TECHTASK: A technical support system of Northwestern University

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Abstract

Technical Support System is created to help individuals having technical issues with electronic device like computers and everything attached to it. Every institution has its own technical support technicians that are assigned to troubleshoot problems in their electronic devices. In Northwestern University, a Technical Support System is important for the colleges and other offices of the school to submit reports about the problems of their electronic devices such as their computers, printers and scanners. This study aimed to develop a Technical Support System for the university. The respondents are the Staff of CICT office and selected clerk of offices in the University. The Research and Development methodology was used in this study. Significant facts were gathered through observations, interviews and questionnaires. The problems identified in the present system are A. It is a Manual System B. It is not capable of managing tasks of the technicians C. It cannot record the amount of time spent on doing task of the technician. D. There are no reports being generated and E. It is not efficient and secured necessitates further improvement for better quality of service. The researchers came up with a design for developing a Web-based Technical Support System for Northwestern University. The effectiveness of the proposed technical support system was evaluated by the staff of CICT and selected clerk of offices and was rated as Strongly Agree, which means that evaluators strongly agreed in the effectiveness of the proposed system, hence, can be adopted for implementation by the University.

Keywords: technical support system, web-based, software, research and development, technical issues

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1. Introduction

Advancement of technology affects the way we live. As our demands and lifestyle change, the demand for advancing the type of technology we use is high. Almost everything we use has been innovated to better standards. With these developments, companies, organizations, and institutions need to cope up with these improvements, thus, promoting the usage of computers in their daily activities. Technical Support System is created to help individuals having technical issues with electronic device like computers and everything attached to it. Every institution or company has its own technical support team or technicians that are assigned to troubleshoot problems in their electronic devices. In Northwestern University (NWU) a Technical Support System is important for the colleges and other offices of the school to submit reports about the problems of their electronic devices such as their computers, printers, and scanners. However, it was observed that the present manual system is not functioning well as it should be. Some complaints coming from employees using it need to be addressed.

2. Literature Review

The advances in computer technologies have affected everyone in the use of computerized support in various activities. Technical Support System can help individuals having technical issues with electronic device like computers and everything attached to it. There were a lot of studies already that can attest the help of a support system in different companies like retail company, educational institution and others. With the retail side of the market in China, the sale of electricity companies as a new source of power retail, they participate in the electricity market business. National and local governments subsequently introduced the corresponding policies and rules, the technical support system becomes one of the necessary conditions for the access of the retail company. Retail electricity companies have started the system construction, but has not yet formed a standardized, complete architecture.

This paper analyzed the business and data interaction requirements of retail electricity companies, and then designs the functional architecture based on basic application, advanced application and value-added application, and the technical architecture based on "cloud". On this basis, the paper discussed the selection of private cloud, public cloud and mixed cloud model, and the rationalization suggestion of system construction which can provide reference for the construction of the technical support system of the domestic retail enterprise (Shao et al., 2017). The goal of this paper was to give a description of the state of the art, the issues, the problems, and the solutions related to industrial dialog systems for the automation of technical support. After a general description of the evolution of the spoken dialog industry, and the challenges in the development of technical support applications, two specific problems were discussed through a series of experimental results. The first problem is the identification of the call reason, or symptom, from loosely constrained user utterances. The second is the use of data for the experimental optimization of the Voice User Interface(Acomb et al., 2007).

Web-based support systems (WSS) concern multidisciplinary investigations which combine computer technologies and domain specific studies. Domain specific studies focus on the investigation of activities in a particular domain. Computer technologies are used to build systems that support these activities. Fundamental issues of WSS are examined, a framework of WSS is presented, and research on WSS is discussed. It is expected that WSS will be accepted as a new research area(Yao & Yao, n.d.). The quality of a Web-based customer support system involves the information it supplies, the service it provides, and characteristics of the system itself; its effectiveness is reflected by the satisfaction of its users. This paper presents the results of a study of quality and effectiveness in Web-based customer support systems. Data from a survey of 726 Internet users were used to test theoretically expected relationships. The results of this study indicate that information and system

quality determine effectiveness while service quality has no impact. Practical implications for managers and designers are offered (Negash et al., 2003).

This research aimed to migrate from the current tedious manual technical reporting mechanism to an online, easy and fast web-based technical support system. Troubleshooting system is incorporated in each organization to provide a quick technical support for the end-users. It provides end-users with on time support in different forms and thus enable them to maintain high quality service. This paper proposes an innovative troubleshooting system which has been developed based on real users' requirements that have gathered during requirement generation phase. It replaces the current challenges of a paper-based system which causes delay, inefficient human resources utilization and end users' frustration. It automates the process of request submission from end-users to IT center. Therefore, it will be a central point that through a various range of IT technical problems could be reported and managed. By implementing this system, the users will experience modern and computerized environment that will effectively and efficiently carry out user' support services from IT center to all IT branches in distant universities (Jaweed & Paracha, 2015).

2.1 Research Framework

Organizational Information Processing theory identifies three important concepts: information processing needs, information processing capability, and the fit between the two to obtain optimal performance. Organizations need quality information to cope with environmental uncertainty and improve their decision making. Environmental uncertainty stems from the complexity of the environment and dynamism, or the frequency of changes to various environmental variables. Typically, organizations have two strategies to cope with uncertainty and increased information needs: (1) develop buffers to reduce the effect of uncertainty, and (2) implement structural mechanisms and information processing capability to enhance the information flow and thereby reduce uncertainty. A classic example of the first strategy is building inventory buffers to reduce the effect of uncertainty in demand or supply; another example is adding extra safety buffers in product design due to uncertainty in product working conditions. An example of the second strategy is the redesign of business processes in organizations and implementation of integrated Information System that improves information flow and reduces uncertainty within organizational subunits. A similar strategy is creating better information flow between organizations to address the uncertainties in the supply chain (Premkumar et al., 2014).
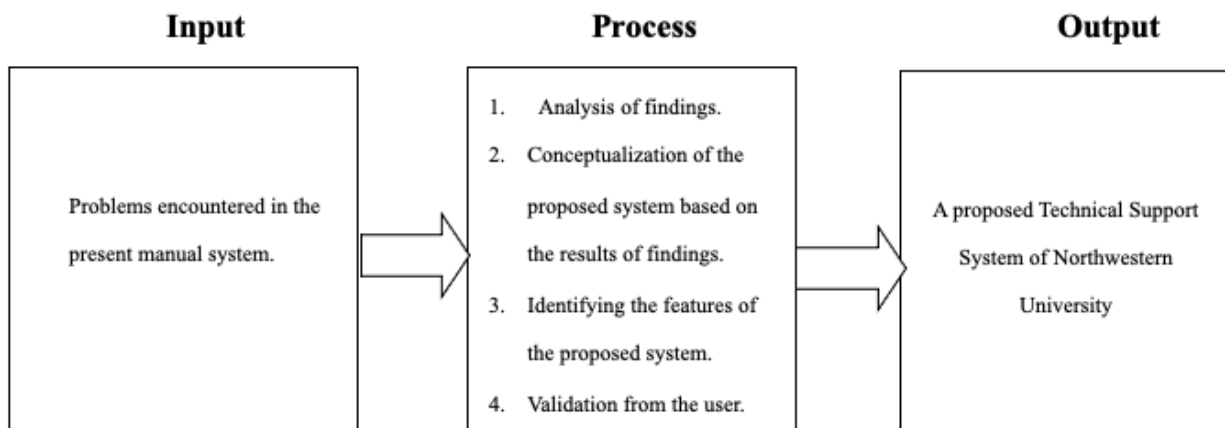
Input   **Process**   **Output**

Problems encountered in the present manual system.

1. Analysis of findings.
2. Conceptualization of the proposed system based on the results of findings.
3. Identifying the features of the proposed system.
4. Validation from the user.

A proposed Technical Support System of Northwestern University

Figure 1. IPO Model

The conceptual framework that was used in this research is input-process-output model as shown in Figure. The researcher gathered data from the respondents to identify the problems of the present technical support system. Terms and conditions are needed for the implementation of the proposed technical support system. All the respondents responded and agreed for an improved technical support system. The researcher processed the information from observations, interviews, and survey questionnaires. To identify the problems of the present system, considering a web-based technical support system will be developed which will be the output of this

study.

3. Methodology

Research Design - The researcher used the Research and Development (R&D) type of research. Mahdjoubi (2009) said that R&D is a method of investigation, a new scientific knowledge, which assumes that science has a monopoly over knowledge, technology is an outcome of science, and economic development is due to technology development. The R&D model confines innovation to technology and then technology to R&D (Mahdjoubi, 2009). Software Development Life Cycle (SDLC) is a framework that defines the steps involved in the development of software at each phase. It covers the detailed plan for building, deploying and maintaining the software (What Is SDLC (Software Development Life Cycle) Phases & Process, n.d.). The System Development Life Cycle as shown in figure 2 served as the basis of the researcher in the development of the system.
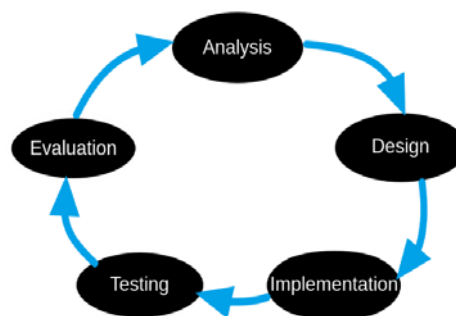

Figure 2. System Development Life Cycle

- ➢ Phase 1: Analysis. It involves the process of understanding why a technical support system should be built and determine the way of building it. During this phase, the researcher analyzed the present system.

- ➢ Phase 2: Design. This phase involves how the system will work. During this phase, the researcher developed the basic architectural design of the system as well as the interface design that user's move through the system, the forms, and reports.

- ➢ Phase 3: Implementation. This phase involves the deployment of the Technical Support System. The respondents used the system. During this phase, users were asked for suggestions and recommendations for the improvement of the system.

- ➢ Phase 4: Testing Phase. This phase is to test and detect bugs, defects, errors & adherence to standard validation on the system. During this phase, the whole system was tested one by one.

- ➢ Phase 5: Evaluation Phase. During this phase, the assessment of the quality of the system took place.

Participants - The respondents of the study regarding on the problems encountered of the present system were 10 users like the director of CICT, technicians, laboratory assistants and selected clerk of offices. On the effectiveness of the proposed system, 26 participants evaluated the system such as the staff of CICT and selected clerks of offices in the University.

Research Instrument - The researcher conducted personal interview to the Director of the CICT and to the head of Technical Staff regarding the present Technical Support System of Northwestern University and their concept related to the study. The researcher also used questionnaires to gather additional information. This determined the problems encountered in the present system and assessed the effectiveness of the proposed system.

Data Analysis - To quantify the problems encountered and the effectiveness of the proposed Technical Support System of Northwestern University, the following mean ranges and descriptive interpretations were

followed.

4. Results

Table 1

Problems Encountered in the Present Technical Support System

Criteria	Weighted Mean	Descriptive Interpretation
There is an existing Technical Support System	2.40	Disagree
It is capable of managing the tasks of the technicians	2.30	Disagree
It prints records for documentation	2.20	Disagree
The system is secured.	2.40	Disagree
The system is efficient.	2.40	Disagree
It records the amount of time spent on doing task of the technician	2.10	Disagree
Technicians record every task which has been accomplished.	2.80	Agree
Some offices ask for a specific technician	3.00	Agree
The technicians spend a lot of time outside their office.	2.50	Disagree
Technicians are assigned in specific offices or buildings.	3.20	Agree
Most of the technicians are equipped with smartphone devices	3.10	Agree
Most of the technicians are equipped with desktop computers	3.30	Agree

Table 1 shows the problems encountered by the Present Technical Support System. The problem is that there is no Computerized Technical Support System hence, it is done manually. Wherein, it is not capable of managing tasks of the technicians, it cannot record the amount of time spent on doing task of the technician and it cannot print records for documentation which is not efficient and secured. These problems further motivated the researchers to develop a system that would cater to their needs and address the indicated issues. When the respondents were asked if they want to utilize a web-based technical support system, all of the respondents "strongly agreed". This information was helpful in conceptualizing and designing how the Web-based Technical Support System should work.

Table 2

Level of Effectiveness Survey Result

Criteria	Weighted Mean	Descriptive Interpretation
Functionality		
The system is always accessible	3.85	Strongly Agree
It has protection/access privilege (username, password) exist for data (input/output data) for the whole system.	3.69	Strongly Agree
The system is protected against unauthorized code editing.	3.58	Strongly Agree
The system is accurate	3.65	Strongly Agree
Reliability		
The system has the capability to error recovery.	3.54	Strongly Agree
The system is reliable to use	3.65	Strongly Agree
Usability		
All buttons of the system are working properly	3.50	Agree
The user comprehends on how to use the system easily	3.65	Strongly Agree
The user uses the system without a lot of effort	3.73	Strongly Agree
Efficiency		
The system has a fast response time	3.58	Strongly Agree
The system consumes fewer resources	3.58	Strongly Agree
Maintainability		
The system is not sensitive to changes	3.54	Strongly Agree
The system requires less effort in verifying changes	3.62	Strongly Agree
Portability		
The software can run with any computer hardware.	3.65	Strongly Agree
The software can run into different Operating system.	3.65	Strongly Agree
The software requires no installation.	3.58	Strongly Agree
General Weighted Average	**3.62**	Strongly Agree

Table 2 presents the level of effectiveness based on the survey result. Respondents strongly agreed on the item "the system is reliable to use." (3.73) because every data that are being entered are stored in the database which information is secured. They rated agree on the item "All the buttons of the system are working properly" (3.50) because a certain user will not be able to use the other buttons depending on their roles and permission. They also rated strongly agree on the item "The user uses the system without a lot of effort." (3.73) the system is user friendly which means that it is simple, easy to use and easy to understand. Respondents rated strongly agree on all the items "The system has a fast response time" (3.58) and it consumes fewer resources. (3.58) the system is web-based so it uses less memory, disks, etc., so there is no need to upgrade computers at Northwestern University.

The respondents rated strongly agree on the items "The system is not sensitive to changes (3.54) and it requires less effort in verifying changes. (3.62) The respondents rated strongly agree on the item "The software requires no installation". (3.63) the system is web-based, and desktop computers and mobiles devices have its own built-in browser so there is no need for installation of any application. Overall findings show that the effectiveness of the proposed technical support system is rated as strongly agree as indicated by the general weighted average of 3.62. With this validation result, it is very clear that the proposed technical support system helps to improve the quality of service and increase employee productivity at Northwestern University.

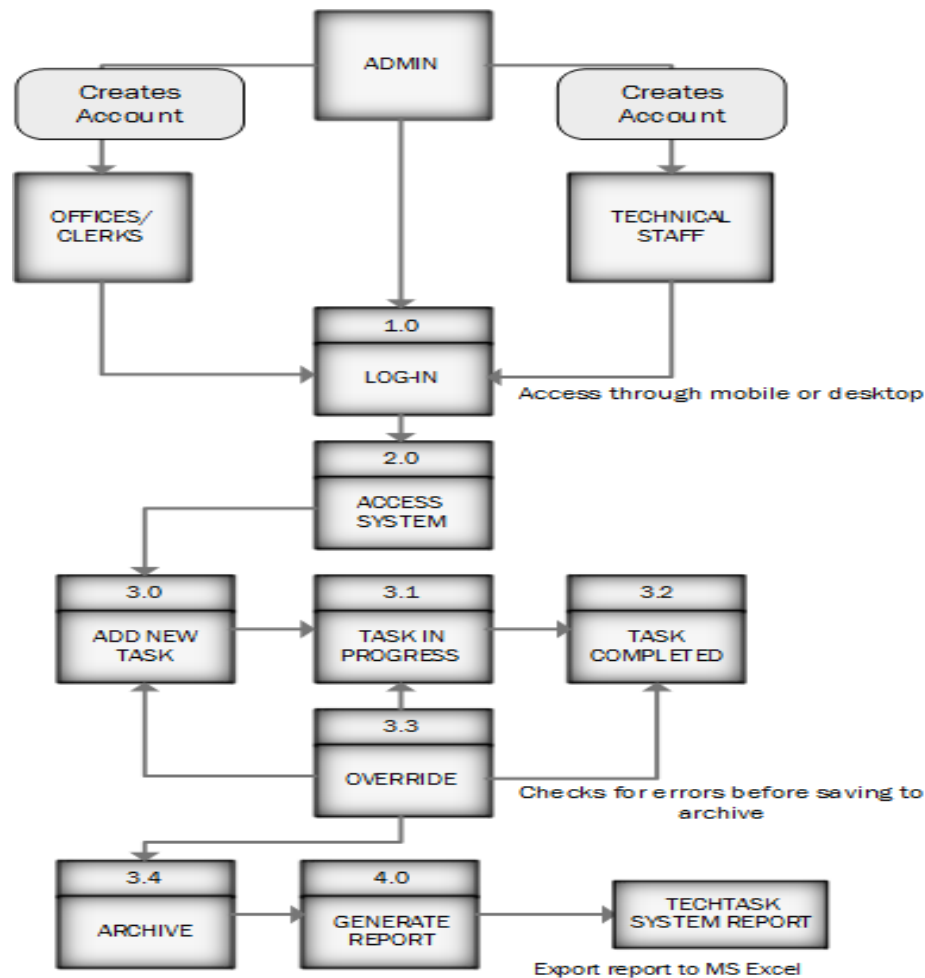**The Proposed Technical Support System for Northwestern University**

Figure 3. Proposed Data Flow Diagram

Based on the identified problems of the existing system, the researchers came up with a design for development of an efficient Technical Support System for NWU as shown in figure 3.

In the proposed system, users are given a unique username and password to gain access in the system. Each user has a specific role in using the system: Clerks can add and view task while technicians can add, edit and view tasks. Users can access the system using desktop computers or on their mobile devices. Tasks data are automatically stored in the database thus information is secured. Also, the system can generate report when needed especially during accreditation.

General Features and the System Function - The staff of CICT and clerks are provided with their unique username and password. Each user has access levels that can only go into certain features of the system; the system has also Admin/Administrator that can gain access all the features of the system like adding additional users and other administrative task. Users must login in order to gain access into the system. Technical Support System was developed to respond to the needs of the institution to monitor the tasks of technicians, and to generate reports.

> Accessibility. Technical Support System provides specific roles to users to access the system on managing and updating tasks.

> Account Form. The proposed system allows only the administrator to add additional accounts. Every account is set with a unique username and password in order to gain access into the system.

> Screens and Tabs. It is basically the user interface of the proposed system. It is also mobile responsive.

> Report Management. The system is able to generate relevant report to Microsoft excel.

> Security. Users whether administrator, technicians and clerks are provided with individual unique username and password to gain access with the system.

> User Friendly. The proposed system is easy to use for it can easily follow the steps to accomplish the desired task at a reasonable amount of time.

> Web-based. The system can be accessed with the use of the local-area-network with a standard web browser.

5. Conclusions

Generally, the study was conducted to improve the present technical support system for Northwestern University. Specifically, it determined the problems encountered in the present system. It also determined what system should be developed to address the problems in the present system. Lastly, it evaluates the effectiveness of the proposed system in terms of ISO software quality model namely: Functionality, Reliability, Usability, Efficiency, Maintainability and Portability. ISO 9126 is an international standard for the evaluation of software (*ISO 9126 Software Quality Characteristics | by Leanard Buenaflor | Medium*, n.d.).

Based on the flow of the present technical support system, which was derived from the survey, researchers found out the following problems of the existing system. A. Manual System (2.40) B. It is not capable of managing tasks of the technicians (2.30) C. It cannot record the amount of time spent on doing task of the technician. (2.10) D. no reports being generated (2.20) and E. It is not efficient and secured (2.40).

Based on the identified problems of the present system, the researchers came up with a design for the development of an effective Technical Support System for NWU which provide efficient reporting and monitoring of tasks. The following was the features of the proposed system: Accessibility, Account Form, Screens and Tabs, Report Management, Security, User Friendly, and Web-based.

The staff of CICT and clerks rated strongly agreed in the effectiveness of the proposed system in terms of Functionality, Reliability, Usability, Efficiency, Maintainability and Portability which means that the proposed system should be implemented and make the most of it at its fullest by the University.

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