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A Framework for An Integrated E- Government System for Public Service Sectors in Developing Countries Using Design Science Research Methodology

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Abstract

This study aimed to develop an integrated framework to enhance government services and improve service delivery for the Namibian government. The Delone and McLean Information Systems success model and the Organizational Information Processing Theory served as the theoretical foundations for this study. The target population consisted of members of the public and a Government Ministry in Namibia. A sample size of 25 participants was selected for the study, utilizing the purposive sampling technique for government employees and the snowball sampling technique for members of the public. Thematic analysis was employed to analyze the data gathered. The study's findings revealed several significant insights. Despite the existence of multiple e-government systems, poor integration among them hindered the ability of the Namibian public service to provide effective and efficient services to citizens. Additionally, the study identified a strong demand from the public for services to be more accessible, convenient, and responsive, including a preference for online applications and faster service delivery. Moreover, the study developed an integrated e-government framework specifically tailored for the Namibian public service, aiming to enhance accessibility, convenience, responsiveness, and cost-effectiveness of services provided to citizens. The implementation of this framework is expected to promote an open and accountable government. It is crucial to emphasize that the successful achievement of e-Government goals relies on factors such as political leadership, support across all government levels, key infrastructure, skilled human resources, a suitable legal and regulatory framework, information resources, and citizen-centric services.

Keywords: e-government, integration, services, framework, citizens

1. INTRODUCTION

Limited resources and the absence of appropriate models pose significant challenges when implementing an integrated e-government system. This challenge is prevalent in numerous countries, particularly in developing nations like Namibia [1]. Inadequate integration of e-government systems within the public service necessitates citizens to physically visit multiple offices to obtain documents required for different services within the same public service [1].

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An integrated e-government system functions as a unified system comprising interconnected systems, aiming to provide value to citizens by enhancing service quality, reducing operational costs, and improving turnaround times [2]. The issue of service integration profoundly impacts e-government implementation and should be regarded as a critical concern, including within the Namibian public service [3]. As technology continues to advance, governments serving as service providers are expected to demonstrate innovation and develop strategies that generate value for citizens [4]. To enhance service efficiency and effectiveness, governments must seize the opportunity to offer integrated services through an integrated e-governance system accessible via a centralized "one-stop portal" for citizens, businesses, and other stakeholders involved in e-government [3].

The e-Government Strategic Action Plan of the Public Service of Namibia, spanning five years from 2014 to 2018 and initiated by the Office of the Prime Minister, emphasizes the need for governments to modernize and enhance their service delivery in response to rapid technological advancements and increasing consumer expectations. Consequently, the Namibian government seeks new service delivery models and methods to achieve cost savings. Information and communications technology (ICT) has emerged as a crucial driver in providing services that align with consumer expectations [5].

In the current state, citizens are required to physically visit government offices to apply for services. Often, they are sent back and forth between different offices when a particular document from another office is necessary for the service they are seeking. The integration of Information Communication Technology (ICT) can address this issue by enabling systems integration, allowing citizens to apply for government services from a single location without the need to visit multiple offices. However, the public service of Namibia currently operates with separate and non-integrated information systems, emphasizing the critical importance of integration to enhance service delivery to citizens [6].

According to [7], systems integration within the public service can lead to an effective flow of information and reduced administrative costs. [8] states that organizations rely on various information systems that require integration for improved business efficiency. Integration eliminates the need for manual data entry by users, as information can be obtained from other systems. This reduces human errors and frees up resources for other business functions. Additionally, [8] highlights that certain ministries still rely on manual requests for information from other government institutions, leading to prolonged decision-making processes and dissatisfaction among citizens.

The primary objective of this research is to develop a framework for an integrated e-government system in the public service of Namibia. The demand for efficient

and effective e-government services expressed by the public underscores the necessity for a framework that guides the public service toward achieving an integrated e-government system. As emphasized by [9], the satisfaction of citizens is vital for e-government systems to be deemed successful. Stakeholders within organizations expect high-quality service delivery, making it crucial for businesses to leverage Information Communication Technology solutions to meet client expectations [10]. Public services should also explore the use of mobile applications, considering that the majority of citizens use mobile phones. This would significantly expand the government's reach in terms of service provision [11]. However, the utilization of mobile phones for service delivery should be approached with a focus on security concerns, prompting the enactment of a data protection bill [12].

Ensuring data protection takes precedence, and leveraging information technology tools can greatly support service integration. An exemplary case is Estonia, where a secure platform has been developed to facilitate data exchange among different databases, irrespective of the underlying technology. This successful implementation aids the process of service integration [11]. E-government was envisioned to dismantle the culture of siloed government operations and promote integrated service delivery [10]. Through integration, government services can become accessible from anywhere and at any time [3]. By conducting a comparative analysis of various frameworks for integrated e-government systems and identifying their shortcomings, the researcher was able to address the gaps and propose a comprehensive framework. The summarized findings of this gap analysis are presented in Table 1.

Table 1. Research Gap

Framework	Elements	Objectives	Gaps
Strategic Framework for Designing E-Government in Developing Countries [13]	designing e-government systems such that the goals are achieved, and the investments produce value for the public	gives a clear starting point and a clear understanding of the connections between the many actions required in creating e-government systems.	there is no instruction on how to combine different e-government systems to work together.
Conceptual Model for an e- Government Interoperability Framework for South Africa [14]	continuous information flow within the government	Determine the pillars of the delivery infrastructure	The framework's effectiveness is not tested to confirm it.

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Framework	Elements	Objectives	Gaps
eGovernment Readiness Assessment [15]	examine key dimensions of the e-government environment	look at important e-government environment factors	outlined suggestions for infrastructure for mobile and wide-area networks
A Framework for Securing e-Government Services [16]	citizens' trust, the success of e-government initiatives, and adequatesafe e-government services	assist government agencies in providing acceptable, secure e-government services.	the evaluation only took into account one particular context; hence it was generalised.
Framework for e-Governance in India by the Government of India [17]	data exchange.	e-government applications must become interoperable.	N/A
An e-Government-Integration Framework for Country Governments in Kenya [18]	assessed the integrated e-government implementation level	to close the e-government frameworks' gap	did not evaluate the ICT infrastructure needed for the integration of e-government

2. METHODS

Interviews with employees of two (2) government ministries, and Namibian citizens were conducted to collect qualitative data. To collect qualitative data, conversations and interviews with the personnel were conducted.The individuals interviewed were a mixture of skilled IT professionals and persons who provide services to the public in order to gather occurrences relating to Namibia's integrated e-government system. The IT team, including the Deputy Directors, Systems Analysts, Systems Administrators, Analyst Programmers, Computer Technicians, Administrative Officers from a User Department, and certain members of the general public, were included in this. Twenty-five (25) people made up the entire sample, which was thought to be the saturation threshold because no further data could be acquired. The Figure 1 illustrates the research process of this study.

The underlying theories of this research served as a guide for creating the interview protocol. In order to provide pertinent interview questions, the study used the [19] model dimensions of system quality, information quality, user happiness, intention to use, service quality, and net benefits. The theory of organizational information

processing by [20] served as the second paradigm that helped shape the interview methodology. In order to achieve optimal performance, this theory specifies three key concepts: information processing demands, information processing capability, and the fit between the two. The interview protocols were created using these three ideas as a reference.

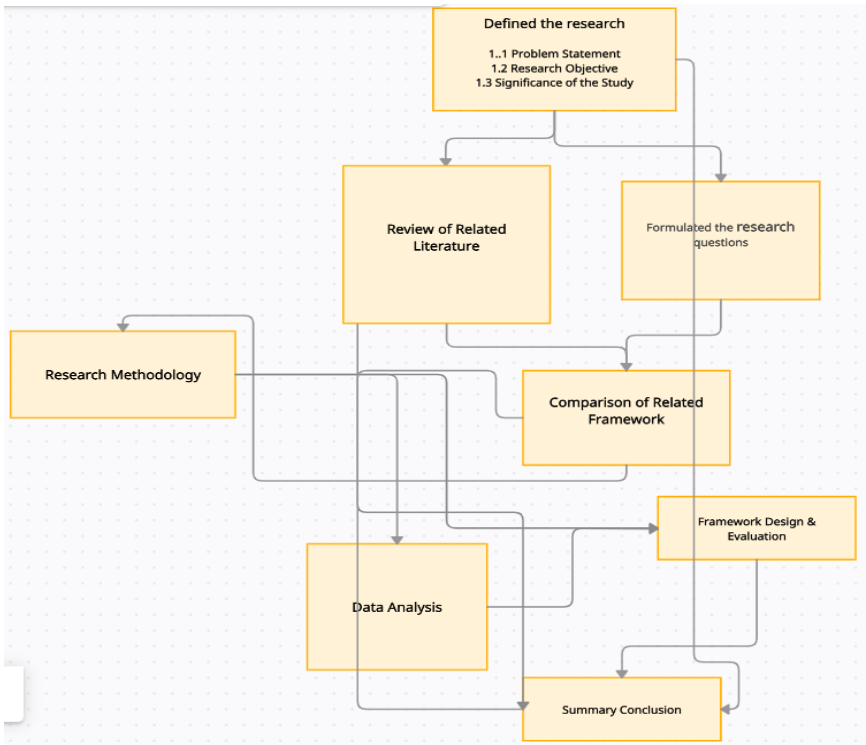

Figure 1. Study Framework

The two identified information system theories were considered to be relevant for this study. The Delone and McLean IS Success Model (D&M model), which presents a broad and inclusive definition of IS success and encompasses several methods of evaluating information systems, was the first theory to be adopted. The model was first put forth in 1992, and various academics have constructively criticized the notion since then. The 1992 [19] model, according to the critics, incorporates more aspects than necessary, and there are better options available. In 2003[19] presented an improved model after reviewing the comments and assessing the contributions from the field. The modified model with the addition of variables like the intention to use and service quality in place of the original model's collection of variables for individual and organizational impact. Service quality, system usage, user happiness, and net benefits are some interrelated characteristics of IS success information that are included in the updated model.

The second is the theory of Organizational information processing theory [20]. In order to achieve optimal performance, this theory specifies three key concepts: information processing demands, information processing capability, and the fit between the two. The theory of organizational information processing includes a plan to meet growing information demands. The major goal is the decrease of uncertainty inside the organization, and key processes are established along with information processing capabilities to increase information flow. Business process reengineering and information system integration are typical examples of the above-mentioned tactic in action. The theory will direct the research as it evaluates information processing requirements based on various service and integrated environment features. The degree of information technology support for diverse operations in an integrated e-government environment will be used to evaluate information processing skills.

These theories are pertinent to this research because they concentrate on the integration of IS, which enhances information flow and decreases uncertainty among organizational subunits, as well as information, system, and service quality, user satisfaction, and net benefits. According to the Figure 2, both theories produce the required results.

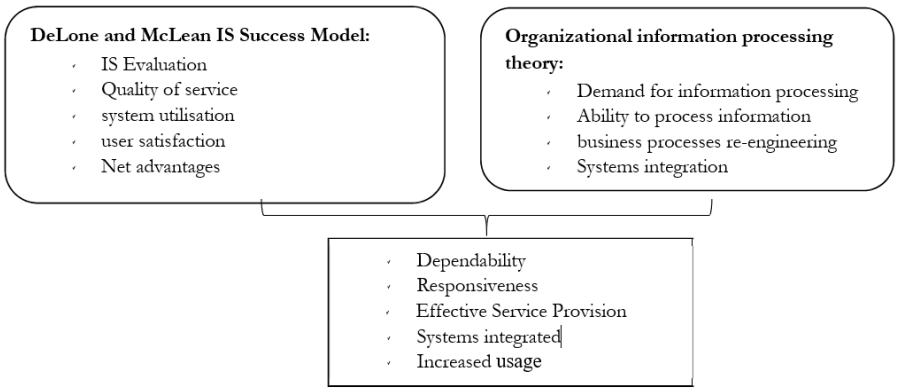

Figure 2. Theories Produce

Out of all the employees, ten (10) employees from the IT department in one of the Government Ministries (to be called Ministry 1) and four (4) employees from the Department of Quality Assurance in another government ministry (to be called ministry 2), who work on e-government projects, were chosen as a sample using the purposive sampling procedure. Five (5) additional employees were chosen for the sample from ministry 1 business unit that offers customer service, as shown in Table 2. Using snowball sampling, which began with one subject and one recommendation from that subject, a total of six (6) people who visit the Ministries for any service were chosen. This recommendation persisted up until a point of

saturation. The sample that was chosen was thought to be well-versed in integrated e-government systems.

Table 2. Population Sample

Population	Sample
Ministry 1	15
Ministry 2 (Focus Group)	4
Members of the Public	6
Total sample size	25

A design science research methodology (DSRM) for information systems research was used to accomplish the study's principal goal. The design science research methodology (DSRM) includes principles, practices, and procedures required to carry out design science (DS) research and meets three objectives: it is consistent with prior literature, it provides a nominal process model for doing design science research, and it provides a mental model for presenting and evaluating DS research in Information Systems. The DS process includes six steps: problem identification and motivation, definition of the objectives for a solution, design and development, demonstration, evaluation, and communication [21]. By utilising this technique, a framework for an integrated e-government system was developed. The Figure 3 shows the design science research methodology.

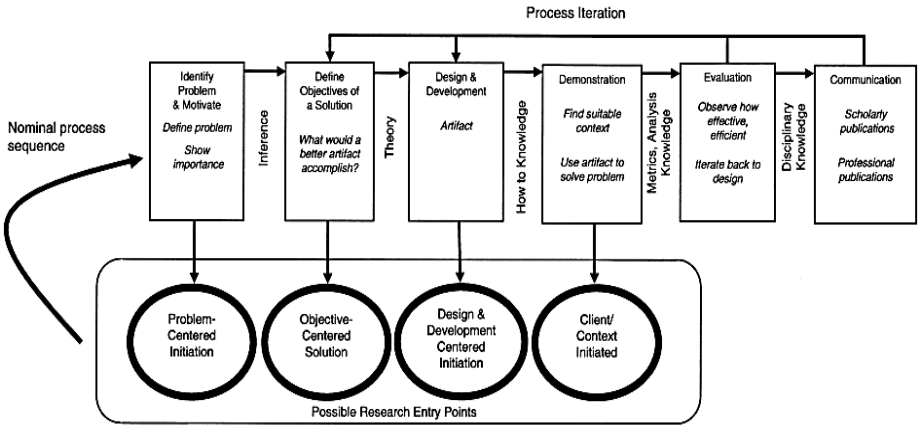

Figure 3. A design science research methodology (DSRM) for Information Systems research [21]

3. RESULTS AND DISCUSSION

This study used inductive research design, [22] defines it as approaches that primarily use detailed readings of raw data to derive concepts, themes, or a model through interpretations made from the raw data by an evaluator or researcher. For

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this study, the traits informed by the semi-structured interviews were verbally described in great depth. For convenience of access, the information obtained during interviews was recorded on a single device. Documents deemed pertinent to the study that dealt with e-government initiatives and policies were also gathered. The information was examined as the researcher investigated the conclusions and viewpoints drawn from the data.

As a result, the researcher was able to create groups or themes using the data. The interview content was entered into the word document after the researcher had frequently listened to the audio recordings of the interviews. The transcript's key points were picked out and then categorized and arranged into topics. The audio recordings were then compared against the transcribed text to make sure the information was correct. The Figure 4 presents the demographics of the study population.

According to the results of the interviews, it appears that the majority of respondents are unaware of or are unsure of what an integrated e-government system is. Twelve percent (12%) of the respondents were unsure of the existence of an integrated e-government system, while forty-four percent (44%) of the respondents said it does not exist and forty- four percent (44%) said it does. It's crucial that every employee is knowledgeable about the topic. [23] contends that knowledgeable citizens are the foundation of a productive and empowered populace that can help the economy grow. People are unaware of the advantages that an integrated e-government system can provide if they lack information.

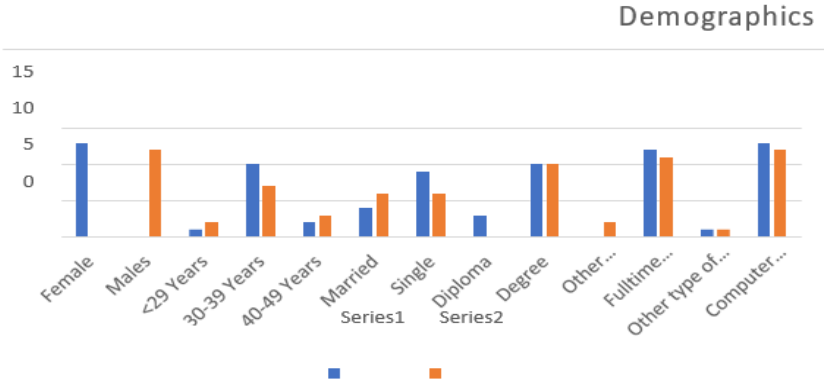

Figure 4. Demographics of the study population

Respondents highlighted a number of challenges that they are currently facing due to the absence of an integrated e-government system. The issues mentioned include inefficient or subpar service delivery, lack of integrated information, expensive manual labor, difficulties in verifying information, lengthy application processing, irate consumers, and more.

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During the interviews, respondents were questioned about the elements that will be needed for the creation of an integrated e-government system within the public sector. According to respondents, an integration framework, data protection strategy, and ICT infrastructure are needed. A few respondents brought up the security issue, as well as the need for capacity building, an appropriate IT infrastructure to support the function, political support, careful planning, communication, and collaboration within the government. Another respondent said that mobile applications should be taken into account.

The interview included additional questions about the methods the Ministry/Office currently employs to exchange system data with other government agencies. The interview results showed that data is manually shared via emails and printouts on a request basis. According to some survey participants, memorandums of understanding are made between government offices to ease data exchange. According to certain responders, some government departments are given permission to access the Ministries' information systems in order to retrieve data. According to [8], certain Ministries manually request information from other governmental organizations for the purpose of verifying data, which causes decision-making to take longer and causes consumer dissatisfaction.

Fourteen out of the Nineteen respondents who were asked about the policies the public service uses for data sharing and protection said they were either unaware of them or that there were none at all. Three (3) respondents noted that the Identification Act 21 of 1996 permits the Ministry to share identity data within the government, and two (2) respondents out of the nineteen (19) respondents said they are guided by the ICT policy for the Government. The results of the interviews further demonstrated that staff policies and the Public Service Act are used to respond to occurrences of data breaches, and that legal proceedings, hearings, and prosecutions take place when a data breach or violation of privacy happens.

The interviewees' replies emphasised basic problems that contributed to the development of an integrated e-government system failing. There is no top-down strategy, according to respondents, and there is not enough political will. Other respondents brought up a lack of resources, a lack of expertise, and a lack of dedication. The focus group participants mentioned a lack of resources and skill sets as well as the absence of a unified objective, legal framework to direct the process, and of adequately completed requirements. Other respondents brought up concerns with management assistance, integration, coordination, lack of a framework for implementation, lack of internet connectivity in rural places, lack of consensus, and the fact that some processes are not automated.

Respondents were questioned during the interview about the elements that may affect the public's acceptance and adaptability of the integrated e-government system. The majority of respondents placed a strong emphasis on raising awareness, computer literacy, user- friendly systems, reasonably priced services, incorporating local languages into service delivery systems, secure systems, and accessible systems, clearly spelled out benefits of the system, online applications, and efficient systems.

According to respondents, the following factors must be taken into account for the public service to successfully implement an integrated e-government system: business process re- engineering, shared understanding, regulations, resources, innovative thinking, a committed project team, and services to be provided in indigenous languages.

3.1 Framework Design

A design science research methodology (DSRM) for Information Systems research by [21] was adopted for the design of the framework. An analyses and comparison of different frameworks related to integrated e- government system was done to help the researcher to build on the gaps learned for the proposed framework. The literature review and the semi-structured interview results were used to guide the design of the proposed integrated e-government system for the public service of Namibia framework, as shown in Figure 5.

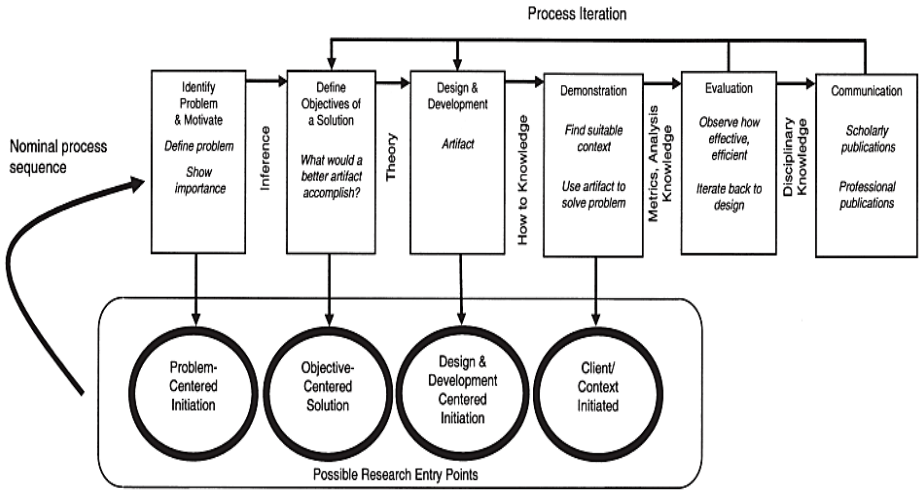

Figure 5. A design science research methodology (DSRM) for Information Systems research [21]

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3.1.1 Problem identification and motivation

To find weaknesses and strong areas to take into account when developing the proposed framework for the Namibian Public Service, existing integrated e-government frameworks were analysed and compared. Through a search of the literature, the study was able to pinpoint the issue as the absence of documented proof of an integrated e-government system framework for the Namibian Public Service. The semi-structured interview with officials from government ministries in Namibia, and certain members of the public assisted in identifying the current issues caused by the lack of an integrated e-government system.

3.1.2 Definition of the Objectives for a Solution

To address the issues highlighted in the findings, it justified he necessity for an efficient structure to direct the deployment of an integrated e-government system. To aid the public service in providing Namibians with high-quality services, a framework for an integrated e-government system was developed.

3.1.3 Design and Development

In order to gather secondary data for the suggested framework, existing literature was examined. Four frameworks that were mentioned in the literature served as guidelines. These four frameworks were chosen to aid in the development of the proposed framework because they provided recommendations, best practices, and operational principles pertinent to the creation of an integrated e-government system for the Namibian public sector.

3.2 Components Identification

The literature review and data analysis, which produced the components of the framework, brought to light a number of issues with the absence of an integrated e-government system. To examine problem areas and set related goals for the development of an integrated e- government system for Namibia's public sector, seven components were identified.

3.2.1 Business Process Re-engineering (BPR)

The foundation and one of the prerequisites for the adoption of an integrated e-government system should be business process reengineering. The purpose of business process reengineering is to identify and close gaps in essential organisational processes in order to boost optimisation. Implementing back-office solutions rarely consists just of automating existing processes. In order to overcome internal resistance, new workflows must be established, jobs must be

assigned, and management must be done. To deliver unified and effective digital services, corporate processes must be reengineered.

3.2.2 Information Communication Technology (ICT) Infrastructure

In this area, the public sector must evaluate the ICT infrastructure that gives the government the tools to interact with and conduct business with citizens. Reviewing the reliability, scalability, and operating status of such infrastructure is the goal of the evaluation. Digital networks, mobile devices, internet access, software, hardware, automation, and other technologies are all included in ICT infrastructure. Budgetary arrangements should be established to support a successful adoption of ICT solutions because they need a significant investment. Systems automation should promote integration by encouraging data sharing with other IT systems.

3.2.3 Security

To create the integrated e-government system environment, vital information infrastructure needs to be protected from malfunction, loss, intrusions, and manipulation. To ensure the preservation of citizens' rights and assure security and privacy, security precautions such as legislation and regulations on the authenticity of actors must be in place. Government agencies should develop a strategic strategy to strengthen the security of their IT systems, encourage the adoption of security checklists, and support the establishment of secure systems.

3.2.4 Secure Data Exchange Platform

The component has to do with the capability of secure data interchange between various databases. A smart and secure digital society is built on interoperability and safe data sharing. To make the integration of e-services easier, it is advised to employ tools or platforms that allow disparate systems databases to communicate despite the varied platforms they are using.

3.2.5 Service Integration

Governments should view offering integrated services to people and e-government stakeholders via a "single portal" as a huge opportunity to increase the efficacy and efficiency of their services. To do this, the appropriate data must be made accessible to the appropriate users at the appropriate times, necessitating the development of an interoperable system of data, services, and procedures.

3.2.6 Online e-government Services

This entails offering e-services that are open to the public and have a user-friendly interface to accommodate people from a variety of social, racial, and ethnic backgrounds, among other things. E-government services are online public services that are provided by a government to citizens in accordance with national legislation. The improvement of the effectiveness and efficiency of government activities in this area is the major objective of providing these services.

3.2.7 Training

Training is a crucial part of being e-ready. One of the most important success factors for an integrated e-government system is training and developing skills for the public sector staff to use modern technologies. Because training focuses on the abilities needed to carry out ICT projects, personnel must be equipped with end-to-end knowledge and expertise in integrated e-government. Soft skills like change management, collaboration, leadership, and good presentation are crucial to creating the correct mindset for e-government development.

3.3 Demonstration

The following scenario is offered to show the framework's potential. Civil registration and identity management are handled by the Ministry of Home Affairs, Immigration, Safety and Security (MHAISS) on behalf of the Government of the Republic of Namibia. The ministry manages a sizable amount of personal data, including information about residents and foreign visitors, and it grants other government services access to such data. For illustrational purposes, a passport application submitted online is taken into account in this situation.

Step (s)	Activity
Business process re-	Analyze the current business procedure for improvement
Assessing the ICT Infrastructure	The infrastructure needed to give the government the tools to interact with citizens and process online passport applications should be reviewed for availability, capacity, and operating state.
Formulate Legal Framework	For the transition to integrated e-government services to be legally supported, legal frameworks must be created and put into place.

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Step (s)	Activity
Integrating government services	To improve the caliber and efficacy of service delivery, the Ministry should establish interoperability among various e-Government platforms. To facilitate the flow of information, the passport system, whose requirements are processed by other information systems, should be integrated with these systems.
Use of secure data exchange platforms	The ministry can use an Interoperable Data Exchange Platform, such as Unified Exchange Program, to enable government departments to directly link and exchange information with one another.
Offer on-line government services	The ministry must take the time to comprehend the requirements of the population for passport applications and ensure that the user experience is appealing, uncomplicated, and simple. Government must set up an online payment system because failing to accept online payments costs governments money and reduces the effectiveness of digital services.
Capacity building	One of the most important success elements is training and upgrading the Ministry's staff to use modern technology to support the online passport system. Prioritize change management, teamwork, leadership, and presentation skills.

3.4 Communication

Public bodies in Namibia will be made aware of the integrated e-government system framework and given instructions on how to apply it in their settings. Additionally, it will appear in scholarly journals. People will be able to take use of the benefits of the suggested framework by making it available, and academics will have a knowledge base for upcoming additions and evaluation.

3.5 Framework

The proposed framework, depicted in Figure 6, aims to establish an Integrated E-Government System for Public Service Sectors in Developing Countries. This framework has been developed based on comprehensive data collection and analysis. It seeks to address the challenges faced by developing countries in delivering efficient and effective public services through e-government initiatives. The framework incorporates insights gathered from the research, including the identified gaps and shortcomings in existing models. By leveraging the potential of

information technology and data integration, it strives to facilitate seamless service delivery and enhance the overall functioning of the public service sectors. Through the implementation of this framework, developing countries can overcome the limitations of fragmented systems and enable citizens to access government services easily and conveniently. This integrated approach holds the potential to drive progress and improve governance practices in these nations, ultimately contributing to socio-economic development and citizen satisfaction.

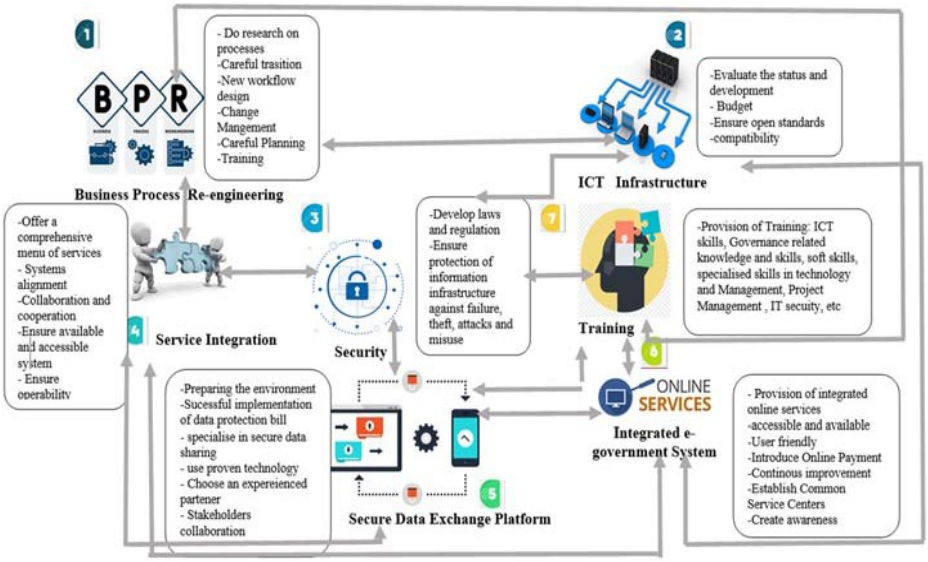

Figure 6. Propose Framework

3.6 Framework Evaluation

The evaluation of the proposed framework aimed to determine its significance, relevance, and practicality. To achieve this goal, an expert review technique was employed, involving a small group of experts from the public service of Namibia who assessed the framework. The evaluation process utilized five evaluation criteria: relevance, application, usability, adaptability, and understandability. Based on the feedback received from the expert reviewers, the framework was found to be highly relevant, appropriate, usable, and understandable in addressing the challenges arising from the lack of an integrated e-government system in the Namibian public sector. This feedback affirmed the framework's value and its potential to effectively resolve existing issues.

As a result of the evaluation, adjustments were made to the order in which the various components of the framework will be utilized. This iterative process ensures that the framework is optimized for practical implementation and aligns

with the specific needs and context of the Namibian public sector. The expert review and evaluation process provided valuable insights, affirming the importance and applicability of the proposed framework in addressing the integration challenges faced by the Namibian public sector. These findings contribute to the refinement and enhancement of the framework, strengthening its potential for successful implementation and positive impact.

4 CONCLUSION

The primary objective of this study was to establish the groundwork for an integrated e-government system in Namibia's public sector. To accomplish this, a comprehensive framework for the integrated e-government system of the Namibian public service was developed and evaluated. The study's findings highlight the existing challenges faced by government employees and residents in Namibia, who often encounter difficulties accessing information or services due to the lack of integration across disparate yet interconnected systems within the public sector. The identification of these issues emphasizes the need for workflow modifications, standardization of procedures, and improved interoperability among government systems. Moreover, the study's findings underscore the importance of incorporating the integration concept into the initial stages of process automation, prompting the government to recognize its significance. Prior to implementing the framework, further research should be conducted to assess its applicability, relevance to the executive branch, and alignment with the integrated e-government landscape. By contributing to the existing body of knowledge on integrated e-government in the public sector, this study serves as a roadmap for implementing such a system within Namibia's public sector. It is crucial to emphasize the vital role of political leadership and support at all levels of government, the presence of essential infrastructure, the availability of skilled human resources, a favorable legal and regulatory environment, access to information resources, and the provision of citizen-centric services in ensuring the success of e-Government initiatives. These factors collectively contribute to the overall effectiveness and positive impact of integrated e-government systems, fostering a more efficient and responsive public sector that caters to the needs of its citizens.

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