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Customer Experience Management (CEM) Supports the Quality of Hospital Services Based on RFID

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***Abstract*—Hospital services as a health service provider is a major factor in the selection of referral hospitals for patients. While this reference about the assessment of hospital services for prospective patients can only be known from patients who have been treated at the hospital. Assessment of patient experience only refers to personal opinions and only one factor such as medical personnel services or room cleanliness factors. Each patient has different arguments about the service of a hospital. This research will describe the creation of a framework to determine the level of service in RFID-based hospitals. Information technology Information is used to capture evaluations from patients through a smartphone application connected using a bluetooth on a computer provided at each administrative desk. The information generated in the form of an evaluation of services at the hospital for patients treated in order to make decisions to improve the quality of administrative and medical services. Furthermore, the information generated will be made according to the report of health service bureaus addressed to the hospital management and the government through the health department. With this service, it is expected that there will be an improvement in the quality of administrative services and health workers in handling patients and can be an information and reference for prospective patients in choosing a hospital as a reference for health services**

Keywords—Customer Experience Management, CEM, Hospital Service, RFID

I. INTRODUCTION

Health services in hospitals are an important factor in achieving its business goals, namely advancing the community in the health sector. The services include health education, patient services and administrative services. The service of a sick patient begins with reading the patient's medical record that aims to find out the patient's identity, history of the disease, treatment and actions [1]. Administration of patient data is very important to support further action. Meanwhile, in order for the patient to enjoy further actions, good service is needed. The good service is in the form of hospital cleanliness, excellent medical services and adequate facilities. The process to improve quality can use the Customer experience management combined with technology, namely RFID. The level of satisfaction of administrative services, handling doctors, hospital conditions and medical facilities is a barometer so that hospitals can survive with satisfactory quality or improve their quality for the better. The determinants of business success that involve patient satisfaction are called customer experience management. This study will discuss how the level of patient satisfaction with the services of patients who receive medical services and the availability of hospital facilities. It starts with registration, medical treatment, availability of facilities, speed of service in every part of the hospital and availability of medicines. Current technology is able to carry out data collection and processing off line and is able to store data in smartphone devices and can be sent on a server for medical purposes. This technology is the Near Field Communication (NFC) tag reader and raspberry pi. NFC tag reader can take data and be processed off-line, then the data can be sent to the server for wider use. In addition, administrative and service data can be used as references and outputs to improve service quality in the form of hospital employee performance reports and the availability of available facilities for hospital managers. Electronic medical record research, among others, carried out by [2], [3], and [4]. In [2] the benefits of RME have been investigated to facilitate administrative personnel in retrieving patient information, while in [3] and [4] it has been stated that RME is beneficial for patients because it increases efficiency in the health care process. Development of smart card-based medical records (NFC) was developed by [5], [6], and [7]. All three studies used RFID cards to store medical record data. Data in the form of output about this service will be analyzed based on the satisfaction level using an algorithm. Furthermore, the data can show the value of the level of satisfaction in each part of the service and become data for hospital management to take action.

II. THEORY THING AND PREVIOUS RESEARCH

Important data that can be taken relating to medical services at the hospital, namely: Patient Record and Management. Patient record is information recorded in electronic or written form about a patient's health and illness. Patient records are generally individual. The second part is related to Management. Management is the process of processing data relating to medical services, medical facilities and labor. Meanwhile, in the medical service at each table there is a computer that can access the quality of service so that it can be useful information for carrying out management, financial and patient health development responsibilities.

This study refers to patient safety research using RFID technology by developing a location-based treatment system (LBMS) for local hospitals in Taiwan Pei-Chung Liao et al [6] The health care system can be improved by taking patient feedback. Output quality can be an evaluation to improve the quality of ongoing services provided by patients. The three management functions for the LBMS are positioning, tracking, and coverage. The use of the combined technology of RFID with the RFID locating system to efficiently retrieve electronic medical records and patient locations in the M. Magliulo radiotherapy department [7]. Customer Experience Management is a strategic process for managing overall customer experience with products or companies. Schmitt (2003)

A. Near Field Communication Tag Reader

Smart phone technology (smartphone) continues to develop with the addition of various features that make this communication tool a multi-use. Near Field Communication (NFC) tag is one of the features contained in it. NFC reader allows smart phones to communicate with other mobile devices without going through cellular networks at a distance of about 4 cm. In addition through NFC, smart phones can also read data stored on smart cards (NFC tags).

B. Raspberry Pi

In this implementation we used Raspberry Pi 3 which is a microcomputer sized like an ATM card developed by the Raspberry Pi Foundation, UK [8] to teach the basics of computer science and programming to school students around the world [9]. Raspberry Pi is a microcontroller that has a physical like Arduino but more like a computer. Raspberry Pi consists of many important hardware parts with several important functions. The main part of the Raspberry Pi is the processor.

III. PROPOSE IDEA

Architecture displays the basic framework of the software system that is built. The architecture of developing a web-based patient experience information system and Android-based Near Field Communication (NFC) is designed for hospitals that want to improve and improve service quality. This system will be developed in clinics or hospitals as a decision-making model based on service input and evaluation and service complaints such as speed of service, availability of facilities and comfort in medical rooms and waiting rooms. NFC will be installed on the administrative desk at the entrance of the hospital and the entrance of the medical room, which can be easily accessed by patients or medical staff. NFC mobile phones will provide a link that can be used by patients to provide whatever information they want related to hospital services. NFC cell phone can be connected to the system using Wireless Access Point (WAP) then the information will be forwarded to the hospital management. Network configuration can be seen in Figure 1.

C. Sistems Architecture

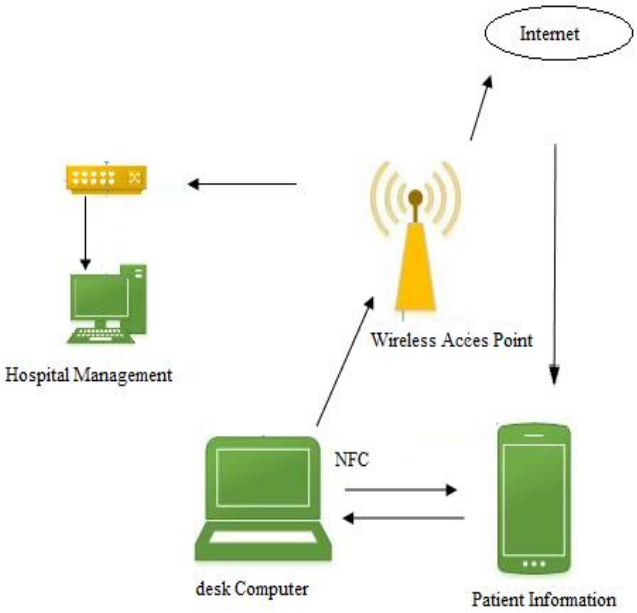

Fig. 1. System Architecture

D. Use Case Diagram

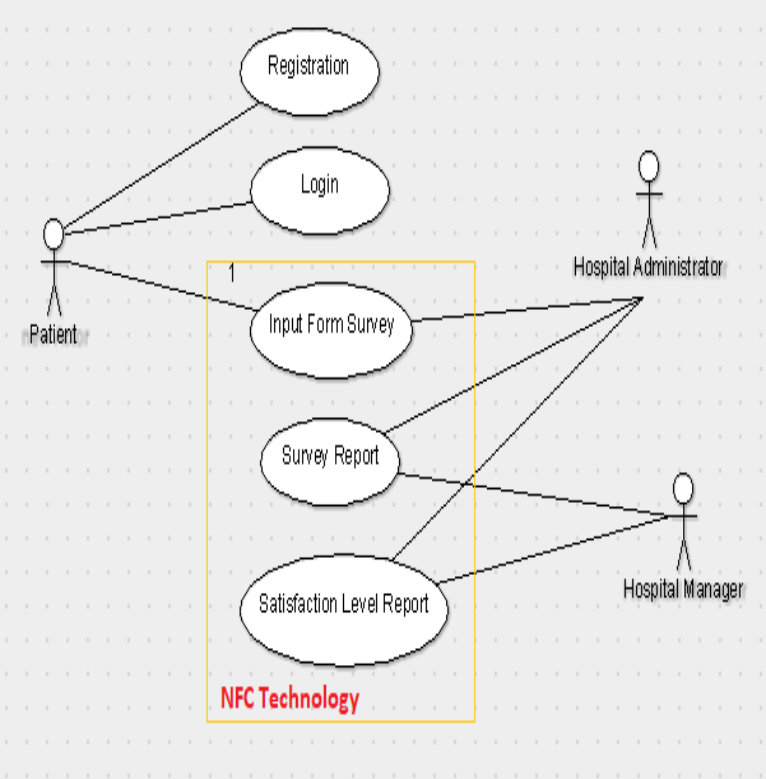

Fig.2. Use Case Diagram

E. Design Web Display

The display design for admin logins is centered on the server. Next, the admin fills in his identity and opens access to be used by all patients filling out an evaluation using a smartphone.

1. Admin Login

Fig. 3. Web Display for admin

2. Design Patient Survey Report

Web Survey is a visitor survey about personnel, available facilities such as room cleanliness, toilets and public facilities. Meanwhile, technology in the form of communication network media is provided.

Fig. 4. Patient Survey Report

F. Design Form Survey

The survey form contains detailed survey of hospital visitors recorded from the results of input via the visitor's smartphone connected using NFC. Visitors can choose by inputting: **STS** (Strongly Disagree) point = 1; **TS**(Disagree) point = 2; **N** (Netral) point = 3; **S** (Agree) point = 4; **SS** (Strongly Agree) = 5.

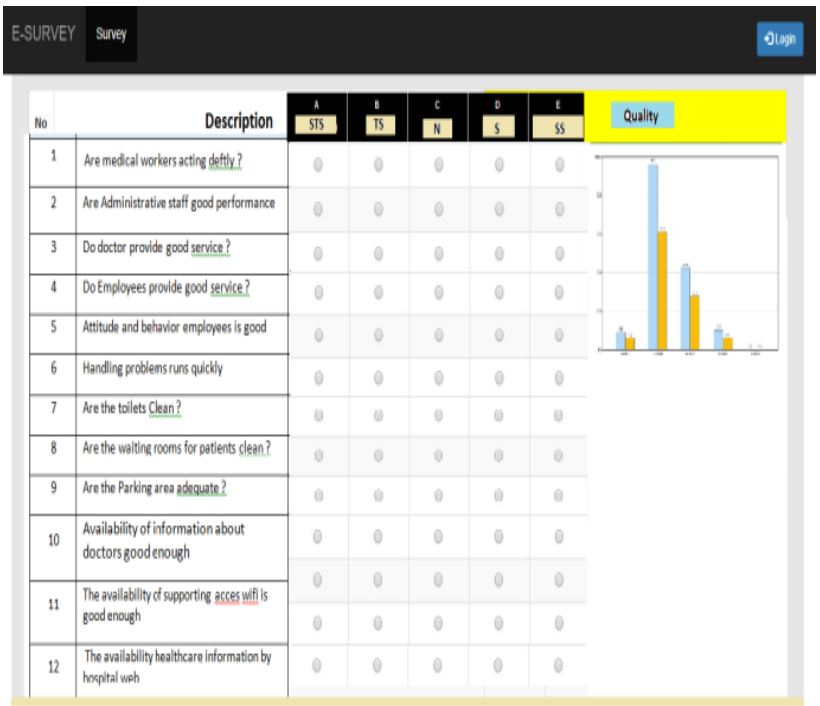

Fig. 5. Form Survey

Every month, the results of the visitor assessment recap will be calculated using the formula:

Score = Respondent value x weight value

SK = Highest score for every question x Number of questions x respondent quantity

results.

the results of the calculation will produce a score of each item being assessed as shown in the table. 1 level of satisfaction

G. Results of satisfaction level

TABLE I. RESULTS OF SATISFACTION LEVEL

Component	Score	SK	Percentage(%)	Remark
People				
Facilities				
Technology				

Score Range on Percentage

0 % - 20% = Very Dissatisfied
21% - 40% = Dissatisfied
41% - 60% = Netral
61% - 80% = Satisfied
81% - 100% = Very Satisfied

The percentage range score is the level of customer satisfaction based on an accumulated assessment in the form of a percentage. the results of this customer satisfaction percentage will be analyzed by the hospital management to make improvements according to the lowest level in hospital service satisfaction.

H. Design Admin Login

Fig. 6. Admin Login

I. Design User Interface : add Patient and Patient Survey as visitors

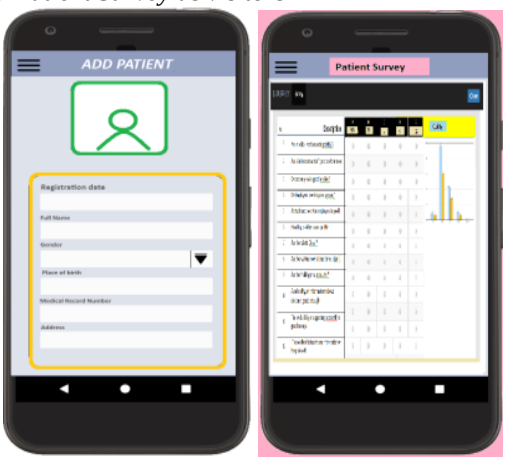

Fig. 7. User Interface add Patient and Patient Survey

The patient satisfaction survey begins with registration on the web at the bureaucratic desk. Furthermore, the smartphone can access the input form and provide surveys through computers on each service desk. Next three menus will appear, namely: People, Facilities and available technology. Patients choose their respective buttons namely STS for strongly Disagree with a value of 1. if the patient chooses the STS button then the object evaluated will be nuanced 1. Meanwhile, TS means Disagree is an attitude with a value of 2, N is a neutral value with a value of 3. S and Each SS has a value of 4 and 5. Completion of the survey can be done while the patient is waiting for treatment and can be done anywhere in the hospital area

IV. CONCLUSION

RFID-based information technology can contribute in the form of speed, accuracy and convenience for hospital management to obtain information. The information obtained is in the form of an assessment of patients about administrative staff services, medical facilities and information technology services. Evaluation input can be done when the patient is waiting for medical services or after receiving services. Information received by hospital management can then be made a report for evaluation to improve the quality of service. Improving the quality of services is needed so that hospitals can provide maximum service in addition to being a reference for patients who need health services. Ease of accessing and providing information using an Android-based smartphone equipped with NFC can be input for management for further technological development.

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