System design and implementation of satisfaction with college students' willingness to donate blood again

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Extended Abstract

1. Introduction

1.1 research background and motivation

Blood is a precious resource that cannot be manufactured artificially. In recent years, the population structure of blood donation in Taiwan tends to be aging, and college students have become the main force of blood donation for freshmen. Most college students donate blood only once, and the rate of re donation is low, which affects the long-term stable supply of blood. Enhancing college students' willingness to donate blood has become an important issue of concern to the Taiwan blood foundation, the Taichung blood donation center and the society. However, the existing measures tend to one-way propaganda, lack of in-depth understanding of the needs of college students and technical tools, resulting in limited effectiveness.

1.2 research purpose

This study integrated software engineering development method and decision laboratory analysis method (DEMATEL) to solve the interaction and feedback problems of demand, technology and benefit in the process of College Students' blood donation, so as to design a system platform to enhance college students' willingness to donate blood again.

1.3 research importance, scope and limitations

Blood donation is an indispensable part of ensuring the blood supply of the medical system. However, although college students are the main group of blood donors for the first time, them re donation rate is generally low. The sampling objects of the study are mainly college students from Guangdong Institute of petroleum and chemical technology. The system function aims to improve the willingness to donate blood again, and does not involve professional medical fields such as blood safety testing. The time limit for data acquisition and model analysis is from January to June 2025.

2. Literature discussion

2.1 research questions and assumptions

Objective to explore the motivation, obstacles and promotion strategies of College Students' blood donation behavior.

• individual factors: health concerns, time constraints, lack of blood donation knowledge.

• environmental factors: convenience of blood donation sites and school support.

• psychological factors: altruism, sense of achievement.

3 research methods

3.1 software engineering methodology

It emphasizes the systematic process of requirement analysis, system design, implementation and testing to ensure that the software functions meet the needs of users. Among them, user demand analysis is the key.

3.2 decision making laboratory analysis (DEMATEL)

Visualizing the dependencies between complex factors is suitable for causal discussion among demand, technology and benefit dimensions, and is widely used in the field of system modeling and decision support.

3.3 structure discussion: demand, technology and benefit

Dimensional content demand convenience, blood donation knowledge, personalized reminders, blood donation incentive technology, blood donation management platform, smart reminders, blood donation records, personalized push benefit satisfaction, increased re donation rate, and stabilized blood donation group.

4 system analysis method

4.1 system development process

Using software engineering methodology, it is divided into four stages: Demand analysis: questionnaire survey and interview with college students to summarize key needs. System design: draw data flow chart and functional module diagram according to demand analysis. System implementation: the mobile application development technology is adopted to realize the blood donation management and reminder system. System test: invite college students to test to verify the system function and user satisfaction.

4.2 decision making laboratory analysis (DEMATEL)

Determine the structural factors: expert interviews summarize the factors related to demand, technology and benefit. Establish the influence matrix: invite experts to score and obtain the degree of interaction among the three dimensional factors. Calculate the direct and indirect impact relationship: draw a causal relationship diagram through the impact degree (d) and the impact degree (R). Causal analysis: identify the core path of demand driven technology and technology feedback benefits.

5. System design

5.1 System function design requirements

Summarize four needs through questionnaires and interviews. Convenience: distribution of blood donation points and appointment system. Information transparency: blood donation process description and blood donation record query. Personalized service: blood donation reminder and incentive mechanism. Sense of achievement: display of blood donation honor and social contribution.

5.2 system function module design

Appointment and navigation module: positioning blood donation website and online appointment. Blood donation record module: record the date, times and rewards of blood donation. Smart reminder module: push reminder according to blood donation cycle. Incentive display module: blood donation badge and contribution ranking list.

5.3 DEMATEL analysis results

The results show that "convenience" is the dominant factor in the demand dimension, and has a significant impact on the "smart reminder function" of the technology dimension. The "reminder function" in turn promotes the improvement of "satisfaction" and "re donation rate".

6. System implementation and testing

6.1 system development tools and environment

- development platform: Android Studio

- database: Firebase

- main languages: Java, Kotlin

6.2 system test and verification

The 37 college students were invited to try the system and collect satisfaction surveys: System convenience satisfaction. Satisfaction with transparency of blood donation records. Satisfaction with smart reminder function. Increased willingness to donate blood again. It is expected that the

willingness to donate blood again will increase

7 conclusion

This study combines software engineering method and DEMATEL analysis to explore the dependence and feedback relationship among demand, technology and benefit, and develop a system to enhance college students' willingness to donate blood again. The results verified the realization of the "convenience" demand driven technology, and the "reminder function" feedback promoted satisfaction and re donation willingness.

Keywords: Decision Making Trial and Evaluation Laboratory (DEMATEL), Planning behavior theory, Influencing factors, School encouragement policies, Satisfaction and willingness.

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