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Technology Organization and Environment Adoption for Assessing Information Technology Hardware Support Services

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ABSTRACT

Information Technology hardware support services (ITHS) is one of the most important services for every organization that has an IT department or uses IT technical support services. IT hardware services are made available to users or departments. Users and other departments who have used the ITHS's IT services have rated the ITHS highly. The technology, organisation, and environment (TOE) model, one of the information system theories, was utilised to support the process from the ITHS elements, while the service quality dimension was used to measure the efficiency and effectiveness of the ITHS element itself. Nonetheless, the three domains of people, process, and technology are the ITHS environment aspects' difficulties. These three barrier elements (people, process, and technology) must fit in the TOE region, and the service quality dimension was utilised to quantify the element's contribution to the ITHS component (Operational Performance, Service Performance, and Efficient) developed from the IT framework. This study addresses the factors taken from the TOE elements to the ITHS components in order to examine the ITHS evaluation model. To the ITHS assessment model, these new proposed ITHS assessment models incorporate the TOE component, service quality dimension, and IT Frameworks components. More exact findings on the relationships between TOE, SERVQUAL, and ITHS are expected to indicate the quality of IT hardware services.

1.0 Introduction

IT support services are the most key priorities in any firm that utilizes an IT system or IT services including the hardware, software, and infrastructure components. [1] . Failure to offer IT services, particularly in IT hardware, may cause the organization's overall performance to degrade or even shut down the organization's operations that rely on IT services. [2]. This leads

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to a drop in quality and user dissatisfaction. The obstacle or the main issues fall into three categories: people, process, and technology. These three categories have also been discussed in [3]–[5]. Formerly, the Information Technology Hardware Support (ITHS), plays a crucial part in the support, longevity, and growth of most businesses by establishing associated business strategies and new policies. As a result of the rapid growth of services and a diversified range of organizations, IT services grew quickly and broadly. IT Service Managers, on the other hand, are faced with the task of reducing expenses while boosting revenue and offering rapid, cost-effective services to their clients. ITHS guarantees that the organization flows efficiently, especially when it comes to information technology (IT) problems related to hardware issues.

All IT hardware issues related to the IT incidents, and must be addressed within a certain time frame can affect service efficiency in both tangible and intangible ways. This has an influence on service quality for customers and the company, ITHS processes are organized to provide services within the service level agreement (SLA) criteria. Because it shows the organization's operational efficiency, this method is used to evaluate the IT service department, particularly the hardware support services.

2.0 Information System Theories Literature: Review And Theoretical Background

A category of description comes from the phenomenon and interaction of variables used to describe or forecast. In Greek theories means "contemplation." [6] A theory is a common rule based on a propositional or decision-making relationship. Information on theories is extensively utilized in IT research, and it provides a core policy-enhancing environment for IT organizations, expanding the ability to develop successful and competitive organizations, generating business value, and providing valuable products and services to customers. In the field of IT research, several new theories have been developed, some of them to help clarify and use technology.

2.1 The Technology Organization And Environment (TOE) In An Organization

From an information system (IS) perspective, several theories are involved with different kinds of research perspectives, environment, and suitability of the work process. The significant information systems theories include the following. Firstly, the structure models explain the influence over time of technological change on organizational design. From the Adaptive Theory of Structure (AST) itself, state to the Gidden Theory of Structure. The theory reflects the interface between organizations and information systems, DeSanctis and Poole have adapted Giddens's theory. AST disagrees with the technology-centered view and emphasizes social aspects as discussed in [7].

Secondly, the model of DeLone and Mclean is a comprehensive IS evaluation model, based on the review and integration of 180 studies. The success of six important information system categories was attributed to the introduction of a comprehensive taxonomy in this study. System quality, information quality, utilisation, user experience, and impact on individuals and organisations are some of the categories mentioned. [8][9].

Thirdly, the Diffusion of Innovation Theory (DIT), which has been modified and used in many different disciplines and technologies. Methodologically and empirically mature technique, it explains the rate innovation is communicated over time and in a particular social system through specific channels. Discussed in [10].

Fourth, the Knowledge-Based Theory draws on and expands on Penrose's resource-based firm theory, which has since been advanced by others. It goes through the many aspects of knowledge integration (efficiency, scope, and adaptability) as well as the four main mechanisms for knowledge management (rules and directives, sequencing, routines, and group problem solving and decision making)."Distribution is the process through which innovation is transmitted overtime via a channel in a social system." Innovation is an idea or an element that the individual perceives as new.

Fifth, Goodhue and Thompson stated that for an information system to have a good impact on individual performance, it must be used and effectively matched to the activity it supports. The Task-Tech Fit (TTF)[11] provides a robust theoretical basis for several problems relating to IT impact on individual performance, including recognition of users' impact on performance. The TTF is based on two different social psychology models: The Theory of Reasoned Action (TRA) states that a person's behaviors are determined by behavioral intentions, with some intentions focusing on the person's behavior and containing the person's performance. The task fit from the TTF is the extent to which technology helps a person to carry out his tasks. Task technology fit is used to provide a user with the instrument for evaluation aimed at organizational assessment of management decision-making exploitation of information systems.

Sixth is the model of Technological Acceptance (TAM) which is also an adjustment of reasoned action theory. TAM theorizes that user perceptions of utility and ease of use as the important drivers for acceptance or adoption of technology. The original TAM is now known as TAM2 [12]. Since then, Davis especially recommends the use of TAM in future research of additional external variables. TAM2 is a tool that is used to investigate the end-user acceptance of a variety of IT systems. In several fields, for example, decision science, management science, TAM2 was used to describe and forecast technology usage. Informatics and information systems management. TAM2 was also used to measure the acceptance of technology across several different areas of culture. As it explores and addresses the role of end-users when the new technology started.

Seventh, UTAUT seeks to clarify user plans for IS utilization and user behavior through the unified theory of acceptance and technology use. The four key components (performance expectation, effort expectation, social influence, and conditions facilitating) are mainly influenced by user behavior. UTAUT[13] provides managers with a useful tool for determining the likelihood of new technology startups succeeding, as well as assisting them in identifying those who accept them by offering actions for groups of users who are less likely to use and benefit from current systems.

Lastly, The Nolan Stage Theory[14], which outlined a set of principles for comprehending IT's absorption in business enterprises. It is based on the assumption that practically all of an organization's computer expenditures follow a consistent model of learning and experience curves and form an S-shaped curve over time. Since organizational learning is to a certain extent, the official transfer of recorded knowledge and, in part, the non-official accumulation of experiential knowledge, the theory suggests that each knowledge organization sequentially crosses four stages of learning: initiation, contagion, control, and integration. This research study will examine three different viewpoints, namely: people, process, and technology. People who work within the organization environment, starting from the manager that manages the department, the IT engineer and IT technician who solve the IT hardware issues daily, and lastly, the end-users or client that requests or logs the incident. The process involves the workflow process starting from the incident until the issues are resolved. The level of users was a factor in the procedure; IT parts availability and vendor requirement time. The technology is used to solve issues or incident requests from users. Toolkits, experience, and knowledge of how to apply technology to repair the IT component system are all important factors.

Theories from the Technology and Environment Organization (TOE) were selected and adopted into this research paper. The TOE framework introduced by [15], aims to identify genetic factors that explain and predict the probability of innovation and the adoption of technology. The TOE framework provides researchers with an understanding of the impact or effects of organizational changes or innovations within three key areas, namely technology, organization, and environment.

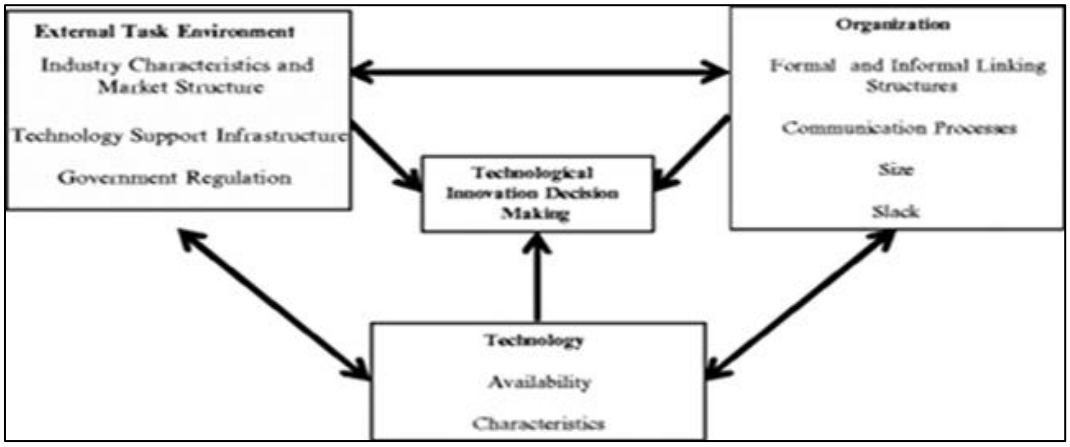

Figure 1: Technology Organization Environment Framework. Adopted From [16]

Figure 1 above, the TOE framework, adopted from [16], there are three areas in this model: the external task environment, the organization, as well as the technology.

The external task environment, for example, combines elements such as market structure, technical support infrastructure, and government rules for adopting new technology. These factors work together to impact technology adoption decisions. The technological support infrastructure is the only factor chosen for this study under the external task environment domain. IT infrastructure, technological readiness, user satisfaction, and internal workers make up technology support infrastructure on the ITHS.

The government regulation and industry characteristics are not selected for this research purpose as the research purpose is to investigate the service quality on the IT support services that bring service satisfaction to users and IT staff in delivering the IT support services in daily routine IT jobs especially on IT hardware.

The organization domain is the second domain. Communication, process, and size selection are the organization's elements. The devotion of top management, communication between users and IT personnel, and the scale of the firm are all factors in communication. Formal and informal linking structures are not selected for this research purpose. The research purpose looks at how the communication between users and staff to deliver the IT support services according to the users' request on the IT hardware services on service quality.

In the technology area, the research examines the technology's availability and characteristics. Availability involves the IT infrastructure (management), IT expertise (human), organizational IT (standard IT services include the internal (IT tools, IT infrastructure), and external (vendors' expertise). Table 1 below illustrates the relationship between the TOE, ITHS, and the evaluated criteria.

Table 1: The ITHS element (Information Technology Hardware System) uses TOE Theory to Support the Process. (Develop for this research purpose)

TOE (Technology, Organization, Environment	ITHS (IT Hardware Services)	Example of evaluative criteria.
Technology context: Availability - IT infrastructure Management - IT expertise: Human IT - Organizational IT: Standard IT services. - Internal: IT tools, IT infrastructure. - External: Vendor's expertise.	(PEOPLE) Efficiency	Materials and Personnel [17].
Organization: Communication Process and Size. - Top management commitment; - Hierarchical organizational structure. (IT Department)	(PROCESS) Operational Performance	Willingness to help customers and provide prompt service [18].
Environment: Technology Support Infrastructure. - IT infrastructure; Technology. readiness - User satisfaction - Internal employees	(TECHNOLOGY) Service Performance	Caring, individualized attention the firm provides its customers. Employee civility and knowledge, as well as the capacity to convey trust and confidence [19].

2.2 Elements to the Information Technology Hardware Service) (ITHS) dimension

The Generally, the ITHS dimension consists of three elements. Operation performance, service performance, and efficient. These three elements are taken from the IT Framework (ITIL, COBIT 5, and CMMI-SVC). It is among the main components that contribute to the ITHS dimensions by selecting relevant parts that are only connected to the incident management process as it relates to IT hardware.

ITIL consist of 26 processes, COBIT 5 consists of 37 processes, and CMMI-SVC includes 24 processes. They're all linked to the incident management procedure. The ITHS dimension only applies minor processes from three IT frameworks (ITIL, COBIT 5, and CMMI-SVC). The processes (incident management) are reflected in the IT hardware area selected. [20] discuss the overlapped process between the ITIL, COBIT 5, and CMMI-SVC process in incident management.

From the previous research, it's mentioned, some of these IT frameworks (ITIL, COBIT 5, and CMMI SVC) are not mutually exclusive and can be combined to provide a powerful IT framework [21] but most of them are overlap on each element. This becomes a serious issue because several frameworks are frequently applied in combinations and, in many cases, concurrently, implying that parallel elements require duplication of investments, expenditures, and human resources. (Lourinho et al., 2017). Before these, three IT frameworks choose the ITHS elements adoption concepts. From a state-of-the-art perspective, there is a range of IT frameworks. The objective or purpose of the IT Frameworks is described in Table 2.

Table 2: IT Frameworks and Purpose (Source: Developed for this research purpose)

IT Framework	Purpose/Objective
ITIL V3 (Information Technology Infrastructure Library)	- Improving support systems in the area of information technology (IT). - Technology utilization system for optimal management of technology and communication. - A quality management framework for the objectives: quality assurance, standard of management, performance, cost reduction, and knowledge flow effectiveness, SLAs, and business process control. [20], [24], [25]
COBIT 5 (Control Objectives for Information and Related Technologies)	- To track whether the information metric system is readily mature or accurate. - Provides management support for optimization of IT resources, including applications, information, infrastructure, and personnel. - Offers a systematic structure that helps businesses achieve their objectives to handle IT businesses. [26]–[28]
CMMI SVC	- Designed exclusively for IT services and products. - To boost service efficiency and customer satisfaction for customer service delivery. [25], [29], [30]
TOGAF (The Open Group Architecture Framework	- Provide methods and tools to promote the growth of architecture companies and to enable them to embrace, build, use and manage the architecture of companies. [31], [32]
COSO (Committee of Sponsoring Organizations of the Treadway Commission	- Help organizations plan and carry out internal control in the light of the many changes in their business and operating environments. [33]–[35]
PMBOK (Project Management Body of Knowledge)	- A subset of expertise is known as good practice in the project management community. - Helps project managers to work with a standardized system across companies. [35]–[37]
Six Sigma	- Manufacturing and other businesses can use this tool to improve their operational excellence.[38]. - To emphasize customer satisfaction, and ongoing improved culture, the search for root causes and full involvement of employees. [39]
VAL IT (Value IT investment)	- Ensuring organizations achieve the optimal value from IT-enabled enterprise investments with known and acceptable risk at a reasonable cost, and provide guidance, processes, and supporting practices to help the board and managers comprehend and carry out their role in this investment. [40]. - Provides methods to measure and optimize the realization of the business value of investments in IT, to achieve certain mechanisms. [41]
PDCA (Plan Do Check Act)	- The continuous search for improved methods. - PDCA: a concept of continuous processes of improvement that are integrated into the culture of the company. ISO 9001 manifestation. [42] A systematic set of procedures for learning and understanding in order to continuously improve a product or process.[43]

Most IT frameworks, as shown in table 2, are designed to support the IT department in running the organization's daily operations. Tools, systems, procedures, methods are used to observe or monitor various processes executed for service delivery especially to users and customers to improve the IT service department's performance and customer satisfaction. The IT Framework improves cost reduction and better IT service delivery. However, depending on the

organization's purpose, capabilities, and demand, not all IT frameworks are appropriate for use, e.g. PDCA, which is designed for controlling and continuous processes and products[44] and VAL IT, which is intended to serve as a set of guidelines for the organization's Board of Directors and executive members [41]. Some IT frameworks are only suitable for large companies and are not suitable for small organizations' businesses. Again, only three IT Frameworks were selected for this research intensification purpose. COBIT 5, ITIL, and CMMI SVC are the IT frameworks chosen because of the harmonization and adaption to the IT support environment portrayed in the IT support service, following the service quality element, of the selected component of each IT frame process. The IT hardware services (ITHS) do not reflect all the framework component processes.

Figure 2: TOE Theoretical Framework to the Information Technology Hardware Services (ITHS). Develop to this research purpose)

TOE Conceptual model to the ITHS

The proposed conceptual model is based on the previously described sections. It conceptualized how the TOE component elements would affect the ITHS operation elements towards the Quality of Service in general. (See Figure 2).

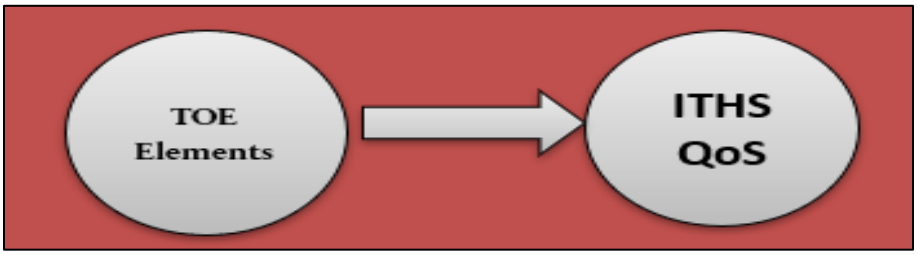

Figure 3: Conceptual model of TOE adopted to the ITHS (QoS).
(Develop for this research purpose)

From Figure 3 above, not all TOE components were selected. Only certain components reflect in the ITHS environment are selected. It was addressed and discussed in table 1 from the previous section of the paper, and it was to support the process from the ITHS element and deliver the outcome on service quality to the ITHS.

2.3 The Assessment Model to the ITHS

Figures 1, 2, and 3 from the previous section of the paper were used to create the ITHS assessment model. All these figures have been discussed based on concepts and components that can fit the ITHS environment. Figure 4 below is the ITHS assessment model. The assessment model is still being finalized. It is to give the proper picture to the ITHS model that brings to the IT hardware services support.

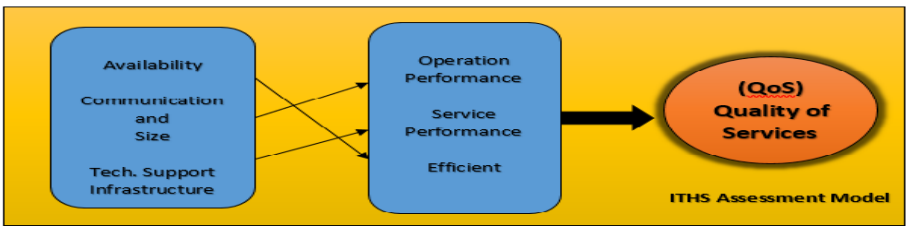

Figure 4: ITHS Assessment model (Develop for this research purpose)

Again, Figure 4 above, starting from the left side, is derived from the TOE model. Not all the components have been chosen. Availability from the technology context, communication, and size from the organization context, and lastly the technology support infrastructure from the environmental context. These components have been discussed in the previous section (Table 1). The TOE model provides all this component context. The ITHS elements are at the heart of the assessment model. Three elements form the IT frameworks from the state-of-the-art perspective. Operation performance (ITIL), Service Performance (COBIT 5), and lastly the efficient (CMMI-SVC). All these factors were mentioned in the paper's prior section. The output to the ITHS is the right to the assessment model. The assessment model's final output is quality of services (QoS). The QoS is the output to ITHS general services.

Conclusion

This paper discusses how the ITHS assessment model emerged from the component phase starting the IT Frameworks component selection. The TOE model from the IS perspective affected the organizations based on ITHS activity from the IT framework component. This, to ensure that ITHS are delivered efficiently and smoothly. The ITHS activity used in the IT environment system was established by considering all the discussed factors. Overall, this paper provides a comprehensive description of the ITHS situation, which includes not only the group but the overall development assessment model, which integrated, TOE model elements, IT framework component selections, and last the service quality dimension.

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