

The Trends of Community Audience for Mobile Application Fields: A Review

Rafizah Ab Rahman¹, Rafidah Ab Rahman¹

¹(Department of Information Technology and Communication, Politeknik Muadzam Shah, Pahang, Malaysia)

ABSTRACT : *Currently the booming mobile applications market had catered to the various needs of all types of users from entertainment, education, health, games and many more. This review aims to find out the community audience mostly tailored for within specific mobile application fields. A protocol review was designed to select primary studies to be reviewed and resulted in the selection of 11 papers. 6 of the papers addressed the needs of the disabled and special needs community in assistive technology and healthcare management fields while the fields of disaster or crisis management, and public services each was covered by 3 and 2 studies consecutively.*

KEYWORDS - *mobile apps, mobile application, community audience*

1. Introduction

Mobile application or mobile apps are categorized according to whether they are web-based access via browser or native apps, which are created exclusively for a given platform. A third category, hybrid apps, combines elements of both native and Web apps. Hundreds of thousands mobile apps populating different app stores generating billions of incomes are deployed across large range of device and environment and cater to different types of users. Mobile application development aimed at communities and societies rather than individual may be more sustainable in long term. There are numerous mobile applications published online that focused on various needs such as health management, assistive technology and disaster management. However, these were sparsely documented in the academic world. Hence, it was highly probable that there was disparity in the target needs addressed by these studies leading to saturation of research in some fields while others were rarely explored. This review strived to highlight the trends of community audiences mostly developed for by researchers for specific fields of mobile application and their impacts to the relevant targets.

2. Research Methodology

This review assessed the trends of community audiences for mobile application fields in recent years. A review protocol was designed and developed specified to our literature search in the field of software engineering. Search engine like ACM Digital Library, EbscoHost and Science Direct databases were used to search for relevant studies. The search keywords used were “mobile application” / “mobile apps” / “apps” + “community” to ensure all related the papers are included. As the initial search based on the keyword “mobile application for community” has resulted 388,213 papers. This is further reduced by a set of inclusion and exclusion criteria to a total of 293 papers. The criteria are as listed in Table 1.

Table 1: Inclusion and exclusion criteria

INCLUSION CRITERIA	EXCLUSION CRITERIA
<ol style="list-style-type: none">1. Open Access and full text papers2. Mobile application described in the paper has been developed and deployed3. Publication year between 2012 to 2017	<ol style="list-style-type: none">1. Papers not in English language2. Mobile application described in the paper is in proposal stage only3. Papers on user acceptance or usability testing of a mobile application

By examining the title and abstract of the primary identified studies, we had excluded most of the paper due to duplicates and irrelevant topic found in the studies. 22 studies were selected during the second activity of selecting primary studies similar to our domain of content. At the third process, we accessed and evaluated the studies by checking the content of the studies. Irrelevant studies will be rejected at this stage and on the hand the

relevant studies will be examined further. Out of 22 papers, there are only 11 papers found similar to our content of reviewing.

3. Results and Discussion

This section abridged and synthesized the findings of this reviews. Table 2 summarized the community audience of each mobile apps field. Overall, the mobile application fields and community audiences targeted by the studies varied: assistive technology for the disabled, disaster management with the municipal or government involvements, healthcare management for the special needs people and public services for specific group of people. Therefore, to highlight the findings of our synthesis of studies on mobile applications development, the findings are presented in 4 mobile application fields: (a) disaster/crisis/humanitarian management, (b) healthcare management, (c) assistive technology and (d) public services.

Table 2: Mobile Apps Fields and Community Audience in Existing Works

Mobile Apps Fields	Community Audience		
	Disabled / Special Needs	Public	Municipal / Government / NGO
Disaster / crisis / humanitarian management			[1] [2] [3]
Healthcare management	[5] [4]		
Assistive technology	[6] [7] [9] [8]		
Public Services		[10] [11]	
Total	6	2	3

3.1. Disaster / crisis / humanitarian management

Disaster or crisis management can be described as the way to manage and organize efforts of overcoming and reducing the impact of disasters while dealing with humanitarian aspects of emergencies by focusing on preparedness, response and recovery. Relief efforts in most disaster emergencies usually involve multiple agencies and organization, thus making accurate, timely, and relevant information shared amongst them very critical. However, humanitarian efforts are sometimes hampered by the lack of a mechanism to help them conduct a needs assessment to find out the type of assistance that can be offered to the disaster-stricken area.

[1]–[3] all have addressed these concerns with the development of AREA (Application for Rapid Epidemiology Assessment), KIRA (Kenya Inter-Agency Rapid Assessment) and SakunAPP mobile applications respectively. AREA app was designed for bio surveillance and health crisis resiliency particularly for supporting situational awareness, risk reduction decision making, and effective resource allocation in public health and humanitarian crisis. Taking advantage of mobile computing devices that are embedded with sensors such as GPS and cameras to build a distributed sensor network, AREA enabled the coordination and information sharing amongst emergency responders thus ensuring quick identification of critical risks. AREA used Bayesian based algorithm models to produce effective assessment with limited information. Moreover, it had the capability to forecast pathogen transmission using social network sampling.

KIRA was developed to provide an innovative coordinated needs assessment tool in Kenya to assure a timely response to humanitarian crisis. KIRA app was implemented on the national level by the government of Kenya. KIRA was implemented in 3 phases, namely the requirement elicitation from stakeholders in adjusting the methodology and tools to the Kenyan background. Then in phase 2, specialized KIRA trainings were conducted along with the goal to enhance information management system focused on remote real-time data gathering allowing the long-term sustainability of the tools. This phase had successfully established an accessible

data sharing KIRA platform. The last phase targeted to institutionalized and integrated the KIRA into national level agencies involved in disaster management.

Similarly, SakunAPP was designed with the aim of improving real-time communication between the local municipal of Philippines and their residents during disaster by implementing the concepts of crowd sourcing and exploiting geolocation features in mobile phones to track the user's location. The pre-production phase involved the collaborations between researchers, consultants and technical experts to establish the conceptual development of the system that was implemented in the production phase. This phase comprised of the software development using various technology platforms and programming languages such as Adobe, Android Studio, Javascript, PHP, Java, CSS and MySQL. Testing was conducted during post-production phase to evaluate the viability of the system.

Although AREA differed in that it focused on public health and humanitarian crisis while KIRA and SakunAPP were centred on disaster managements, all three shared a common trait, they all needed the active involvement of multiple agencies administrations in developing and implementing these apps.

3.2. Healthcare management

Recently, spiralling healthcare costs have become one of the major concerns for the public. Simultaneously, there is a remarkable surge in the healthcare apps available in the market. Healthcare organizations started using a mobile app to provide quality care, improved workflow and increased patient interaction with minimum cost. The way the people get used to mobile technology and looking for easy way to self-diagnose also increased the demand for mobile health apps.

Mobile health apps or mHealth apps range from innocuous apps like weight tracking to a more clinical diagnosis and treatment recommendation function. However, the use of mHealth apps without proper guidance and no clinical evidence may lead to improper treatment and severe repercussions. [4] had developed a mobile application functioning as therapeutic tools for treating Social Anxiety Disorder (SAD). Named as The Challenger App, it helped users to overcome their social anxiety by challenging them to accomplish interactions with their surroundings. It can be used with the supervision of a psychotherapist in severe symptoms cases or independently for mild to moderate symptoms. This app implemented gamification technique to motivate users striving to accomplish the challenges by setting the goals for the development of their personal or social skills. However, this app was only available for iOS platform, specifically for Apple devices.

[5] on the other hand has developed ARMStrokes, a mobile application that provides real-time support for doing rehabilitation exercises amongst stroke patients. Developed specifically for iOS platform, the app incorporated interactive games approach to encourage stroke patients in recovering their upper extremities anytime and anywhere. This mobile application allowed patients to receive instant feedback on their performance and communicate with their healthcare providers. ARMStrokes leveraged the sensors found in mobile phones to reduce unnecessary hardware addition.

3.3. Assistive technology

Assistive technology (AT) is anything such as item, a piece of equipment, software program, or product that improves, maintains, or increases the functional capabilities of disabled person. Everyday activities such speaking, typing, remembering, writing, pointing, seeing, hearing, learning, walking, and many other things that we often take for granted can be very difficult for others. There were times when people with disabilities need to carry different devices to help them in navigating and identifying objects around them such as colour identifier to read aloud colour of their clothing and money reader to identify the denomination of a dollar bill. Sometimes they also have difficulties conversing with others. With the explosion of assistive technology using mobile applications, disabled people only need one device and can download as many relevant apps as they need to enhance their daily living.

[6], [7] and [8] had developed assistive mobile applications that help hearing impaired and visually challenged people. The first mobile application by [6] facilitated deaf users touring the indoor of the National Roman Museum Palazzo Massimo, while the second one was intended for the open-air archaeological excavation site of the ancient Roman harbour of Ostia Antica. Both implementation sites were within the municipality of Rome, Italy. Both apps enabled users to be immersed in their experience in accessible tourism using either video of sign language or textual section describing the archaeological artefacts. [7] proposed an app that can translate Arabic language either written or vocal into sign language and vice versa to help deaf and normal people communicate easily barring misconception.

SmartTactMaps by [8] envisioned the improvement of maps accessibility for blind users by integrating machine readable metadata into maps that can be recognized by the mobile application so that interactive instruction to position the mobile phone or location information can be relayed to users aurally. Designed for Android platform, this solution supported the use of tactile maps without the complexity of Braille annotations. The SmartTactMaps used auditory instructions to blind users to help them positioned the mobile phone above the tactile map while detecting fingertip marker.

Monetary transaction also has been made quicker and easier for the visually impaired by [9] in using mobile application to recognize currency bills, achieving 95% recognition rate using Local Binary Pattern (LBP). Hundreds of the currency bill images were used as training data to ensure robustness against varying degrees of illumination, speed, scale and orientation. To date, the apps recognition capability is limited to the Trinidad and Tobago currency. Similarly, this mobile application was only designed for the Android platform.

3.4. Public Services

[10] has proposed a mobile application that enabled users to monitor their taxi ride and calculate the fare in real-time. The apps presented the mean cost of 3 calculations based on tracked GPS data, Google Maps data and average community-based fare. Each tracked data will be recorded in a database. However, the authors cautioned that the low level of accuracy of community-based calculation will improve as more users used it.

FeedFinder by [11] has been developed to support breastfeeding women in finding, reviewing and sharing public breastfeeding places with other women. The app aims to encouraged women in continuing breastfeeding even in public by making them feel secure and realized that there are public places such as department stores, cafes, pubs and coffee shops that allowed breastfeeding. As such, these establishments also can benefit from positive reviews by users. However, the apps depended on small, specific type of users mainly breastfeeding mothers and taxi users in getting the data needed to improve their accuracy and reliability, that given enough time, they can establish themselves.

4. Conclusion

Based on the selected 11 papers, we noted that majority of the studies focused on the disabled or special needs community mainly in the field of assistive technology and while only two studies on public services for the public, highlighting the prominence target audiences for researchers. The high percentage of mobile applications developed as assistive technology may be contributed by the fact that there is higher awareness of the issues faced by the hearing and visually impaired community. Meanwhile, the development of mobile application on disaster management were addressed by three studies that emphasized the crucial involvement of multi-agencies during development process as they required proper planning and often were time-consuming to be developed as most involved experts' specialized knowledge and coordination with stakeholders to achieve optimum results. The complexity of working with various agencies and organizations to develop the critical and much needed apps on disaster or crisis management may contributed to the low percentage of only 27% apps developed for this field, thus more research on disaster management need to be encouraged. Although assistive technology is highly popular than other fields of mobile application, it does not denote the irrelevance of other fields for the community. The high percentage of mobile applications developed as assistive technology may be contributed by the fact that there is higher awareness of the issues faced by the hearing and visually impaired community.

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