

# System design of blood supply chain management based on Supplier Customer Relationship Management (SCRM) approach

Zuhdi Allamsyah and Agus Mansur\*

Industrial Engineering, Islamic University of Indonesia, Yogyakarta, Indonesia

**Abstract.** Blood supply chain management is very complex system. By considering blood's demand that characterized as stochastic, therefore information and communication among stakeholders are considered as important cycle in supply chain. This research is objected to design interactive communication model based on information technology with android as platform to create effective customer-supplier relationship to support Customer Relationship Management or better known as CRM. The methods that suggested in designing its information system are Quality Function Deployment (QFD) approach, Kano Model and Morphological Chart. From mentioned methods, attributes of design and specification priorities of purposed android system technology design are established. Attributes of design will be adjusted with customers' requirements derived from customer voice that will further be integrated with technical responds in QFD. Technical responds will provide priorities on each design's attribute of android information system and will be forwarded to the specifications determination by using morphological chart. Later, work flow of design system will be generated by using Data Flow Diagram (DFD). The result of the research will demonstrate the design of information system technology based on android that already adjusted with the requirement of donors as means of communication between suppliers and customers in blood supply chain.

## 1 Introduction

Blood is a vulnerable commodity yet a vital transport system component to every person. The number of minimum requirement of blood in Indonesia was counted around 5,1 million blood packs per year or equal to 2% of total Indonesian residences. Until recently, it only covers 4,1 million blood packs sourced from 2,7 million donations, in which 87,74% of them are derived from voluntary blood donation [1]. The fact there was the imbalance supply and demand in DIY province [2]. Generally, worldwide, there are hospitals that suffer from insufficiency of blood stock, hence they require proper management [3]. The source of blood unavailability is the stochastic products' demand. While, only 5% of population that consider as proper as blood's donors [4]. The scarcity of blood also emerged by the stochastic number of donors and/or the blood's stocks that are stored in the blood bank [5].

As the efforts in improving good service to customers, PMI DIY provides SMS gateway service to deliver information about blood's stock, reminder to conduct the donation and various events of blood donation. This service is expected to maximize the information distribution from PMI to customers. Nevertheless, this SMS gateway service still covers several shortages, for instance, it only could deliver information based on text that apparently will be one of the causes of information retardation. The availability of information system has effect on its user's performance in accessing the

information [6]. Appropriate information system can possibly facilitate two-way communication for better information sharing. Information sharing and information quality on the implementation of supply chain management could result on customers' satisfaction [7]. Customers' satisfaction is considered as immense capital for loyalty [8]. Accessible and accurate information could maximize the CRM [9].

Based on described background, the researchers proposed information system design based on location-based service to improve services and to fulfill the requirements of stakeholders in blood management. The result of CRM system design is expected to enhance services as well as provide satisfaction to all donors in PMI.

## 2 Research Methods

Established system design is based on concepts of CRM as the integration of coordinated selling, marketing and service strategy [10]. Initial step is to find out customers' requirements toward established system. QFD and Kano model are employed as tools. QFD is defined as analysis tool to convince that development of products' features, characteristics and specification that covers manufacturing and required processes, has met the customers' necessities [11].

While, Kano model is described as theoretical model that connects requirements that supposed to be filled by a

\* Corresponding author: [agusmansur@uii.ac.id](mailto:agusmansur@uii.ac.id)

product or service with customer’s satisfaction by identifying three types of necessities that could influence it, which are: must be requirement, one dimensional requirement and attractive requirement [12]. Second step is to determine technical requirement derived from voice of customers by using morphological chart. The final step is designing system data flow by applying Data Flow Diagram (DFD). DFD is considered as a method that describes data process flow from a system to its end [13].

### 3 Result

#### 3.1 Technical Requirements of the System

Obtained Voice of customer will be graded by using Kano Model that implements Blauth’s formula, later, several attributes that have influences toward customers’ satisfaction will be selected. Attributes that are categorized as indifference will no longer be processed, as they have low influence on customers’ dissatisfaction [14]. The result of Kano model will be the input for Quality Function Deployment (QFD) processing to translate costumers’ requirements to company’s technical requirements that also described by morphological chart stages to determine system’s specification in detail. Hence, the aspects of system requirements are illustrated as follows:

**Table 1.** Morphological chart

No	Function	Means
1	Providing appropriate application’s content	Appropriate information for donors’ requirements (information about blood’s stock, events, history of blood’s donor, personal identification, etc)
2	Presenting information on blood’s availability	Entire information about blood (type of blood, rhesus, blood’s component)
3	Displaying information status for donor activity	Available
4	Displaying notification about information	Only notification related to information of donor’s events, routine reminders, birthday greeting and friends’ request
5	Integrated with blood’s supplier institutions	Local BDRS and UTD
6	Displaying accurate information	All features
7	Requesting location checking while application is being operated	Available

No	Function	Means
8	Recommending the nearest location with blood’s supplier institutions	Available
9	Recommended radius of distance with blood’s supplier institutions	≤ 10 km from user’s location
10	Providing information of contact person and the nearest location of other Donors (other users)	Available
11	Radius of recommended distance with the Donors	≤ 10 km from user’s location
12	Providing information and recommendation on an event and its nearest location	Available
13	Recommended radius of the nearest blood donation event	≤ 25 km from user’s location
14	Accomplishing user’s account to improve privacy, data security and accessibility while operating information system of blood’s donor	Available, but optional so the users could access the application without user’s account
15	Displaying profile picture on its information system’s user account	Available
16	Providing the features for utilization information	Help Menu

#### 3.2 System Data Flow

##### 3.2.1 System Context Diagram

In this diagram, scope of stakeholders’ relationship in system is determined, which are: customers that consist of the donors and patients, Blood Transfusion Unit (UTD) PMI and hospitals, either Blood’s bank hospital (BDRS) or not.

##### 3.2.2 Data Flow Diagram Level 1

Blood donor’s information system, consists of 9 main processes, which are: login, location service, management of customers, management on history of the donors, management of blood’s stock, management of events, notifications, the donors’ access, help. This information system also equipped with donors’ schedule reminder system to ease the donors in performing the activity of blood donation. It also equipped with location based service to identify distance’s estimation to institutions of blood suppliers, blood’s donation events and the nearest location of the donor from user’s location.



## 4 Conclusion

Based on the results of the test which has been performed, it can be concluded as follows:

Producing shared information system that appropriates with donors' requirements and existing means, by displaying information that adjusted with donor's requirement (availability information on blood's stock, information on events of blood donation, information on blood's donor history, personal identification, etc). Displaying information on blood's stock (type of blood, rhesus and blood's components), performing information status on donation schedule, notification that relates to blood's donation events, routine's reminder, birthday's greeting and feedback on application. Integration with local BDRS and UTD, announcing accurate information on all features, conducting location scanning when application is operated, recommending the nearest location with supplier institutions  $\leq 10$  km from user's location, providing information on contact person and recommending the nearest location of the donor  $\leq 10$  km from user's location, providing information related to blood's donation events by radius of  $\leq 25$  km from user's location, establishing user's account to improve privacy, data security and accessibility. Yet, this will be optional to allow users to be able to access the application without user's account. Displaying profile picture to ease the identity recognition and providing utilization assistance feature with Help menu.

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