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Evaluation of ICT Migration Plans in a Select Number of Companies in South Africa

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Abstract

The rapid evolution of the Information and Communication Technology (ICT) industry has made ICT migration a critical component for companies seeking to enhance productivity, efficiency, and competitiveness. However, migration often presents challenges, including high costs, system compatibility issues, cybersecurity risks, and employee resistance to change. This study evaluates the ICT migration plans of selected companies in South Africa, examining their strategies, challenges, and overall effectiveness. Using a mixed-methods approach, the research integrates qualitative and quantitative data collected through interviews, surveys, and document analysis. Companies are selected through purposive sampling to ensure diversity in industry, size, and ICT readiness. The study focuses on analyzing existing ICT infrastructure, identifying migration obstacles, assessing the success of implemented plans, and providing recommendations for improvement. Key assessment areas include cost-effectiveness, system scalability, cybersecurity measures, employee training, and post-migration performance. The findings of this study will contribute to the existing literature on ICT migration while offering practical insights for businesses aiming to implement or refine their migration strategies. Additionally, it will provide valuable recommendations for industries and IT professionals, facilitating smoother and more efficient ICT transitions in South Africa.

Keywords: ICT, migration plan, evaluation, Infrastructure

1. INTRODUCTION

Information systems have recently been essential for all organizations, especially in this digital age. The reason is not too farfetched since the internal processes of many organizations depend mainly on business Information Technology (IT) [1]. In contrast, business IT depends on the organization's IT infrastructure. The infrastructure migration process in IT is a planned organizational decision that has a lot of impact on the organization's performance, growth, and output [2]. Many organizations are joining the bandwagon of IT infrastructure migration. Some organizations might be looking at the need to set up IT infrastructure by doing so, considering taking advantage of any of the new data center cloud storage [3]. Also, some organizations need to migrate their IT infrastructures due to some

managerial decisions or some new acquisitions that might bring about the migration of IT infrastructure from one tenant to another or from one domain to another [4]. When it comes to IT infrastructure migration, the decision to migrate a running system/infrastructure from one location to another or from one domain to another might cost the organization a lot of alterations in their system integration, user actions, business process, and management support [5]. It is necessary to investigate change management when considering the migration plan of an IT infrastructure. The managerial team and the technical team have a lot of grips in the planning and implementation of an IT infrastructure migration process as they are also part of the stakeholders in the migration process [6].

Infrastructure migration in IT is the movement of its components, which comprises data, applications, etc., from one domain to another in the same location or to another site. Although this sounds so easy, it involves a lot of changes to the existing infrastructure. For many organizations, the primary goal of any migration plan is to achieve more success or to be in the correct competitive position with their competitors. Infrastructure data migration in IT takes a lot of processes to be followed in executing the migration plan. A lot of preparation steps must be involved in migrating an IT system from one target location to another, and it consists of many processes. Many organizations have different reasons for embarking on a migration project, which vary from data merging or acquisition (which can come from an organization merging or acquiring a new organization), overhaul maintenance of the existing IT infrastructure system, or upgrading the current IT infrastructure systems.

The IT industry has developed, but the migration process is challenging and complex. Therefore, there is a need for an accurate migration plan for an organization and the need to integrate the necessary stakeholders in the migration plan properly. Also, the organization's IT business must be appropriately aligned with the IT infrastructure migration plan [7].

1.1. Related Works

Organizations nowadays are encountering many adjustments, including increasing competition, higher execution state, and constant demassification. A lot of organizations are constrained to frequently re-structure and re-profile themselves so that they can cope with different situations. Furthermore, organizations need to consider them. A robust IT infrastructure is crucial for businesses, not only to enhance operational efficiency and achieve success but also to meet customers' evolving demands and expectations in a timely and consistent manner. Moreover, businesses must recognize that IT infrastructure is essential to withstand the competitive pressures posed by rivals with IT-enabled products, supply chains, and IT-powered interactions with customers and organization [8]. Due to the high

costs associated with maintaining their current IT infrastructure system, many organizations are contemplating migrating their systems. These organizations have invested heavily in IT infrastructure hardware but have realized that the investment is not being fully utilized. A recent survey of six corporate data centers revealed that most servers used only 10-30% of their computing power. At the same time, desktop computers had an average capacity utilization rate of less than 5%. Additionally, the expense of maintaining the infrastructure is substantial.[9].

Information Technology plays a vital role in organizational operations in the current digital age. Successful management of IT requires a harmonious blend of technical and human components. Additionally, IT systems should be flexible and compatible to align with an organization's business value. Therefore, it is crucial to ensure a smooth migration of IT systems between different environments without negatively impacting the existing Management Information Systems (MIS) of the organization [10]. In the past twenty-five years, the goal of creating a sustainable environment has been passed across from government agencies and regulators to cooperating organizations. Although many corporate organizations focus on their data center power consumption capacity, which most of the time takes up to 5% of companies' energy consumption, according to Gartner Research [11]. Therefore, many organizations are trying their best to migrate or move most or all of their IT infrastructure to the cloud. Also, organizations decide to adopt either a whole cloud IT infrastructure or a hybrid IT infrastructure.

Information Technology infrastructure should be compatible and dynamic as it should fit into the core value of information technology in the organization. Information technology infrastructure needs to be proactive in nature so that it can be flexible and fit into and adapt to the continuously changing business structure of an organization. This way, the organization can easily compete in this digital age with its competitors. Also, IT infrastructure is the driving force for the perfect implementation and running of MIS (Management Information Systems) [12]. Information technology is crucial to many organizations, especially organizations going through one digital change process or the other. It is also essential for organizations to go through one business process transformation or the other. Thus, nowadays, most leading companies in this digital age create business-driven IT infrastructures. Establishing a business-oriented IT infrastructure requires the knowledge of IT maxims, which gives a full picture of the company's future direction [10].

Many organizations do not have the potential to maintain their IT infrastructure due to the dynamic and delicate position they occupy. Therefore, they are fond of outsourcing their IT functions. Due to the criticality of IT infrastructure, quite a good number of critical systems are being handed over to the vendor company for the maintenance and implementation of projects. However, it is the responsibility

of the client company to maintain control of its infrastructure. Most of the time, clients have internal auditors who help to put a check and balance on the activities of the vendor. Also, the internal auditors have the sole responsibility of making sure the initiation and implementation process of the vendor activities meet the standard and requirements of the client organization. There are a lot of legal binding agreements that must be signed between the two parties: both the vendor and the client. This is because the vendor will have access to data that is personal to the client company. For example, if the email system of a client is outsourced to a vendor company, the vendor company might have access to the sensitive email data of the client company.

In the process of planning for data migration, security needs to be put into consideration, such that during the migration process data are securely migrated, and confidentiality is also upheld. This will ensure that data transfer can be safely done without any data loss. It is critical because data is essential for all organizations, and no organization will want to go for migration progress that will put the security of its infrastructure in jeopardy [7]. Infrastructure migration in IT is also a tactical organizational choice, which must be taken at the managerial level of the organization. This is an important decision because IT infrastructure migration carries along with it a lot of concerns like the disruption of business processes, security issues, staff productivity, system interoperability, and data integrity. Critically looking at the disruption of the business aspect of the criticality, a decision must be made by the management to implement the migration process during the off-peak hours of the organization's production hours [6].

Enterprise architecture from the perspective of framework architecture TOGAF can help take care of enterprise architecture concerns concerning building architecture levels, which include technology, data, application, and business. Also, in mapping between Cloud-RMM and TOGAF iterations, three major processes need to be considered during the migration process: Planning, Execution, and Evaluation [13]. Information Technology maxims help to describe how a firm needs to connect, share, and structure its information and IT systems across its organization. This is important because having this kind of understanding will help organizations identify how they must properly integrate the migration plan into the existing infrastructure or totally integrate new overall information and IT systems across their organization. It is also crucial to pay attention to the fact that during and after the migration process, the organization network must give permission and enable organization units' access to selected applications that are important for the smooth running of the organization's shared business objectives. Examples are the email facilities and communication systems that are essential for the high interactive synchronization between the staff in the organization for proper business process flow within the organization with no interruption. Also, cooperative communication within the organization's staff must be appropriately

handled [10].

IT governance plays a crucial role in IT infrastructure migration and is a key aspect of enterprise governance that requires a business-focused approach. By implementing IT governance, the board can effectively oversee the development and implementation of the organization's migration processes, structures, and relational mechanisms. This enables business and IT teams to fulfill their responsibilities, supporting business/IT alignment and creating business value from IT-enabled investments. It's important to note that the impact of IT governance on IT infrastructure migration plans is not independent but rather an integral part of the overall enterprise strategy, which should drive the success of the migration [14]. Effective risk management is crucial for successfully migrating an organization's IT infrastructure. There are several reasons why an organization may decide to relocate, such as cost reduction, acquisition, sustainability, data quality improvement, and continuity of services. Before deciding to migrate to the cloud, a hybrid solution, or an on-premises solution, the benefits and drawbacks of each option must be carefully evaluated. Ensuring that the chosen migration plan is sustainable and aligns with the organization's overall business strategies is also essential. Business needs, roles, and relationships must be considered to ensure seamless integration with the IT infrastructure migration project. In today's ever-changing business landscape, organizations must implement IT infrastructure plans that keep them competitive, relevant, and efficient.

1.2. General Overview of IT Infrastructure

Information technology infrastructure is an interconnected IT resource. It comprises hardware, software, communication media, data, applications, skilled human resources, values, norms, and the intelligence that comes together to create IT services that are exclusive to an organization. The IT services offer a fundamental application for communication internetworking in the whole organization, and they also help with the development and implementation of existing and future business applications. Information technology infrastructure is "a set of shared, tangible IT resources that build up a frame for business applications". The IT definition represents both the hardware, software, data, network, systems, and applications that run the business operations in an organization. These IT infrastructure resources are crucial for smoothly running an organization's business application.

To successfully implement a business-driven IT infrastructure decision such as IT infrastructure migration, it is crucial to have a deep understanding of the company's strategic context. The maturity and currency of an organization's IT infrastructure play a significant role in the execution and resilience of its business processes. However, the decision-making processes for IT investments, particularly critical

ones like IT infrastructure migration, can be complex and often misunderstood. Numerous companies recognize the importance of IT infrastructure and make decisions based on their strategic context. In Figure 1, the interrelated elements of IT represent the combination of business processes and IT infrastructure. The ultimate goal of investing significant financial resources in IT infrastructure is to create a robust system that enhances the organization's business process [10].

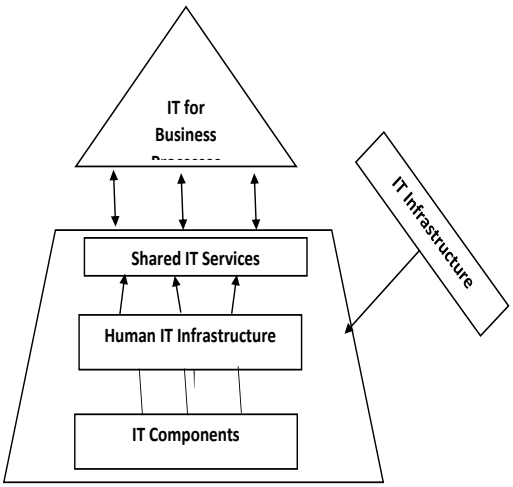

Figure 1. Element of IT infrastructure [15].

1.3. IT Migration

Moving IT systems from one premise to another is a critical IT task, and it requires a systematic approach [16]. Data Migration is identifying the right system to be migrated, making the system ready for the migration process, removing the necessary data needed for migration, converting the required data, and moving it from one computer to the other. Movement is motivated by the necessity to modernize the infrastructure and fit it into the current technological trend. The migration can be in whole or in part, which is dependent on the reason why the migration is initiated [16]. For the migration of IT systems to occur in an organization, there must be a requirement to gather the existing IT systems components. This is important for the reengineering plan and decision-making, which is necessary for the stakeholders' decision-making concerning the IT system migration plan. With this requirement gathering documentation, it will be easy for the decision-making stakeholders to understand the existing infrastructure properly and, from there, make a more concrete decision based on the organization's business requirements.

The global IT system migration decision-making by the stakeholders of an organization is not dependent only on the existing IT systems infrastructure

requirement gathering documentation, also some internal organizational structure changes, new acquirement, downsizing or upsizing, keeping with competitors' global technology trend to remain relevant in the market. It is necessary to consider that the continuously changing business environment and business transformation pattern due to the rapid industrial Age transformation into the Information Age is also an essential factor for stakeholders' IT system migration decision-making [10]. From the energy efficiency perspective, a sustainable business should consider the power consumption of its IT processes, including data centers and hardware infrastructure, when making decisions about IT system migration. One may move from on-premises to the cloud to implement a sustainable IT infrastructure. Before making this migration, it is crucial to understand why the current infrastructure is not satisfactory and to identify the essential components of the future infrastructure. Once this is determined, it is necessary to decide which systems will be migrated and to develop a new design architecture for the proposed infrastructure [17].

Live migration has become increasingly important for companies that heavily rely on their IT infrastructure and cannot afford extended periods of downtime. Therefore, implementing live migration on a large scale is essential. This trend has gained popularity in enterprise environments as it enables companies to perform activities like service maintenance, disaster recovery, redundancy, and test environments without disruption [18]. Figure 2 shows a cloud computing migration model inspired by a more significant percentage of the ADM model, a method from the TOGAF framework. With the model above, it is easy to consider different cases related to IT infrastructure migration to the cloud. The model describes five distinct cases that can be gradually divided into critical phases throughout migration. [2]. For any data migration, the plan and purpose of the migration must be clear. For example, if it is cloud migration, there must be a clear understanding of the destination environment of the IT infrastructure owner. There must be a clear SLA between the vendors about the plan and purpose of the migration.

1.4. Migration in Database

This type of migration involves data migration from an existing database to another. The current and the other databases can be of different vendors, e.g., Oracle Database to SQL Database, or the same vendor moving from one version to another, e.g., Oracle 11g to 12c.

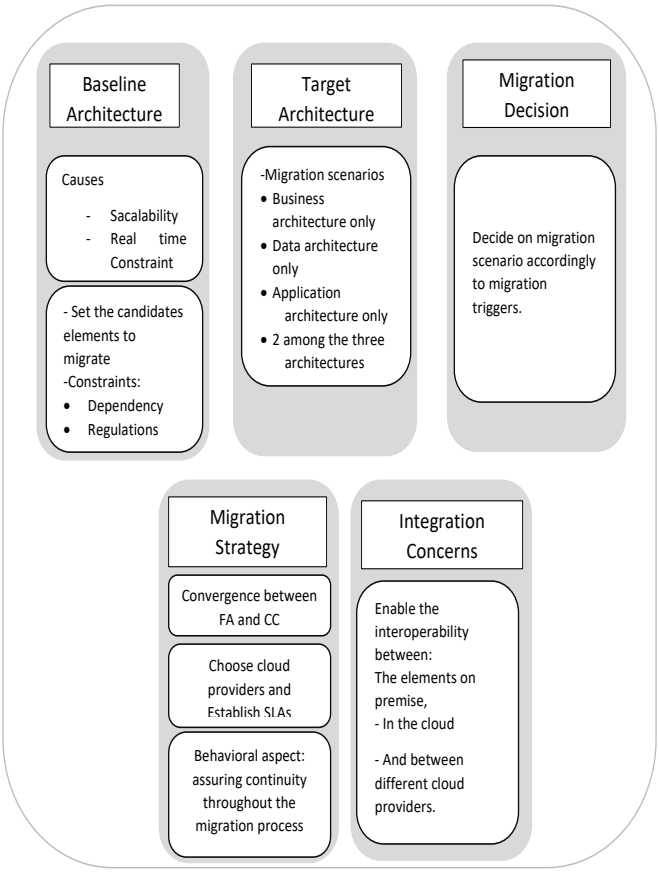

Figure 2. Cloud computing migration model [19].

1.5. Relocation of Datacenter

It involves the movement of a data center from an existing location to another location. Moving the database from the current location to the new location is vital.

1.6. Application Migration

It is essential to notice that by migrating applications from one environment to another, the dependency data related to the application being migrated must be migrated alongside the migrated application [7]. Moving legacy applications from one environment to another is a big concern because it requires a rigorous approach. It is important that during this kind of migration process, large-scale and complex legacy systems are moved to another environment, and the issues of security, interoperability, and vendor lock-in are considered important. [28].

1.7. Business Process Migration

In most cases, when the business process changes in an organization, the changes can be caused by different reasons, e.g., the merger between two organizations or the acquisition of an organization by another organization. It can also be because of business optimization. Concerning the reason for the business process changes, data needs to be migrated from one system to another. [7].

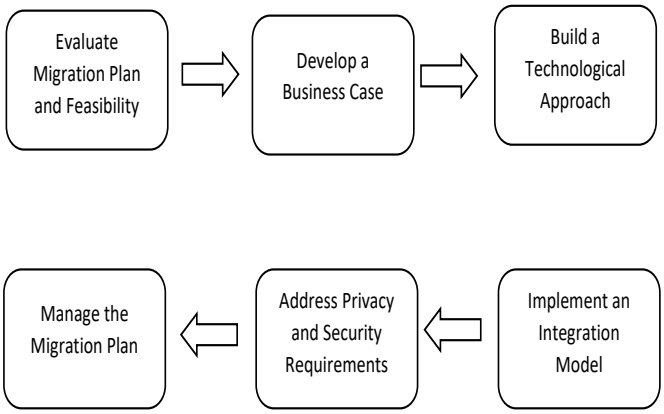

Figure 3. Cloud Migration Steps the Element of IT Infrastructure [20].

Figure 3 illustrates the perspective steps that can be adopted to guarantee the effective movement of existing projects to cloud computing.

1.6. Evaluating the Migration Plan and Feasibility

This is the first step to be considered when it comes to the Migration of IT infrastructure systems. This will help the organization gather the proper requirements for the existing systems and, from there, decide which systems and data can be promoted for migration. Also, at this stage, there is the need to consider the risk impact of the migration project on the existing IT infrastructure system and the current business process. [1]. Furthermore, it is also recommended to use a gap analysis tool; this tool helps to understand the real situation of the running business process in an organization. This helps to know if the present working business process of the organization in question can withstand the effect of the change the IT migration plan will cause the business process performance of the running process. Gap analysis will also help measure the maturity of the migration project with the existing problems and short comments in the current process [21].

To implement this step, it is recommended to establish a migration transition team that can thoroughly examine the challenges, risks, and potential deviations

associated with the project. Once the team has analyzed these factors, they should present a comprehensive report to the stakeholders and decision-makers outlining migration's advantages and disadvantages. This report can then assist in creating a migration plan and identifying the necessary resources needed for a successful migration process.

2. METHOD

The migration of the IT infrastructure system also involves developing or adjusting the existing business process to fit into the business process. Immediately, the stakeholders decided that the IT system should be migrated. There should be a general overall cost evaluation of the after-migration process and the dependencies.

2.1. Build a Technological Approach

Regarding the cloud computing migration process, the two major and most likely possible platforms are Platform as a Service and Infrastructure as a Service. Information technology infrastructure migration plans entail a lot of technical know-how on how to go about implementing the plan. If a wrong step is taken on the technical approach of the migration plan, then the project is going in the wrong direction.

2.2. Implement an Integration Model

Depending on the kind of migration deployment models, which can be public, private, hybrid, or community. It is essential to look into the connections between the different applications that are planned to be migrated so that all migrated modules will be integrated appropriately after the migration process [1].

2.3. Address Privacy and Security Requirements

In this age, data privacy is considered a serious element, especially in Europe. Security and privacy are serious issues that need to be given high priority in IT infrastructure migration, especially when the target environment for migration is a cloud environment [1]. The concept of the multi-user nature of cloud computing raises the dust on the security of organizations, now having only remote access to their IT infrastructure systems. This raises the question of confidentiality and integrity, two significant factors that need to be considered during an IT infrastructure migration plan [5].

2.4. Manage the Migration Plan

It is vital to take into consideration that, finally, there is the need to get involved in the migration process as a qualified and experienced IT manager or a system analyst. This is important because IT infrastructure system migration is a complex task that needs an experienced IT manager with the latest knowledge about IT infrastructure [1].

2.5. IT Infrastructure Migration

Information Technology infrastructure migration is migrating IT infrastructure components from an existing premise to a new environment. Most of the migration that has been done is being migrated to the cloud environment. For this reason, it is essential to properly understand the environment in which the infrastructure is being migrated. The cloud environment consists of public, private, and mixed (hybrid) clouds. The public cloud is owned and controlled by the Internet Service Provider, individual cloud users on the private cloud, and the mixed (hybrid) cloud is when a customer uses both private and public cloud services [14]**.** Also, it is essential to know that cloud adoption can occur in three forms, dependent on the service model subscription. Cloud computing has three service models: Software-as-a-Service (SaaS), Platform-as-a-Service (PaaS), and Infrastructure-as-a-Service (IaaS). The migration committee needs to investigate these three service models keenly to choose correctly which of the three service models fits the requirements for the information systems that are planned for migration. Furthermore, some software-intensive applications, safety-critical applications, and embedded software applications might not misuse the new environment if the new environment is a cloud premise. For critical systems like this, migrating them to a private cloud is better, where the system owners can have total control of the migrated systems and applications**.**

It is also important to properly check all issues involved with migrating the IT system to another environment. The issues might vary from business terms to technical factors, including how easy the migration project can be implemented, the cost of data center maintenance or monthly cloud platform subscription, the cost of support, and licensing. It is required to involve the help of trained, experienced individuals who can help investigate the issue of licensing, which might revolve around hardware and software licensing. The licensing might be per user or per device. It is important to consider the legal issues surrounding the migration project during the migration plan. Looking beyond the technical perspective, organizations are keen on where the applications will be hosted, executed, and processed, especially when migrating from on-premises to cloud infrastructure. Also, with the new GDPR law in Europe. The majority of European firms will prefer to migrate their IT infrastructure systems to a cloud facility located

in the European Union countries [27]. It is also expedient to carry along the work council of an organization when it comes to cloud migration, especially when it involves migrating data to the cloud.

Many organizations have different perspectives regarding IT infrastructure services and make decisions based on strategic contexts. For example, Johnson and Johnson invested in shared IT services across previously autonomous businesses. Hong Kong-based conglomerates Jardine Matheson and Hutchison Whampoa have decided they will not invest in firmware investments in IT infrastructure services. Citibank Asia is centralizing and standardizing all backroom IT processes to a centralized data center in its operations center in Asia. Honda Motor Corporation has developed a complex communication system to reduce cycle time for its new car production in the United States of America. Many of the executive managers of the companies mentioned have made various decisions based on their IT infrastructure, which might not be the perfect decision. This can only be an ideal decision if there is a proper alignment between the business and IT management. Also, according to [8] the term "flexibility" is defined as the degree to which an organization can rapidly address the changes in business environments. In this regard, flexible IT infrastructure mainly relies on firms' scalability, modularity, and compatibility." Most of the time, organizations must make drastic decisions to make their IT infrastructure flexible. This will be of help in the organizational business process. Some of the decisions are migrating IT systems to the cloud or migrating the most of applications related to the customer process to the cloud for proper and quick accessibility of the customers to the systems [8]**.**

Enterprise architecture helps to understand the fundamental constituent of a system, its embodied components and their relationship with each other, and all the principles governing her design and evolution. The primary work of an enterprise architect is to align the enterprise process with the available IT system. It is already known that there is a close relationship between business-IT alignment and enterprise architecture. Although it is hard to integrate them thoroughly. Enterprise architecture comprises a meeting point for the principles, methods, and models used to design and realize enterprise organizational structures, business processes, information systems, and infrastructures. It is also crucial to understand that enterprise architecture is not just a tool to realize business-IT alignment but also a tool to manage it**.**

A perfect IT infrastructure system ensures better practices for managing information systems in business organizations. How appropriate the IT infrastructure of an organization is dependent on her capability. Also, the executive's commitment to the migration process is significant for the overall IT development and investment because the whole IT department is not just

controlled by her financial or technical resources but by the commitments of her cooperating executives and their involvement in a big project of IT like IT infrastructure migration cannot be undermined.

2.7. IT Infrastructure Migration Plan

The IT infrastructure migration plan is a long-term investment for firms. It helps her to improve her effectiveness when it comes to her business process. An IT infrastructure migration project must be planned appropriately so that the migration implementation will go in the right direction, e.g., the prevention of the duplication of data in the IT infrastructure database systems [42]**.** For an IT infrastructure cloud migration process, organizations seek technical guidance to guide them through the roadmap for a successful migration plan. The migration plan differs from one organization to another based on the uniqueness of the IT infrastructure components. The organization needs to decide:

1) Which existing applications can be migrated, and which current applications are ready for the migration process? This is important because many legacy applications were developed without considering the unique requirements attributed to migrating the applications to another environment, i.e., if the application has been moved to the cloud. Many legacy applications were not developed, considering the unique requirements attributed to the cloud environment, e.g., interoperability, multi-tenancy, and elasticity.
2) How will the organization implement the migration process so that it will not affect the operation hours of the organization? Organizations will not want to lose their customers based on downtime caused by the poor migration plan. It must be considered appropriate that downtime must be appropriately managed during the migration process.

2.8. Technical Perspective

Information technology outsourcing has been a common practice implemented by organizations when it comes to the IT infrastructure migration process. Most organizations prefer to outsource the project because it is more efficient, cost-effective, and an expert solution designed to meet the project's implementation demands. It will be more demanding and time-consuming for organizations to train or recruit new IT employees for this migration project task.

An adequately designed information system cannot be successfully operational on its own without the proper components that will stand as a platform on which the information systems will be placed. It is necessary to consider the hardware requirement gathering for every information system that will be migrated from one environment to the other. Because if the information systems are correctly

migrated to the new environment but on a wrong hardware platform requirement compared to the existing environment. Then the business processes on the Information systems will not be sustainable in the new environment and will affect the functional performance and end result of the migration process. Also, organizations that are planning to migrate their IT systems or infrastructures need to properly strategize which approach should be implemented or adapted for the migration process. There are approximately four approaches to migration, majorly cloud migration, which are:

1) Replace activities: This technique can only be implemented if only one or more on-premises services are replaced by cloud services.
2) Partial migration: This approach involves migrating one or more application layers to the cloud.
3) Full-stack application migration: This technology entails the management of the hardware components on the premise, and the software component of the system is migrated to the cloud.
4) Cloudify**:** This involves migrating all IT infrastructure to the cloud.

2.9. Business Perspective

It is well-known that IT plays an important role in organizational operations and financial management. However, the effective use of IT to manage the organization and its finances depends on how fast and adequately IT Governance (ITG) is implemented. Because of bad ITG, many organizations have lost billions of dollars annually. As organizations need to manage ITG very well, it is quite interesting to know from research that ITG frameworks work best.

It is also essential to investigate the business aspect of IT infrastructure migration. It is vital to have a vivid understanding of all the Service Level Agreements accrued to this migration process. It is also essential to investigate the business perspectives of all the stakeholders involved in the migration process. The migration plan will bring about an intra-organization issue, which must be handled appropriately. It is necessary for the organization to investigate addressing the changes that come with the migration process with her cultural differences, how the cooperation will address these changes, and how the organization's employees and customers will react to these changes.

Immediately, an organization takes care of its business process and data structure to support one-to-one customer interaction with the IT migration plan during the stakeholder meeting for the migration project. There should be careful consideration when it comes to the distribution of organizational information supporting the new IT information system environment that will emerge after the migration plan implementation. The customer data must be securely taken care of before and after the migration process. Organizations going into any form of IT

infrastructure migration project must take care of their customer's interactive user interface technology. Also, it is clear to us that business processes are focused on the descriptions of an organization's activity developed as IT processes. It can be said that the business process is tailored to meet up with individual customer satisfaction. Therefore, the organization must take into cognizance the business process systems during the migration plans because the business process system directly impacts the organization's customers. If, after the migration process, the customers are not affected by the business process applications migrated, then the migration is on a positive note [26].

The organization needs to take into higher priority during the migration process the information systems because any implementation process failure during the migration process can cause a tremendous financial loss to the affected organizations [22]. As we all know that Information Systems implementation failures only cause the losses made by these corporate organizations [22]. The market orientation concerning IT business values determines the extent to which an organization will invest in IT innovations, which will enhance the edge it has over its competitors. Market-oriented firms intend to provide higher value for customers by gaining a high knowledge of their customers' needs and preferences by analyzing the industry environment. This understanding of the customers' needs can stand as a valuable tool for an organization to achieve its objectives, which most of the time affects the IT business process of an organization's planning. When it comes to the business perspective, the rate at which an organization's executive stakeholders pump money into IT infrastructure and the ability to be flexible and creative with the evolving IT world is dependent on how much the organization is dependent on IT infrastructure for its business strategies. Also, if the organization's IT infrastructure is the one driving the business and giving the organization a better edge over its competitors. Then, the organization will be ready to invest enough resources for the management of its IT systems [10].

As is clear in the present digital market, the contemporary marketplace, as of now and in the future, will continue to be characterized by some spontaneous changes that affect both the competitors' actions and our customers' preferences. This is the primary reason why organizations try to detect market changes as soon as possible and adjust their system to fit into the new marketing trends. Presently, what is trending in the marketplace is organizations moving the whole or some part of their IT systems to the cloud to have a more robust and fast IT system process, which will all cost less when it comes to energy consumption by the IT systems [8].

Considering the effect of IT on the customer sales and services of an organization. It is essential to check the impact of the IT migration process on customer service effectiveness and how it will serve the customers more satisfactorily. Also, it is

important to consider how the migration process will affect the organization's marketing services. Information technology is necessary to check how the migration project will bring more flexibility and dynamism into her marketing efforts in collaboration with her Customer Information System (CIS). According to Figure 4, all the IT processes involved in the migration plan must have one major goal, and that is Successful Customer Interaction after the implementation.

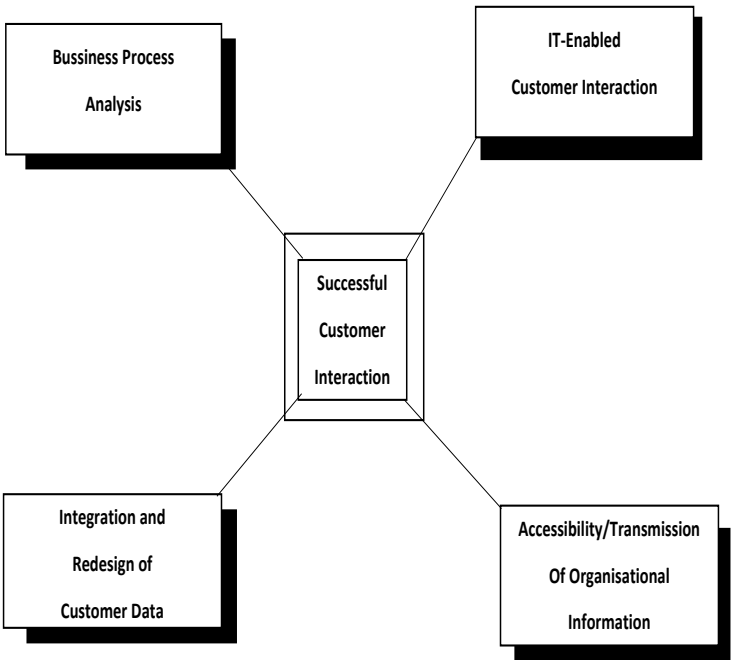

Figure 4. Key Elements for Successful Customer Interaction [22] [23].

Information technology investment is a significant investment decision that needs to be adequately considered. To understand its effect on the business of the organization properly. Many consider investment in IT for the business organization a waste of money, and it might not be a profitable business for an organization to risk investing money and resources into; integrating it once more, organizations need to investigate or consider its technical resource capacity when it comes to managing IT projects appropriately as shown in Figure 5.

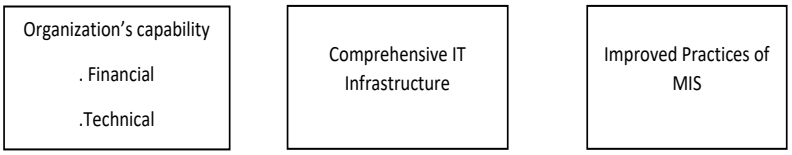

Figure 5. Impact of organization's capacity on IT Infrastructures for practices of MIS [24].

2.10. Migration Challenges

One of the major concerns or challenges in IT infrastructure migration, especially cloud migration, is the issue of security. A lot of organizations are not secure sending their sensitive data outside their firewalls, but with cloud migration, it is compulsory to send sensitive data outside the firewall of the organization. However, it depends on the kind of system or services migrated to the cloud. This is not farfetched because many organizations do not trust the firewall security installed in the cloud infrastructure of the cloud service provider [4]. Also, some organizations are still skeptical about migrating their IT infrastructure systems to the cloud since they are afraid of losing control of their systems. Another perspective is the difficulty of migrating legacy systems due to the difficulty of upgrading the system to the modern technology version. Some organizations are also not ready to migrate their safety-critical applications and systems to the cloud. Although it is easier for start-up companies because they are just building their infrastructure, it is easier for them to migrate [6].

If the Information technology infrastructure migration is being migrated to the cloud, it is essential to take into consideration the interoperability of the applications that will be migrated to the cloud. Especially if the applications are built via a composition of cloud services that are developed by different providers. The challenges come to play because different cloud providers have different underlying technologies and underlying APIs for their cloud services development [27]. The implementation of an off-premises data center brings more attractiveness to customer interaction, mainly cloud IT systems, which can be easily accessible by customers with fewer firewall and gateway protocol rules, which is needed for extra intranet protection. This level of IT flexibility gives the customer the flexibility to interact with the IT system from home or office. This is a beautiful move in the right path because it also cost the organization less cost for her to maintain her IT infrastructure compared to when it is on-premises.

In the aspect of loss of control when it comes to cloud migration, It is noticed that many organizations do not want a situation where they will not be able to access their system during critical times because they solely depend on the cloud service provider's customer care service. Sometimes, there can be a delay in response to tickets on the side of the customer care service of the service provider, which might lead to downtime for the affected organization [6]. From this perspective, it is quite essential to understand that for an organization to enjoy a robust and dynamic business environment, it should achieve an alignment between the business and the IT department [25]. Without this, it will be hard for the board of management in an organization to allocate and approve the IT budgets for the continuous upgrade and up-to-date technology implementation required to keep up with competitors in which part of the upgrade implementation is the migration of IT

systems and platforms to a more robust environment. With a lot of benefits that come with IT innovations and flexibility, many organizations have struggled with carrying out these innovative initiatives. "A survey of 107 European firms shows that 48% of managers are concerned with the difficulty of incorporating external knowledge into an innovation process". It is critical to know that the support for this implementation must come from within, opening more opportunities for innovative performance. As a cogent organizational tool, a modern IT infrastructure can stand as a motivation to help optimize the innovation performance of an organization[15].

2.11. IT Flexibility

This is the ability to aptly and economically adapt to IT applications to support evolving requirements and manage knowledge sharing with external sources. It helps organizations obtain knowledge from a wide range of external partners through quickly adjusting IT applications. It is expedient for a firm to have flexible IT. This helps an organization to be robust enough to take the right decision at the right time to bring about open innovation in an organization. This kind of innovation might tend to update the IT system into a more radically competitive infrastructure that gives the organization an upper edge in a competitive state with its competitors [15].

In the IT flexibility context of open innovation, it is of a high level of attainment to bring into place innovative IT integration techniques, the main brain behind which is to have a robust IT infrastructure running a flexible IT business. In this digital age, organizations are moving their IT systems from on-premises to cloud environments to have a more flexible IT infrastructure in which it will be easier for international companies to have their data centers brought close to every region in which their organization is situated. It makes their IT system more centralized with the innovation of cloud systems.

In the pursuit of making IT systems flexible and migrating it to the cloud to make it a centralized and robust system. Many organizations already have legacy systems that are situated on premises in organizations' on-premises data centers. It is an excellent project migrating all existing systems from on-premises data centers to cloud data centers. Also, many IT tech companies' giants have moved their services to the cloud to give their customers better services. Examples are Oracle, Microsoft, IBM, etc. This is being done to make IT services to their customers more easily accessible. From Figure 6, we can see the capability of human IT infrastructure to enable a flexible IT system. Then, by looking at IT infrastructure components as firm resources and looking at IT information processes as firm capabilities.

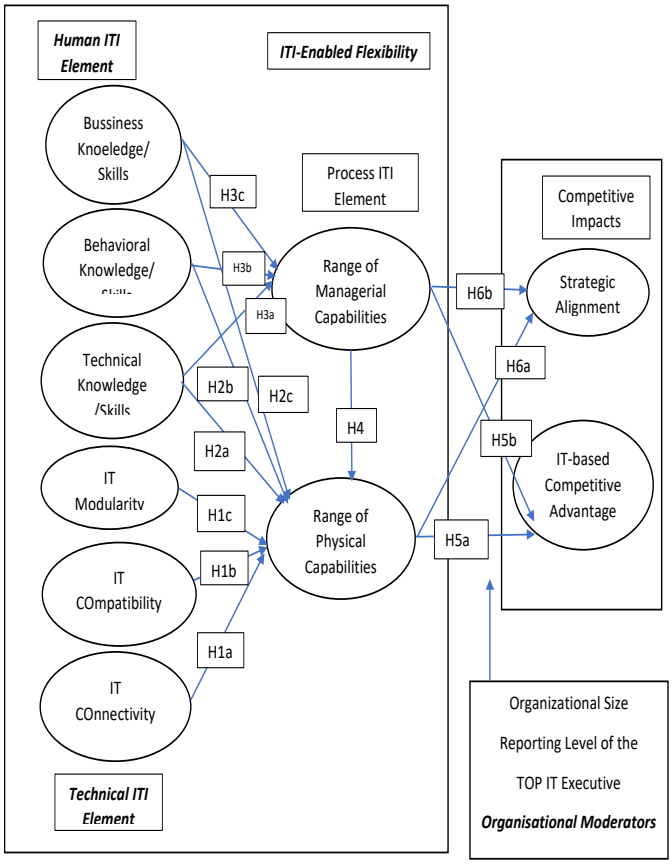

Figure 6. Hypothesized Paper Model (Based on: [26])

3. RESULTS AND DISCUSSION

3.1. Implementation and Design

A complete IT infrastructure migration may create an awful experience and side effects instead of solving the problem the movement intends to address. The migration plan must be developed for the process. Executives of organizations find it challenging to align infrastructure investment decision-making and business strategy-specific formation. This is because in an executive's decision-making for infrastructure investment, which includes IT infrastructure migration, many stakeholders in the executive meetings are only interested in how to cut costs for the organization's expenditure and not in the migration process plan. The aspect of business strategy and alignment with IT infrastructure planning only comes to play if the company is a business IT strategy-driven [10]. Although it might be hard, creating an alignment between the [27]".

Business IT Alignment enables the environment between the business and the IT infrastructure, which helps the business aspect of the organization to meet up with the IT infrastructure in such a way that it meets the expectations of the stakeholders in the organization. This makes the business process efficient and effective in meeting customer demands. This is the kind of IT infrastructure relationship with business IT the stakeholders have in mind even before proposing any IT infrastructure changes [28]. Figure 7 below, we have three layers: Enterprise Strategy, Enterprise Planning, and Solution Delivery. It can be noticed that the three layers work together to create a successful IT infrastructure migration plan that will fulfill the requirement of alignment.

1) Developing A Strategy for Migration Plans

A strategy must be developed and a proper analysis of various strategies that are helpful for a successful IT infrastructure migration plan. Figure 8 below tells us that strategic planning must focus on two factors, which are the company's corporate executive and the company's survival (aim and objective), and these two factors must interrelate with the Organization's capacity and commitment of the corporate executive. With the figure below, it is easier for the migration planning committee to be more focused when developing a strategic migration plan for their organization.

2) Involving the Experts in Migration

Deploying the right IT resources when it comes to human resources is critical in IT infrastructure migration. Many institutions make the error of trying to integrate their existing IT staff into the IT infrastructure migration project. This is ok if only the current IT staff members have technical data know-how of how to implement the migration process. In most cases, it is recommended to involve external consultants who are professionally trained for this activity and have vast knowledge about migration IT infrastructure. However, involving an external consultant in the process requires a lot of Service Level Agreements (SLAs).

It is an appropriate step to properly align the experts involved in the migration process to have a full and sound understanding of where the firm vision and mission is rather than concentrating more on where she is coming from. Many organizations fall into this trap where the concentration and the orientation of the migration will be more on the existing infrastructure since the organizations' employees are afraid of changes. They do not want to start learning new tools to fit into the migration process. But rather than that, the stakeholder's meeting should concentrate more on the future of the organization and integrating her business idea into the new IT infrastructure born from the migration process.

3) Planning and Implementation

Proper planning is important for successful IT migration. Information technology doesn't matter at which level of IT migration the project is taking place. A good understanding of the organization's strategic context and the relationship between the different components that make up the whole IT infrastructure will give a better understanding of how to go about successful IT infrastructure migration implementation. Also, a proper understanding of the plans of the organizations in the quote is important for the planning of the IT infrastructure migration. Most of the time, it is hard for an organization to come to the point of making an IT infrastructure migration investment decision.

There must be a proper and standard knowledge-sharing environment between the stakeholders and the business departments because this helps with proper decision-making for the migration project. If there is not a proper standard knowledge sharing before the migration implementation process, the migration process might lead to an inflexible IT infrastructure implementation. An inflexible IT infrastructure can affect the quick response of the organization to any market requirement change update. This can lead to the organization not meeting up to date with its competitors in the market. The proper understanding of the role of IT infrastructure flexibility in the market competition helps in the appropriate planning and implementation of the migration process.

In our present world and with the rate at which the world is advancing in technology. Jet age has made organizations' processes more dependent on information technology, and this helps organizations rely on innovations to drive their business. It is important for an organization to understand how IT impacts its business innovation capability and how it makes it stand out from its competitors. When an organization decides to run an IT migration project. It is important for her to check the impact of this process on her business. The stages of EAP about Zachman. Following this framework, which is made up of four stages, which are: Planning initiation, Current conditions of Enterprise, Architecture Design, and Implementation/ Migration plans, will help to have a clear understanding of the step-by-step process necessary for the migration process.

4) IT Infrastructure Migration Failures

Different organizational groups define success and failure separately. It can also be seen from the different units of an organization separately. For example, the way a software developer will see the success and failure of a project is different from the way a project manager, top management, or a user will see it. Also, the top management only sees the value of the project, its outcome, and its financial

measures such as Return on Investment (ROI), Net Present Value (NPV), and Internal Rate of Return (IRR). From the users' perspective, they are only concerned about the usability of the infrastructure system after the migration process. They want a situation whereby it is easy to use the system the way they are used to even before the migration process. It shows that it is complex to satisfy users' satisfaction. It is so complicated that in the same organization, some groups of users might be more excited than others about a new system [22].

To implement a successful IT infrastructure migration plan, it is essential to get top management support. IT is also essential to involve a project champion; without a project champion, it is unlikely that the project will be successful. Users' participation and involvement in the process are also critical for the success of the IT infrastructure migration project because it is necessary to understand users' requirements before you design a structure for them. It is important to know that after the migration, if the users are not comfortable with the newly migrated IT infrastructure, the migration project is a failure [22].

Another important thing to investigate is that we are not just implementing new architecture we need to know that alongside the latest IT infrastructure that comes with the potentially changed organizational structures and cultures, and the way the stakeholders will accept the changes depends on how prepared their minds are toward the change and the percentage variance between the old IT infrastructure and the new IT infrastructure. If the disparity is not that much, then it is easier to work on the minds of the stakeholders about the changes, but if the percentage of change is much, then it take much effort to convince the stakeholders about the changes [22]. The main challenges often encountered in infrastructure transformation are presented in Table 1.

Table 1. Main Challenges In Architecture Transformation [20]

Challenges	Occurrences
High Coupling among parts of the pre-existing system	50%
Identification of the boundaries of each service	38.9%
Decomposition of the pre-existing system	33.3%
Automation support for testing	33.3%
Reduce coupling among services in the new architecture	33.3%
Finding the best business-IT alignment	27.8%
Decomposition of the domain	22.2%
Finding the proper service granularity	22.2%
Lack of proper documentation of the system	16.7%
Bringing domain experts into the process of designing the new system	16.7%
Undocumented/ Uncommon code	11.1%
Other	33.3%

3.2. Participants Responds

The participants' role in the organization is shown in Figure 7. The organization's roles were harmonized to enable role comparison between different participants.

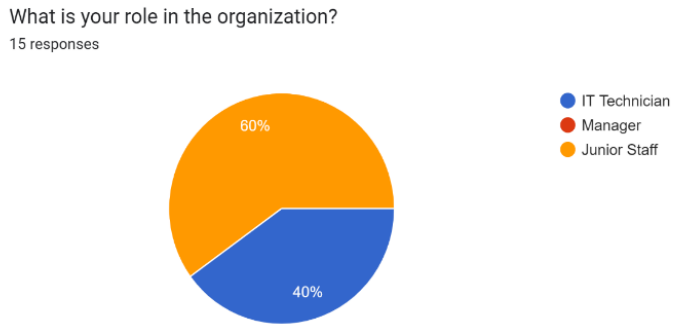

Figure 7. Organization role.

The graph in Figure 7 provides details of the different organizational roles of the pilot participants. With regards to the organizational role characteristics of the pilot sampled participants, the areas where the migration plans was done in their organization is shown in Figure 8.

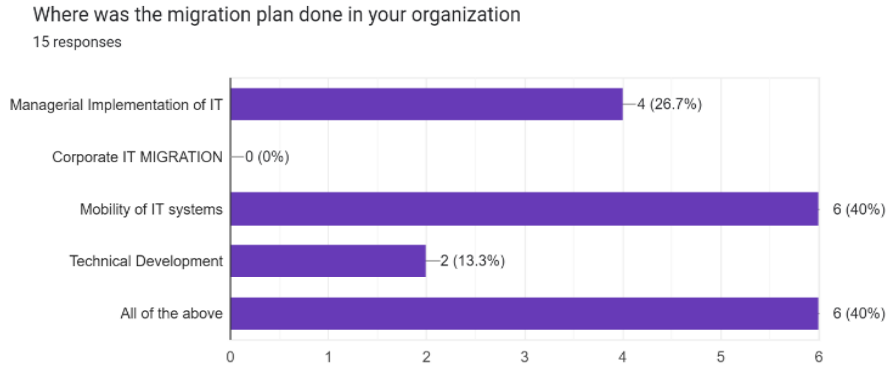

Figure 8. Organization migration plan.

The participants' knowledge regarding IT migration is shown in Figure 9. IT migration knowledge is obtained to know the knowledge level between different participants as either high, intermediate, low, and medium.

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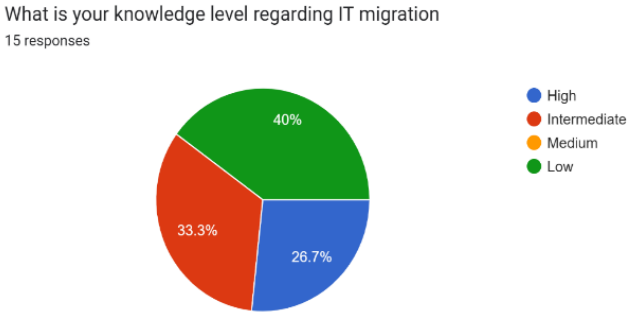

Figure 9. Knowledge level regarding migration.

Turning our attention to the feedback collected regarding the questionnaire on knowledge regarding IT migration. Overall, most of the pilot participants have low knowledge of IT migration (40%), few have high knowledge (20%), and participants with medium knowledge is 40%, as shown in Figure 10.

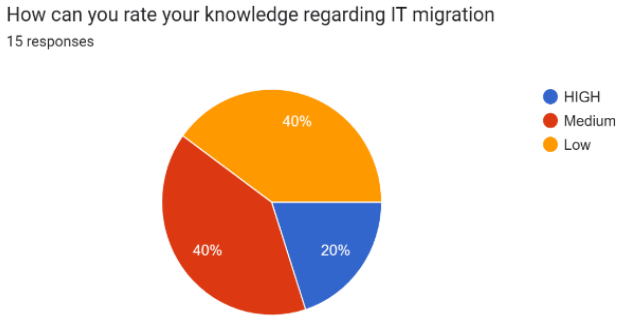

Figure 10. Knowledge regarding IT migration

From the questionnaire given, the participants were asked to know whether IT migration assists them to have proper understanding of the existing infrastructure in decision-making process. Figure 11 shows the response of the respondents.

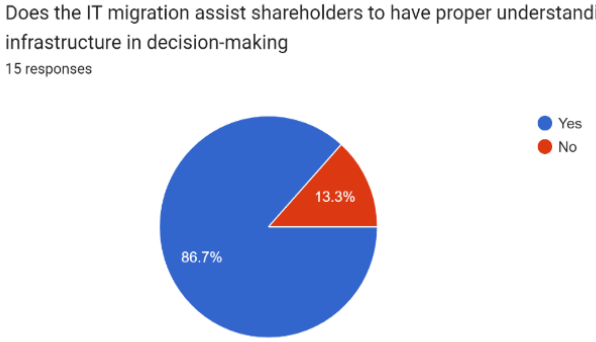

Figure 11. Shareholders IT migration understanding.

From Figure 12, 66.7% participant agree that the IT migration assist shareholders to have proper understanding of the infrastructure in decision-making and 13.7% says "no" that the IT migration did not assist the shareholder to have understanding in decision-making. Figure 12 shows the approach used in the organization for their IT migration.

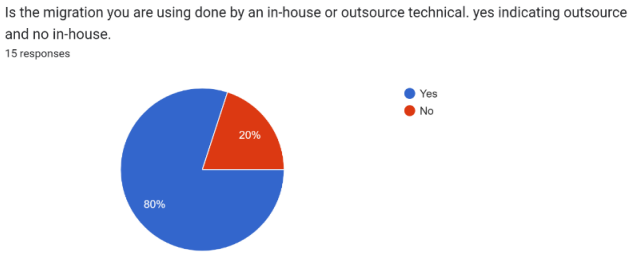

Figure 12. Approach used for migration.

80% of the participants said the migration is done as outsourcing and only 20% of participants said the approach is used in-house. Also, the participants were asked to give ratings of the challenges they encountered during the IT migration. Figure 13 shows the responses of the participants.

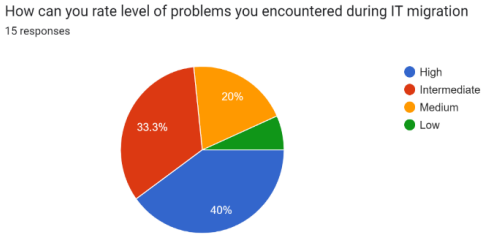

Figure 13. Ratings of challenges encountered during IT migration.

47% say the encountered high, 33.3% say the challenges they encountered are intermediate, 20% of the participants say the challenges encountered is medium, and only few encountered low challenges. Furthermore, the participants were asked about the cost-effective of IT migration, the responses are shown in Figure 14.

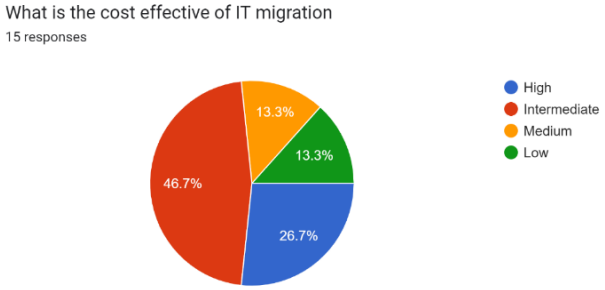

Figure 14. Cost of IT migration.

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Regarding the response obtained from the participants, 46.7% say the cost of IT migration is intermediate, 26.7% say the cost is high, 13.3% of the participants say the cost is low, and 13.3% say the cost is medium. Finally, participants were asked if they a willing to recommend IT migration to any of their colleagues. The responses of the participants are shown in Figure 15.

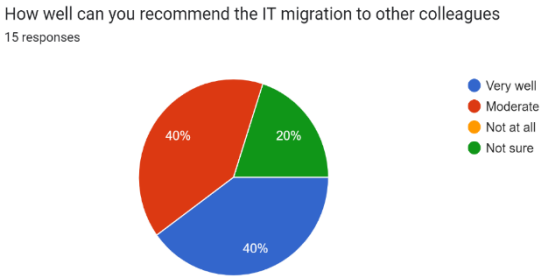

Figure 15. Recommendation of IT migration to colleagues.

40% of the participants say they will recommend it, 20% say they are not sure whether they will recommend it to their colleagues or not, and 40% say they will recommend IT migration to their colleagues.

3.3. Discussion and Recommendations

The implementation of IT infrastructure migration is a complex process that requires meticulous planning and strategic alignment with an organization's business objectives. A poorly executed migration can lead to operational disruptions and unintended consequences, negating the benefits that the migration aims to achieve. One of the primary challenges in IT migration lies in the decision-making process regarding infrastructure investment. Executives often prioritize cost reduction over strategic investment in IT transformation, which can create misalignment between business objectives and IT infrastructure improvements. In organizations that adopt a business-driven IT strategy, infrastructure migration must align with corporate goals to ensure efficiency, productivity, and stakeholder satisfaction. Business-IT alignment plays a pivotal role in bridging the gap between technological advancements and business needs, ensuring that IT transformation supports organizational growth while enhancing operational efficiency and customer satisfaction.

A successful IT infrastructure migration plan involves multiple layers, including Enterprise Strategy, Enterprise Planning, and Solution Delivery. These layers work in synergy to facilitate a seamless transition from outdated systems to modern IT environments. Developing a well-structured migration strategy is crucial, requiring a thorough analysis of corporate priorities and survival objectives. Organizations

must integrate their capacity for change and executive commitment into the migration process, ensuring that the transition is executed with minimal disruptions. The strategic roadmap must account for both technological and business considerations, balancing the need for modernization with cost-effectiveness and risk mitigation.

One of the most critical factors in IT migration is the involvement of experts and stakeholders throughout the process. Many organizations attempt to rely on their existing IT teams, who may lack the specialized expertise required for large-scale migrations. While internal teams play a vital role, incorporating external consultants with specialized migration knowledge can significantly enhance the efficiency and success of the migration. These professionals bring valuable insights, best practices, and hands-on experience that can help mitigate risks and ensure a smooth transition. However, engaging external consultants often involves complex Service Level Agreements (SLAs) and additional costs, requiring organizations to carefully balance internal and external expertise.

Resistance to change is another common challenge in IT migration. Employees often fear transitioning to new systems due to concerns about usability and the learning curve associated with unfamiliar technologies. Organizations sometimes focus excessively on preserving legacy infrastructure rather than envisioning the future-state IT ecosystem. This shortsighted approach can limit the benefits of IT migration and lead to inefficiencies in the long run. To address this issue, migration planning should emphasize the long-term advantages of IT transformation rather than merely replicating existing systems in a new environment. Effective stakeholder communication should highlight how IT infrastructure migration contributes to business growth, enhances operational efficiency, and fosters innovation.

Proper planning and execution are essential for a successful migration process. A comprehensive understanding of the strategic context and interdependencies within the IT ecosystem is necessary to prevent potential pitfalls. Without proper planning, organizations risk implementing an inflexible IT system that cannot adapt to changing business requirements. Lack of flexibility in IT infrastructure can hinder an organization's ability to respond quickly to market demands and technological advancements, negatively impacting its competitiveness. To overcome this, organizations must adopt an agile migration approach that prioritizes scalability, adaptability, and long-term sustainability.

The failure of IT infrastructure migration projects often arises from differences in how stakeholders perceive success. While top management typically evaluates success based on financial outcomes such as Return on Investment (ROI), Net Present Value (NPV), and Internal Rate of Return (IRR), end-users focus on

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usability and ease of transition. This disconnect between financial priorities and user experience can create friction, making it challenging to define migration success. Ensuring user involvement and participation throughout the migration process is crucial to addressing these concerns. If end-users struggle to adapt to the new system, the migration can be deemed unsuccessful, even if it meets technical and financial benchmarks.

Another significant challenge in IT migration is the integration of new infrastructure with existing organizational structures and cultures. Stakeholders' acceptance of IT changes depends on their level of preparedness and the degree of variation between the old and new systems. When the difference between the two infrastructures is minimal, employees are more likely to adapt easily. However, if the changes are substantial, organizations must invest more effort in change management strategies to ensure a smooth transition. Effective training programs, clear communication, and stakeholder engagement initiatives are essential for fostering a positive adoption environment.

The main challenges encountered in IT infrastructure transformation are often related to system complexity, integration issues, and documentation gaps. Organizations frequently struggle with high coupling among components of the existing system, making it difficult to isolate and upgrade specific elements without affecting the entire infrastructure. Additionally, identifying service boundaries, automating testing processes, and reducing dependency among services are significant concerns that need to be addressed. The lack of proper documentation and the presence of undocumented or uncommon code further complicate the migration process, making it difficult to troubleshoot issues and ensure continuity. These challenges emphasize the need for a well-documented migration framework that incorporates best practices, detailed implementation guidelines, and contingency plans.

A crucial aspect of IT infrastructure migration is cost-effectiveness. The financial investment required for migration varies depending on factors such as system complexity, migration scope, and level of expertise required. Organizations must carefully assess their budget constraints and expected return on investment before committing to migration initiatives. According to survey results, 46.7% of participants perceived IT migration costs as intermediate, while 26.7% found the costs to be high. Cost considerations should be weighed against the potential benefits of migration, including improved operational efficiency, security, scalability, and competitive advantage.

The feedback from participants highlights varying levels of expertise and knowledge regarding IT migration. While 40% of participants reported low knowledge levels, 40% had moderate knowledge, and only 20% had high expertise,

indicating the need for better awareness and training programs. A significant portion of stakeholders recognized the benefits of IT migration in enhancing decision-making and infrastructure understanding, with 66.7% agreeing that migration supports better strategic planning. Additionally, 80% of organizations opted for outsourcing migration services, suggesting a preference for leveraging external expertise over in-house migration efforts.

Despite the challenges, many participants expressed positive attitudes toward IT migration. When asked about their willingness to recommend migration to colleagues, 40% responded positively, 20% were uncertain, and another 40% expressed willingness to advocate IT migration. These findings emphasize the importance of ensuring a well-managed, transparent, and structured migration approach to maximize stakeholder confidence and adoption.

To address the challenges identified in IT infrastructure migration, organizations should adopt a proactive and structured approach that encompasses pre-migration assessment, expert collaboration, scalable solutions, and ongoing monitoring. A comprehensive pre-migration assessment that includes thorough audits, risk evaluations, and stakeholder analysis is essential to align objectives and mitigate potential issues. Developing a customized roadmap with clear priorities and timelines allows organizations to implement migration in phased stages, reducing risks and ensuring smooth transitions.

Collaboration with ICT consultants and global best practices can enhance migration efficiency while training internal staff to build long-term capacity. Scalable solutions, such as cloud-based and hybrid models, should be considered to ensure flexibility and future growth. Organizations must also prioritize data management and security, ensuring proper backups, compliance with regulatory frameworks such as POPIA, and robust cybersecurity measures.

Moreover, change management strategies play a crucial role in easing the transition for employees. Clear communication, comprehensive training, and continuous feedback collection help employees adapt to new systems and reduce resistance to change. Finally, ongoing monitoring and evaluation are essential to measure migration success. Organizations should establish Key Performance Indicators (KPIs), conduct post-migration reviews, and implement continuous improvements to optimize infrastructure performance. By adopting a strategic, well-planned, and adaptive approach, organizations can navigate IT infrastructure migration successfully while minimizing risks, enhancing operational efficiency, and driving business growth.

4. CONCLUSION

In today's digital age, IT migration has become essential for organizations, as their internal processes are deeply dependent on business IT, which, in turn, relies on a robust IT infrastructure. IT infrastructure migration is a strategic organizational decision that can profoundly influence performance, growth, and overall productivity. Organizations are motivated to undertake IT migration for various reasons, including the need to establish a modernized infrastructure or take advantage of advancements such as cloud-based data centers. A survey conducted with participants revealed that integrating IT migration into organizational processes yields positive outcomes, particularly in enhancing organizational satisfaction and improving decision-making. As shown in Figure 16, a significant portion of respondents (40%) indicated a willingness to recommend IT migration to others. Additionally, the feedback highlighted considerable interest among participants in accessing employment support and exploring available training opportunities related to IT migration.

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