A Reusable Product Line Asset in Smart Mobile Application: A Systematic Literature Review

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Abstract—A reusable product line asset is a product or asset that can be reused for different purposes including charity. Smart mobile applications are one of several communication and information methods used in charitable activities. Web, mobile, or hybrid platforms can be used to develop charity applications. It takes design and purpose to build an application, whether methodology or software development is applied for the smooth design or development of an application. The data for this study were acquired from the appropriate literature between 2017 and 2021 in order to determine the application development on current charity applications. The Systematic Literature Review (SLR) was employed in this study. The SLR method is used to identify, review, evaluate, and analyze all available research on relevant topics, as well as research issues for philanthropic development. This study aims to answer the following research questions: identify the donation applications that are frequently developed by researchers; identify the methods that are commonly used in the development of charity applications; identify the application platform that is frequently used; identify the functions utilized to the developed application and identify the key users who are using the application. The findings show, charity donations app, structured method, mobile applications, authentication and charity centers and donors were the most often observed in this study.

Keywords—Application; charity; donation; reusable product line; systematic literature review

I. INTRODUCTION

The advancement of information technology is very rapid nowadays. The growth of the telephone or mobile phone, as well as the internet's existence, has had an impact on many facets of life. Whether in one's personal life, socially, or in relation to the world of business or business. Information technology is used in philanthropic activities in addition to facilitating and speeding up communication and information processes. Humanitarian and social concerns can be carried out more quickly by taking advantage of technical advancements. This is because the internet, which has become a part of daily life, makes it easier to access information [1] [2]. The society has a role to play in the expansion of universal social and humanitarian concern activities. As a result, charitable activities have the ability to be done conveniently and quickly through the use of internet technology [3]. Many websites and mobile charity

applications have sprung up to function as a middleman, connecting people who want to help such campaign organisers and donors with people who need support [4]. With the growth of charity platforms nowadays makes it easier for everyone who wishes to donate or seeks donations with only access to the internet. Many communication and information technologies, like an application, are being created to assist users in undertaking donation activities. Application development is often classified into three platforms: desktop, online, and mobile. It takes a good planning to build an application, which must be examined to see whether the purpose, software development process used for the smooth design or development of an application. As a result, the objective of this study is to discover and examine prior studies relevant to the development of donation applications developed by previous researchers. The findings from this study will be used in the following phases for the proposed application SeekandHelp. Various stages should be evaluated before designing an application, including the area of focus, purpose, system user, method, or platform on which the application will run. The systematic literature review (SLR) strategy was applied to discover relevant findings and identify publications in a systematic way, with each procedure according to predefined phases or criteria [5]. This study is important to determine the application development on current charity applications so that it will give researchers to gain some insights on the application. The following sections in this study are organized as follows. Section II describes the methodology used for comparison study, Section III presents the result and analysis and lastly the conclusion.

II. METHODOLOGY

This section will discuss and describe the phases of research process through using SLR method. SLR is a process of identifying, evaluating, and interpreting all research sources relevant to a research question regarding a research topic. Primary studies and secondary studies are studies and publications that contribute to SLR.

A. Systematic Review Process

The systematic literature review method conducted will follow a specific process [6]. Each stage of this process will perform its respective tasks according to the order of research to obtain systematic research results. The process begins with

identifying research problems followed by formulating research questions and objectives. The next stage is the literature search strategy stage which process is to determine what keywords to use in article searching in the database and what searching criteria to include and exclude. In next stage, after search strategy completed is the process selection of the study which the process will including identifying, selecting, literature, extracting and evaluating the reporting research results obtained with followed by the last stage in this process. The systematic review process can be seen as Fig. 1.
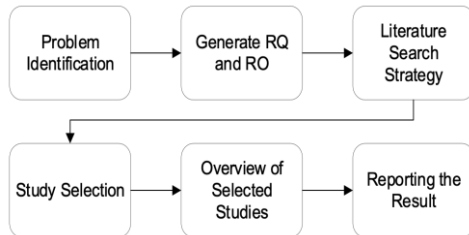

Fig. 1. Systematic Review Process

B. Problem Identification

The initial stage for systematic review is to identification of the research problems. Research problems are issues raised in related research which will be examined to be discussed and resolved. In this study, the research problem identified is that there is still a lack of research in the current study that provides a structured and comprehensive literature review regarding the development of applications in charity causes.

C. Generate RQ and RO

In this stage, Research Questions (RQ) and Research Objectives (RO) are created. Research questions function to extract detailed information from each study conducted. Four research question formulations were made related to the study's namely the extent to which the implementation and development of applications related to charity were developed. The four questions have been generated and research questions are arranged in Table I.

TABLE I. RESEARCH QUESTIONS (RQ) AND RESEARCH OBJECTIVES (RO)

Research Question (RQ)	Research Objective (RO)
RQ1. What are the purpose and area of charity researcher focused in developing charity app?	Identify the purpose and types of topics focused on by researchers in developing the applications for charity donation.
RQ2. What methods were used in the app development of the study?	Identify method used by researchers. Knowing the method utilized in the various studies, this information can serve as a point of reference for designing a donation application for use in further study.
RQ3. What platforms are widely used in the development of the charity application?	Identify the platforms most frequently used to develop charity apps. Therefore, it is necessary to consider what platforms can be used for further studies.
RQ4. What functions and features are suggested in the charity app developed?	Identify the features used to develop charity apps
RQ5. Who is the focused user in system development in these studies?	To develop a system, it is necessary to identify who is the user will be involved.

D. Literature Search Strategy

At this stage, the search process is carried out to obtain relevant sources to answer the Research Question (RQ) and other related references. The search process is carried out using electronic search journal databases, namely, Google Scholar and IEEE Explorer. This search on Google Scholar was chosen because Google Scholar provides a simple way to broadly search for scholarly literature and quickly gauge the visibility and influence of recent articles in scholarly publications

The keyword "local charity donation application" was used as the search query/search string. The search query or search string is what's utilized to find published material that explains the process of creating applications for charity causes. The keywords are formalized by using Boolean operators, namely the process of finding information from queries using Boolean expressions [7]. The Boolean expressions use the logical operators AND, OR and NOT in determining the calculation results only in the form of binary values. The Boolean retrieval result is only relevant documents or nothing. Thus, a Boolean retrieval overload does not result in the same document. Fig. 2 illustrates the search string.

1) Literature inclusion and exclusion criteria: Inclusion and Exclusion Criteria is performed to decide whether the data found is suitable for use in SLR research or not. Article search is selected based on criteria such as year of publication, type of journal article, books and proceedings. The Inclusion and Exclusion criteria's in this study is show as follows Table II.

E. Study Selection Process

The procedure by which records identified in the preceding stage are evaluated for inclusion in the study is described as study selection. By objectively and methodically applying the predetermined eligibility criteria to each record to evaluate if the article should be included, selection bias can be avoided. This study selection process is shown in Fig. 3.

Fig. 2. The Finalized Search String/Sentence.

TABLE II. INCLUSION AND EXCLUSION CRITERIA

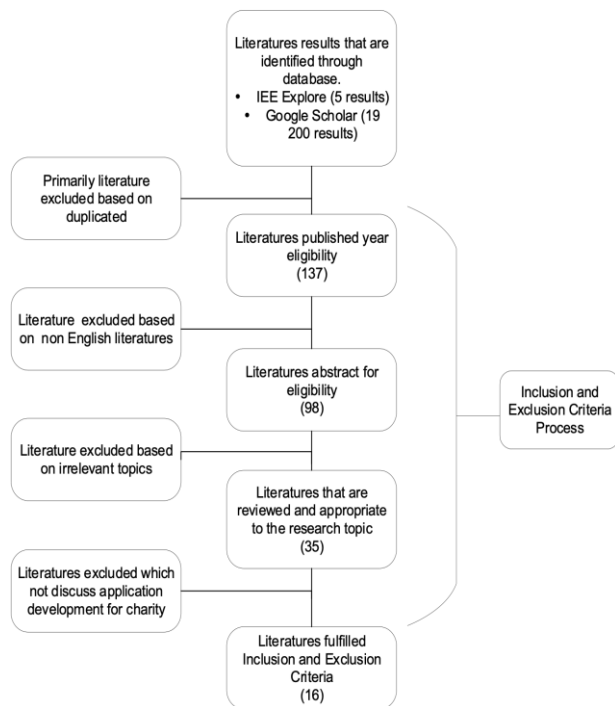| Inclusion Criteria	Exclusion Criteria
Literature publication from 2017 to 2021.	Literature publication year is below 2017.
Literature focusing on application development with related topics.	Literature which not discusses related topics in the study will not be selected.
Literature that uses only English.	Literature is not in English.

Fig. 3. Study Selection Process.

The selection process begins after obtaining literature search results in the database and obtained articles with details from Google Scholar with results with total of 19200 articles and in IEEE Explorer resulted in five literatures. Because of the large number of results, the first 250 literatures are selected for the screening stage. The first primary and second screening process is to exclude literatures based on duplicate literatures. The initial and second screening generated results of 137 and 98 literatures are excluded from non-English and year eligibility. The next screening is on study and understanding the abstracts of the literature to identify which articles are appropriate and which are not in accordance with the criteria for inclusion. Based on a comprehensive review of the title and abstract, there are 35 study literatures that meet the criteria relevant to the topic discussion. The following screening assessing of each literature for fully inclusion and exclusion criteria examines the literature in more depth. The process's inclusion and exclusion criteria finally resulted of 16 literatures accessible for this study.

1) Data extraction and analysis: The selected article then performed was data extraction to answer the research question (RQ). The data extracted from the research article discusses the development of charitable applications, whether the purpose, area, development methods, platforms used, features of the purpose app and system users of each application developed. By reading and analyzed the selected articles, an analysis will be produced that can answer the research questions. This process will be described in the results section and subsequent discussion in detail.

F. Reporting the Result

Select Studies Overview indicates the distribution of selected literature through that source published. From 1320 literatures, 34 literatures were selected as shown in Table III.

III. RESULT AND DISCUSSION

RQ1. What are the purpose and area of charity researcher focused in developing charity app?

The applications were grouped by the area focused by research in the literatures show in the Table IV divided into four groups: (1) Charity center donation, (2) Blood donation finder apps, (3) Food donation app, (4) Crowdfunding donation apps, and (5) Donation handling apps.

A. Charity Center Donation

A total of six literatures were focused develop an app to find charity center for donation. The apps share the information of charity center to receive of donations and with information of center will be easier to find donors to meet the needs of the charity center. As studies by [13] focused on application to help the donor to find information about the non-profit organization available, [10] develop applications to facilitate donors and organizations to reach out directly and [8] reduce poverty. Study on [12] was not just to facilitate social institutions in making donations, but in [9] the apps were helpful to connect people to donate their used items and meanwhile, [11] help to reduce wastage and fulfil other items requirements of needy organizations. In the studies, an application was developed for further maximizing social services in the development of social welfare. The author of the literature focused on donation application design to facilitate the community in donating to the charity center in various forms, such as used good, volunteer, etc.

TABLE III. AREAS OF CHARITY DONATION APP FOCUSED

Focused donation area's	Ref. No
Charity donation center app	[8], [9], [10], [11], [12], [13]
Donation handling process app	[14], [15]
Blood donation app	[16], [17], [18], [19], [20]
Crowdfunding donation app	[21], [22]
food donation app	[23]

TABLE IV.   DESCRIPTION OF SELECT STUDIES OVERVIEW

Literature	Purpose	Method	Platform	Area of Donation system focused	Features	User
[8]	To facilitate people and organizations to reach out easily in Bhutan.	Structured method	Web Application	Charity donation center app	Authentication	Charity organization and donor
[14]	To provide a better solution for donation handling in Sri Lanka during disasters.	Structured method	Hybrid	Donation handling process app	Authentication and Geolocation	Charity organization, donor and admin
[16]	To fill the knowledge gap about new technologies that can be developed to help the community in relation to blood finding.	Structured method	Mobile Application	Blood donation app	Geolocation	Donor and community
[9]	To facilitate and connect people in books donation.	Structured method	Mobile Application	Charity donation center app		Donor and seeker
[10]	To help people donate items in an easy way to the charitable organization in Malaysia.	Structured method	Mobile Application	Charity donation center app	Authentication	Donor and charitable organization
[21]	To design the crowdfunding platform specifically tailored to address food. insecurity problems in Indonesia.	Structured method	Mobile application	Crowdfunding donation app	Authentication	Charity organization, community
[20]	To improve the current existing system regarding the blood donation.	Structured method	Hybrid	Blood donation app	Authentication	Donor, patient, admin and authorize organization
[11]	To provides a platform for donation of useful items to the nearest NGO and reduce the wastage.	Object oriented	Mobile Application	Charity donation center app	Authentication and Geolocation	Charitable organization and donors
[12]	To help charitable organization and donor to raising/ giving donations.	Structured method	Mobile Application	Charity donation center app	Geolocation, Authentication and notification	Charitable organization and donors
[23]	To design and facilitate regarding food security issues.	Food donation	Mobile Application	food donation app	Authentication	Donor and community
[15]	To build an application program to reduce manual work of managing for the blood donation process	Object oriented	Mobile Application	Donation handling process app	Authentication and Geolocation	Charity organization, admin and donor
[17]	To develop a mobile blood donation management system and enhance the existing system.	Object oriented	Mobile Application	Blood donation app	Authentication and Geolocation	Authorize organization and donor
[18]	To solve the problem of searching for blood donors in the city of Lampung.	Object oriented	Mobile Application	Blood donation app	Geolocation	Donor, community and admin
[22]	To design, develop and test the decentralized crowdfunding web application in facilitating the donation process on Ethereum network.	Object Oriented method	Web Application	Crowdfunding donation app	Authentication	Charity organization and donor
[13]	to solve the problem by providing the donor complete information about the organization that accept the used item for donation.	Structured method	Mobile Application	Charity donation center app	Notification Authentication	Charity organization and donor
[19]	To develop blood donation app for handle emergency situation of blood availability.	Object Oriented method	Mobile application	Blood donation app	Authentication	Donor, Admin and authorize organization

B. Blood Donation App

Research focusing on the development of applications for blood donation was obtained from relevant studies. This app focused on as an information tool to find blood donors or donate their blood. The blood application serves to provide information to users in facilitating the monitoring of blood supply and coordination of the processes involved. The availability of appropriate bloodstock is crucial for use during special medical condition [25]. Thus, various apps are design to solve the problems. Six articles were identified which researchers [16] and [18] develop an app to focus on blood donors to aid the community in relation to blood donation finders. A study by [20] focused to improve the existing system which was studied facilitating monitoring of blood supply and coordination of the processes involved. The research on [18] focused on to solve the problem of searching for blood donors based on the closest location. In [17], to the factor of authenticity, the apps develop focus to facilitate the work of the process of managing donors' information more quickly while [19] with organized blood bank donation data and information on bloodstock will facilitate people with easier access to bloodstock information without visiting a blood bank.

C. Food Donation App

Researcher focused on food donation app which is a social movement themed application of donating food waste and foodstuffs to urban communities, in an effort to develop a digital community in reducing the amount of food waste. Research by [23] developed food donation applications as intermediaries to address food insecurity and eliminate food waste by using food sources available in local communities. This food -focused research is how to design an app with the theme of a social movement donating food and food waste to the community, in an effort to develop a digital community in reducing the amount of food waste.

D. Crowdfunding Donation App

Crowdfunding is a fundraising practice for various types of businesses, whether in the form of product ideas, businesses or profits derived from donations from the general public or groups. There are two studies focusing on crowdfunding donations which researcher in [22] developed a decentralized crowdfunding focused application to facilitate the donation process on the network and record donation transactions securely. While researcher in [21] developed a platform specifically designed to address food insecurity issues that allow the public to make contributions to achieve targeted campaign funding. This type of development is different from regular donations, donations in crowdfunding are done online, where digital money is given for each campaign or project undertaken.

E. Donation Handling Process App

Two studies found which focusing on developing an app for the process handling of donations, namely, researcher [14] which develops applications to improving the process of handling donations when a disaster strikes. It provides a better solution for handling donations when they are needed by the community. Meanwhile, researcher in [15] developed an application that focuses on the process of reducing the manual work of managing donations in charity organizations in helping social organizations to run projects more transparently.

RQ2. What method were adopt in the development of application in the study?

Table V show structured methods which are the dominant method in the development of charitable applications. Structured methods in information system development, often known as the System Development Life Cycle (SDLC). In general, SDLC is sequentially divided into six stages, namely, planning, analysis, design, implementation and maintenance. This structured method is made up of many models, and in this study, we found as total 10 researchers who utilize it in the development of charitable applications.

An agile model is used in studies [13], in which the work process is repeated in an organized and systematic way. The prototype model has been utilised in studies [8], [14], [9], [20] and [23] which this model allows to understand the requirements at an early stage of development, helps get valuable feedback to understand what exactly to expect from the product under development. The authors in [16] and [21] utilise spiral model, which supports risk management and this model consists of multiple cycles, similar to a combination of waterfalls and iterations divided into each phase. The Rapid Application Development (RAD) paradigm is utilised in this study by [10] to emphasise rapid prototyping and quick feedback within an ongoing development and testing cycle, and it may produce multiple iterations and update software quickly with fast application development. In [12], the author utilised the waterfall model or known as classical method that follows a gradual regular pattern worked from top to bottom.

Object-oriented methods, as opposed to structured methods, total six researchers were utilized in their studies [11], [15], [17], [18], [19] and [22]. This object oriented method is used to simplify all kinds of problems that exist in a system by using many objects.

RQ3. What platforms are widely used in development of application in the studies?

The results shown in Table VI show that the dominant platform used in developing charity-based applications is the Mobile Application. Research focused on mobile platforms was carried out by [10], [16], [9], [21], [11], [12], [15], [17], [18], [13], [19], [15], [17], [18], [13] and [19].

TABLE V. METHOD USED IN SYSTEM DEVELOPMENT

Method	No. Ref
Structured method	[8], [14], [9], [20], [23], [16], [21], [12], [10] and [13]
Object Oriented method	[11], [15], [17], [18], [19] and [22]

TABLE VI. PLATFORM USED TO DEVELOP AN APPLICATION

Platform	Ref. No
Mobile Application	[10],[16], [9], [21], [11], [12], [15], [17], [18], [13], [19] and [23]
Web application	[8], [22]
Hybrid (Web and Mobile)	[14], [20]

A mobile app is an application that can be put into a mobile device and used at any time and from any place [21]. This is because mobile applications and their global influence show that they are used and impacted differently by individuals, businesses, and social groups [16]. Users can take advantage of the ability to use and benefit from mobile devices that can be accessible by mobile devices over mobile telecommunications networks [12], which helps users get to their desired place in their preferred time slot [11] and provides additional e-philanthropy experiences [10]. As a result of its simplicity of use, ubiquitous availability, and speed, smartphones have become more of a necessity than a commodity for most people [9][24]. Research on [8] and [22] applying web application development to the charities studied. Web application platforms, according to researchers, have lower communication costs. It can also encourage people to participate more often as there are no time constraints [22]. Meanwhile research by [14] and [20] focuses on both mobile and web application development. Implement a hybrid system makes it easier for users and organizations to gain access to the system [14]. Aside from that, mobile application and a website hosted on a cloud hosting that serves as an interface for system users and leverages the cloud to store and process data. This enables the system to take use of cloud hosting characteristics including rapid deployment, high availability, scalability, and management simplicity [20].

RQ4. What are the functionalities and features proposed in the development of charity apps?

This question is discussed by considering the results obtained from the implementation of 16 applications selected and answered the questions of RQ4 mentioned above. The features were evaluated for each of the selected literature. The results are presented in the Table VII.

F. Authentication

Authentication is the process of gaining recognition or gaining recognition. So this validation will verify who has actually interacted with the system. Authentication implementations can include what only the person knows [8], [10], [21], [12], [11], [15], [23], [17], [17], [19], a user who logs in with a username and password that only he knows, can be ascertained that that person is actually logged into the system when it comes to biometric authentication which involves part of body to be recognized by the user [26]. Researcher in [14] on the use of biometrics, for example, facial identification using the camera used to identify and record the faces of the people in an array for future accesses or [20] to identify and measure the health.

TABLE VII.   COMMON FEATURES PROPOSED

Feature//Function	Ref. No
Authentication	[8], [10], [21], [12], [11], [15], [23], [17], [17], [19], [14]
Notifications	[12], [13]
Geolocation	[14], [16], [15], [17], [18], [12], [11]

G. Notifications

There are two applications that have been developed to provide users with a notification feature [12], [13]. This feature's implementation allows users to be notified in a variety of ways. Among those investigated, a notification could be an immediate alert the user receives about a reminder, news, or the next date on which event is possible. Users can also get push notifications for upcoming campaigns in their area as well as instant invitations to charitable events. Notifications are a potent tool that takes attention away the user's attention. However, if these notifications convey irrelevant and interesting messages, they can become annoying and leading to a negative perception of this feature.

H. Geolocation

The most significant element that should be added into a mobile app is geolocation, which allows users to identify their actual position by using a map that perfectly represents routes or other navigation data [27], [28]. Presently, GPS service for crises, or Location - based services, was among the most feature using in smartphone, making information sharing seamless and quickly [29]. Approximately 7 of the literatures analyzed [14], [16], [15], [17], [18], [12], [11] have built-in geolocation capabilities. Donor and centre locations are displayed on a visual map and optimised based on user real-time location data to identify the nearest one centre or donor. Since GPS services utilise users' personal information, harmful implications, as well as privacy and anonymity problems, might be crucial considerations that must be addressed to prevent data misuse.

RQ5. Who is the focused user of the system studies?

Based on 16 research articles reviewed, it was found that stakeholders who benefit from the use of charity applications are social organizations, donors, the needy, the community, authorized entities and patients. What can be seen from this study, researcher [8], [10], [11], [12], [26], [14], and [22] develop applications that focus on its main users involved in the system which are donors and charity centers and [15] develop similar systems but require an admin to manage donations from donors to social organizations before being sent to the receiver while [21], [23] involved with community. Researchers in [16] focus on the main users in the system which are donors and the community in blood finding. The author in [17] develops a blood finder between the donor and the authorizing party which is the hospital. As [16] in contrast to researchers [19], [18] [20] focused on connecting users and engagement between donors, admin, authorize the entity involved and the patient. Researchers in [9], [18] and [23] focused on the main users involved are donors and the needy who interact directly without an intermediary. As examined, the user is the component that determines how the user can communicate with the developed application. Therefore, indicating the system created is necessary to determine who will later be a user or users in the system in accordance with the system created.

IV. CONCLUSION AND FUTURE WORK

This literature review aims to systematically examine the extent to which charity application development and practice activities in the 2017-2021 range are based on the criteria exclusion and inclusion, 16 research articles were used for review. This literature review was carried out which is an approach to identify, collect and obtain information based on research question. Sixteen (16) articles were re-analyzed using five elements: the year, the article was published; the area of charity app develops that became the main focus of this research; the method used to conduct this study; the platform developed from the research; and the proposed feature and users who would use the system. In this finding, numerous academics have undertaken research to development of charity apps such as food donation, charity donations center, donation handle processing, crowdfunding and the search for blood donors. In literatures review resulted donation to charity center is the most discussing the topic. Furthermore, several methodologies are used in developing the apps, including structure method which consists of model waterfall, spiral, RAD, prototype, and object-oriented method. In this study, structured methods are the most commonly used and three platforms were discovered found in the literatures studies which mobile application development is dominance over web application and hybrid. From the aspects of functional, majority of apps installed include mobile features that could enhance the donation experience of the donors. Authentication, Notifications and Geolocation are the most interesting functionalities found in these studies. Research on system users, there are various users on each system developed, and it was discovered that donor users and charitable organizations are more in emphasis in the study. As a follow-up to this research, it is recommended in the form of suggestions, namely the need for further development and research on the application of charity in carrying out human activities and will be very useful during disasters or when times cannot be avoided.

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