system in the country plays a pivotal role in Local Government Units particularly in government hospitals. It has become a vital components of public service provision to streamline administrative processes, enhance the quality and delivery of patient care services and rationalize resource utilization.

The Camarines Norte Provincial Hospital (CNPH) is a government general hospital owned, administered and operated by the Provincial Government of Camarines Norte. It is situated in Bagasbas Road, Daet, Camarines Norte and has a 150 authorized bed capacity, functioning as a Level 2 Hospital with more than 800 employees.

CNPH is one of the government hospitals in the country using the Integrated Hospital Operations and Management Information System (iHOMIS) in the delivery of quality healthcare services in the community for more or less eight (8) years.

iHOMIS is a digital information platform crafted by the Department of Health to bolster hospital administration in delivering efficient and high-caliber healthcare through the provision of prompt, pertinent, and dependable data. It is an entirely unified, Windows-operated hospital information system, tailored for medical facilities utilizing cutting-edge technology to streamline daily operations. The objective of iHOMIS include: (1) To systematically collect, process, store, present, and share information in support of hospital functions and (2) To improve hospital services in a time-efficient and cost-effective manner. [7]

Since CNPH has been using IHOMIS for several years, it is imperative that an assessment be conducted to assess its effectiveness, identify areas for improvement to maximize its intended benefit towards the goal of quality and effective healthcare service. Despite the adoption and installation of e-government system in Camarines Norte Provincial Hospital, challenges still persist ranging from technical glitches, data security concerns and slow connectivity. This research seeks to evaluate how well the current e-government system in CNPH works by using the ISO 25010-2011 standards or indicators for system/software quality to get a thorough understanding of how the system performs and to pinpoint any problems or shortcomings.

The researchers anticipate that the results of this study will play a pivotal role in improving e-government operations within healthcare settings, especially in governmental institutions like Camarines Norte Provincial Hospital, where there is a continuous drive for elevated healthcare service provision.

The researcher reviews various literatures, articles, and researches to acquire a comprehensive understanding and valuable insights into e-government and its influence on public administration, governance and service delivery.

Several studies evaluated the effectiveness of e-government system in their respective institutions and its impact on the promotion of good governance. (Aklikokou and Chen, 2019) revealed that the advancement of e-government has positive effects on government effectiveness and efficiency, aligning with the

findings of (Taewoo Nam, 2019). (Qi Zou, et al., 2023) corroborate these conclusions in their study. Similarly, Dias (2020) demonstrated that the presence of well-defined e-government strategies and the ability to execute them effectively can significantly impact outcomes. Countries with robust plans may surpass expectations, while those lacking such frameworks often fall short of anticipated performance.

Conversely, (Suri, et. al., 2022) analysis the effectiveness of strategy implementation as a critical predictor of e-governance performance. The study identifies four key constitutes of effective strategy implementation: resource mobilization, change management, monitoring and evaluation and stakeholder engagement. The findings suggest that greater emphasize should be placed on these implementation factors when planning e-governance initiatives to ensure its success.

There are also studies that discusses the significance of technology/technological process, connectivity and infrastructure in achieving digital transformation these are the studies of (Doran, et.al., 2023) and (Arfa Afzal, et. al., 2023).

Comparative studies that assess the significance of research on e-government systems in the Least Developed Countries have been prioritized. The insights gleaned from these studies are crucial for informing initiatives aimed at enhancing e-government services. One such study of significance is the research conducted by (Twizeyimana and Anderson, 2019).

Another set of studies have examined the crucial elements and mechanisms of e-government, including the contributing factors and frameworks identified by (Li and Shang, 2019 as well as (Santa et al., 2019).

Numerous studies have highlighted the significance of e-government in healthcare management. For instance, (William Barbosa et al.'s, 2021) research focused on telemedicine, emphasizing its importance. (Nzarama et al., 2024) underscored that national policies in Rwanda do not sufficiently promote health information exchange (HIE). They noted a lack of a common data model supporting interoperability among healthcare facilities, leading to non-interoperable Electronic Health Records (EHRs) and hindering caregivers' access to complete patient medical histories. Additionally, (Garcia, 2021) advocated for Health Information Systems tailored for older individuals. (Cortez et al., 2023)

examined paper-based reporting in Bataan, stressing the necessity of capacity training for utilizing health information systems effectively.

Other researchers delve into how Local Government Units are embracing digital government systems within their communities. For instance, (Romero and colleagues, 2022) examine how online projects aimed at engaging citizens are being fostered. Meanwhile, (Yuriati and Sakir, 2022) explore how the Simpor Application facilitates collaborative development as a digital monitoring and evaluation platform.

It is worth mentioning that in Laguna Medical Center in the Philippines they highlighted some areas for improvement to maximize the benefit that can be derived from the use of iHOMIS. [8]

2. Methodology

The study uses a quantitative research approach, employing a survey questionnaire to collect data from thirty-eight (38) active iHOMIS users across various departments, sections, and units within Camarines Norte Provincial Hospital. The questionnaire was structured based on the ISO 25010-2011. These criteria facilitated a comprehensive evaluation of the system's performance, aiming to identify any existing issues or deficiencies and improve the e-government system in government hospitals. Using a Likert scale for responses, the methodology allowed for a detailed assessment through statistical analysis, ensuring a thorough evaluation of the hospital's e-government system. The researcher personally administered the questionnaires and conducted Focus Group Discussions to validate the responses provided by the informants.

3. Results and Discussion

The responses collected from the informants via the System Evaluation Questionnaire, pertaining to the ISO 25010-2011 system/software quality model criteria, are delineated in this section.

Camarines Norte Provincial Hospital has been using the iHOMIS for more or less eight (8) years. To thoroughly understand the quality characteristics of the iHOMIS, the researcher broke down each system feature to analyze the strengths, weaknesses, and areas for improvement based on the provided ratings of the informants.

Table 1 shows the functionality of e-governance in Camarines Norte Provincial Hospital, assessing the software's suitability, accuracy, interoperability, effectiveness in meeting user needs, and security. The top-rated indicator received a weighted mean score of 4.44, while two others scored 4.34. These scores indicate strong agreement among informants that iHOMIS effectively covers the hospital's needs, provides accurate results, and supports task completion. Thus, informants are highly satisfied with the functionality of iHOMIS.

Table 1: Functionality of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted (WM)	Mean	Adjectival Rating
1. The software has a suitable but appropriate set of functions in accordance with its system objectives.	4.55		Strongly Agree
2. The software provides accurate results.	4.42		Strongly Agree
3. It is interoperable with defined sets of computing environments.	4.34		Strongly Agree
4. The software addresses the defined set of needs.	4.34		Strongly Agree
5. It is capable of preventing unauthorized access, whether accidental or deliberate, to programs or data.	4.37		Strongly Agree
WM	4.41		Strongly Agree

Table 2 evaluated the reliability of the iHOMIS in CNPH. The indicators assessed include meeting the needed reliability. The informants strongly believe that iHOMIS is up and running when needed, scoring an average of 4.47. However, its capability to uphold consistent performance during glitches or interface breaches lags behind other reliability measures, scoring 4.16. This suggests that while informants acknowledge the system's reliability, there is room for enhancement, particularly in handling software hiccups or interface issues. Therefore, they have less confidence in this aspect compared to other reliability indicators of the system.

Table 2: Reliability of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
1. It meets the needed reliability under normal operations.	4.45	Strongly Agree
2. It has the ability to maintain a specified level of performance in case of software faults or infringement of its specified interface.	4.16	Agree
3. It is operational and accessible when required for use.	4.47	Strongly Agree
4. It has the capability to re-establish its level of performance and recover the data directly affected in case of a failure and on the time and effort needed for it.	4.32	Strongly Agree
WM	4.35	Strongly Agree

Table 3 assessed the usability of iHOMIS in Camarines Norte Provincial Hospital. The ease-of-use score is exceptionally high, averaging at 4.50,

suggesting that users perceive the system as straightforward and user-friendly.

The lowest weighted mean is for "the software protects users against making errors," suggesting that this aspect of the software is perceived as the least satisfactory among the criteria assessed. This implies a need to enhance the software's error-prevention features to improve user satisfaction. Users may have experienced difficulties with iHOMIS's ability to prevent errors, indicating a potential area for improvement in the software's usability features.

Table 3: Usability of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
1. It is easy for users to recognize whether a product or system is appropriate for their needs.	4.42	Strongly Agree
2. It is easy for the user to learn its application	4.34	Strongly Agree
3. The software is easy to operate	4.50	Strongly Agree
4. The software protects users against making errors	4.13	Agree
5. The software interface is pleasing and has satisfying interaction for the user.	4.34	Strongly Agree
WM	4.35	Strongly Agree

Table 4 evaluates the performance efficiency of the iHOMIS system at Camarines Norte Provincial Hospital, focusing on response time, resource use, and requirement fulfilment. The highest score (WM 4.32) reflects strong agreement that the system effectively manages resources to meet needs. However, response time and throughput rates, scoring 4.05, indicate room for improvement. Enhancing these aspects could boost user satisfaction and system effectiveness.

Table 4: Performance Efficiency of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
1. It has acceptable response and processing time and throughput rates.	4.05	Agree
2. It considers the amounts and types of resources used by a product or system when performing its functions to meet the requirements.	4.32	Strongly Agree
3. The software considers maximum limits to meet the needed requirements.	4.08	Agree
WM	4.15	Agree

Table 5 evaluates the compatibility indicators of the iHOMIS system in CNPH. Results indicate strong agreement that the software performs efficiently in a shared environment and does not negatively affect other

products, showing good compatibility and resource management. The capability to interact with other products and use exchanged information has a slightly lower weighted mean of 4.03 but still reflects positive interoperability and communication capabilities. This suggests that while the software is highly rated, there is room for improvement to further optimize information exchange protocols.

Table 5: Compatibility of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted (WM)	Mean	Adjectival Rating
1. The software product can perform its required functions efficiently while sharing a common environment and resources with other products, without detrimental impact on any other product.		4.16	Agree
2. The software product can exchange information with other products or components and use the information that has been exchanged.		4.03	Agree
WM		4.09	Agree

Table 6 presents the evaluation results of the maintainability of iHOMIS in CNPH. Informants highlighted the feature "It is easy to be used in more than one system or in building other software products" as particularly strong. This indicates the system's capability to integrate with other systems and facilitate additional software development, which is advantageous for hospital management.

Conversely, the feature related to the ease of modifying or fixing faults, without compromising product quality, received the lowest weighted mean (WM) of 3.92. This suggests that while the system is generally well-designed, it could benefit from improvements in maintenance and modification to enhance its long-term viability and adaptability to future hospital needs.

Table 6: Maintainability of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
1. It is easy to diagnose the deficiency's causes.	4.03	Agree
2. It is relatively easy to modify the software or remove faults without sacrificing product quality	3.92	Agree
3. It is easy to be used in more than one system or in building other software products.	4.16	Agree
4. It is easy to validate any modification made.	4.13	Agree
WM	4.06	Agree

The assessment of the portability of the E-Government System at Camarines Norte Provincial Hospital is presented in Table 7. The indicator that the software is easy to install in a specified environment has a weighted mean

(WM) of 4.11. This suggests that there are some challenges when the software is transferred to different environments in terms of installation. Its adaptability earned the lowest score among the indicators under portability, with a WM of 4.0. This indicates that while the software can adapt to different environments without significant changes, there is room for improvement to maximize the portability aspect of the iHOMIS system for hospital users.

Table 7: Portability of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
1. It could adapt to different specified environments without applying other actions or means than those provided for this purpose for the software considered.	4.0	Agree
2. It is easy to install the software in a specified environment.	4.11	Agree
3. It is easy to replace another specified software product for the same purpose in the same environment.	4.03	Agree
WM	4.04	Agree

Table 8 presents indicators for the security of the e-government system in Camarines Norte Provincial Hospital. The indicator for user access levels and login authorization based on standard password protocol received a weighted mean (WM) of 4.47, indicating strong agreement among informants that iHOMIS follows standard password protocols and that access levels are favorable for hospital users. However, the system's resistance to breaches, with a WM of 4.13, suggests that there is room for improvement in safeguarding data and restricting access to authorized individuals. Enhancing security measures and regularly updating protocols will increase user confidence in iHOMIS and better protect sensitive patient information.

Table 8: Security of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
1. It has user access levels and provides login authorization based on standard password protocols	4.47	Strongly Agree
2. It is hard to breach given its functions and operations.	4.13	Agree
3. Only authorized persons are allowed to access files and documents.	4.34	Strongly Agree
WM	4.32	Strongly Agree

Table 9 summarizes the overall effectiveness of the e-government system in Camarines Norte Provincial Hospital. It combines the weighted means in various aspects of the evaluated iHOMIS system.

The results indicate a strong overall satisfaction with the various aspects of the iHOMIS, particularly highlighting high functionality, reliability, usability, and security. The highest ratings were observed in functionality (4.41), reliability (4.35), and usability (4.35), all of which garnered a "Strongly Agree" consensus, reflecting a robust and user-friendly system that meets user needs effectively. Security also received a high rating of 4.32, suggesting that users feel confident in the system's ability to protect their data and privacy.

In contrast, the ratings for performance efficiency (4.15), compatibility (4.09), maintainability (4.06), and portability (4.04) were slightly lower, each falling into the "Agree" category. This indicates that while these areas are generally satisfactory, there is room for improvement to elevate them to the "Strongly Agree" level. Overall, the grand weighted mean of 4.22, which falls within the "Strongly Agree" range, signifies a positive user experience and a well-regarded system, even though with potential enhancements in certain areas to achieve uniform excellence across all evaluated criteria.

Table 9: Functionality of E-Government System in Camarines Norte Provincial Hospital

INDICATORS	Weighted Mean (WM)	Adjectival Rating
Functionality	4.41	Strongly Agree
Reliability	4.35	Strongly Agree
Usability	4.35	Strongly Agree
Performance Efficiency	4.15	Agree
Compatibility	4.09	Agree
Maintainability	4.06	Agree
Portability	4.04	Agree
Security	4.32	Strongly Agree
Grand Weighted Mean	4.22	Strongly Agree

4. Conclusions

After thorough assessment on effectiveness of e-government system in Camarines Norte Provincial Hospital, the study arrived at the conclusion that various aspects of the iHOMIS is highly satisfactory, particularly in terms of functionality, reliability, usability, and security. The highest ratings were observed in functionality, reliability, and usability, all of which yielded highly positive consensus, reflecting a robust and user-friendly system that meets user needs effectively. Security also received a high rating, suggesting that users feel confident in the system's ability to protect their data and privacy.

In contrast, the outcome for performance efficiency, compatibility, maintainability, and portability were slightly lower. This indicates that while these areas are generally satisfactory, there is room for improvement. Overall, the

result signifies a positive user experience in Camarines Norte Provincial Hospital, even though with potential enhancements in certain areas to achieve uniform excellence across all evaluated criteria. Clearly, the iHOMIS is well-suited to the e-governance need of government facilities like Camarines Norte Provincial Hospital. Thus, the objectives of iHOMIS are met. The system successful deployment at CNPH is a testament that the introduction of iHOMIS really help the hospitals enhance its operational efficiency and patient outcome. Digital transformations journey of CNPH will serve as an inspiring model for other government healthcare facilities to embark on similar digital transformation journey to optimize patient outcome. DOH shall enhance best practices in iHOMIS system by having continuous training and performance audits to maximize the use of iHOMIS system in the hospital management and operation. In this manner, we are assured that the system remains high-quality as it evolves. The results of this study are expected to play a crucial role in advancing e-government practices in the Philippines.

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