Mobile Application Development: A comprehensive and systematic literature review

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Abstract

In the present age of e-commerce, mobile penetration has risen to a significant level and can be seen as it grows exponentially in the past decade. The mobile application has opened up a new sense of customer service. With an increase of these applications, researchers have inclined their interest towards development and identify various issues linked to it. This study focuses on accumulating a vast academic literature in a time frame of the last ten years. A comprehensive and systematic literature review was done in the emerging area of mobile application development. After the process of reviewing the extensive literature from the biggest database 'Scopus', a total of 26 relevant journal papers were considered for the review after multiple steps of filtrations. This paper gives the scope and the direction in the field of mobile development and helps the organization to have a vast knowledge regarding the same. The findings of this study provide valuable insights and future recommendations in this developing field.

Keywords
Mobile Application, Collaborative System, Online Services, Android Operating System, framework

1.0 Introduction

The introduction of mobiles and applications in the various fields has ushered in a revolution in the last decade. The initial usage was in the advertising, marketing and various service sectors, later it got expanded into various sectors like healthcare and insurance leaving no industry and organization untouched. The exponential pace of application development encouraged research community to understand all vertices in niche. Past researcher (Lee et al.,2014) proposed a framework that takes into account the vitality productive execution of mobile applications by mostly loading the workload of a mobile device into a clever cloud. The framework contains a development toolkit, which encourages the development of mobile applications fit for supporting computation loading, and a runtime infrastructure for the organization in the cloud. Miravet et al. (2013) developed a device-independent mobile application generation (DIMAG), a framework which demonstrates how the final detail of client-server mobile applications can be a proper way for creating both customer and server sides of native applications. Yusop

et al. (2016) examined the difficulties and constraints faced by requirements engineers and software engineers in inspiring security requirements and security properties. Two experiments, concentrating on the manual elicitation of security qualities from a lot of requirements situation have been led with novice requirements engineers (REs). The experiment demonstrates that the elicitation of security traits is exceptionally trying for the novice REs and they need support, particularly automation support. Hoehle and Venkatesh (2015) conceptualized and related survey instrument dependent on Apple's general user experience rules that can help such an undertaking. Ramakrishna et al. (2017) presented the Mobile Infrastructure Analytics System (MIAS), which helps proficiently recognize and investigate application blames in a disseminated domain, comprehensively examining application and network action crosswise over client devices, application servers, database servers, and so forth. According to (Dar et al.,2018) for any software development, prerequisites designing is the underlying advance towards characterizing partners' needs and requirement. Poor necessities may prompt huge client disappointment and low software quality. Consequently, proficient rules and practices encourage professionals to adjust specific strategies for social occasion requirements. The whole context focuses on cruciality of mobile application development which is further systematically sampled in further sections of paper.

2.0 Research Methodology

The process of literature review and the methodology adopted have been discussed in this section. A thorough and comprehensive literature review was undertaken in the area mobile application development. The systematic and comprehensive literature review is based on the procedures given by (Tranfield et al. 2003; Dubey et al. 2017)
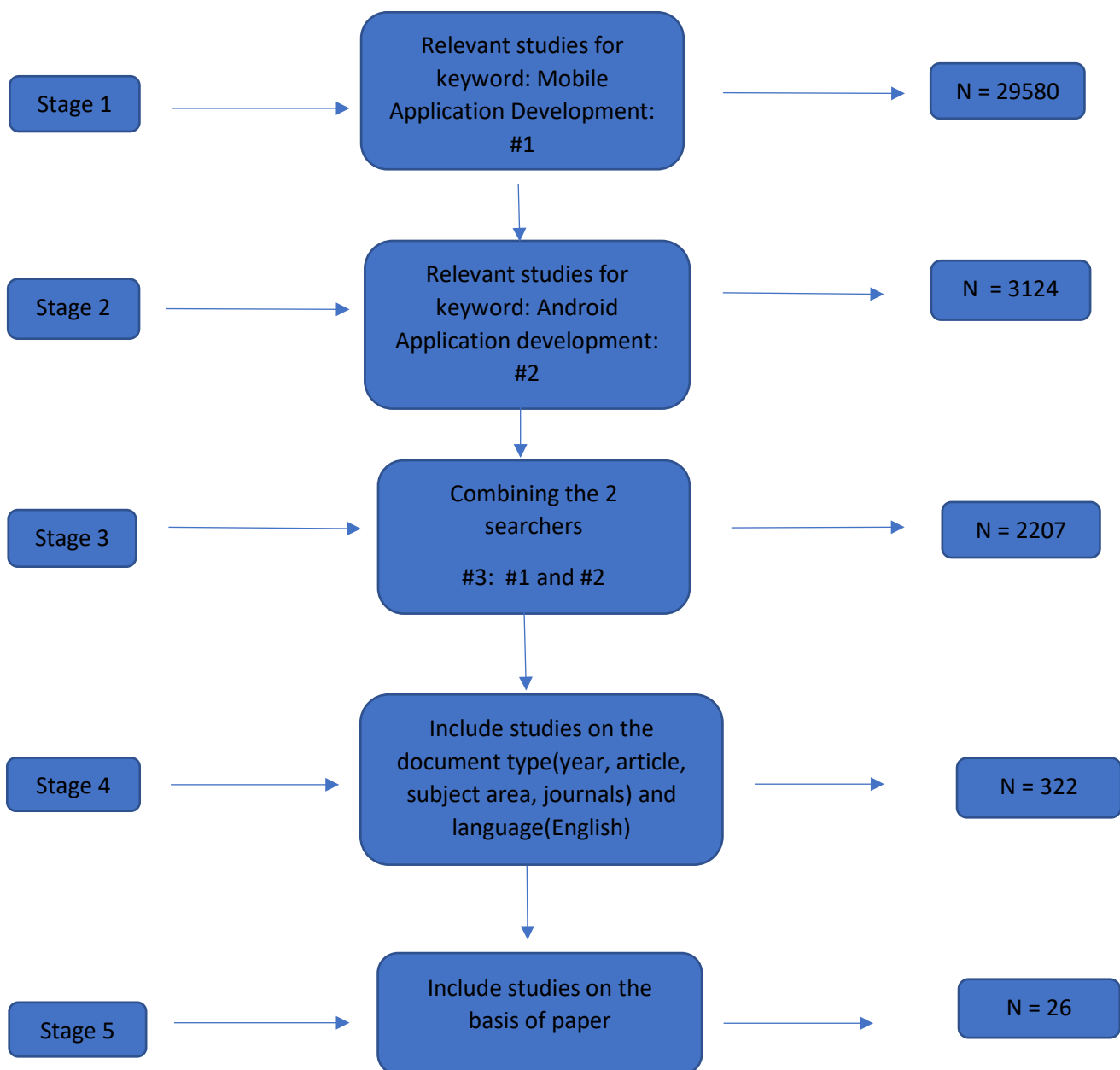
2.1 Identification of Literature

The database searched for literature review in this study is Scopus (https://www.scopus.com) which is currently the greatest and the most significant database for academic journals. Scopus records papers into various classifications, for this study we have considered sections (I) Computer Science (ii) Engineering & cross-disciplinary research, and this was another purpose behind choosing Scopus for this study. As the range of our point is spoken to by these two classifications, the utilization of Scopus has been a characteristic decision. There are other digital databases like Web of Science, DBLP and IEEE Xplore however Scopus contains more academic journals than these databases. The hunt was performed autonomously on Scopus utilizing 'or' administrator for every watchword and from there on the query items of these two ideas was blended utilizing an 'and' administrator in Scopus. The inquiry sentence structure can be found in Table 1. To reproduce this inquiry on Scopus.com, this punctuation can be reordered in the propelled hunt area of that digital database. The query item will change in the number of archives as this database is effectively refreshed. The information for this study has been taken from the primary conceivable date of indexation of a journal paper to the date of inquiry performed on the Scopus database (Jan 2, 2019). Hence, this information is a genuine impression of the data that was exhibited on Jan 2, 2019. Our pursuit procedure portrayed in Fig 1. Elaborating the flow, we led a look for enormous information related catchphrases (see Table 1), this brought about 29580 hits. The second stage, comprised of a look for HSC catchphrases inside the after-effects of the principal arrange, bringing about 3124 hits. In the third stage, we have seen the convergence of the information from stage one and stage two yielded in 2207 papers. In stage four, we have considered just journal articles with (322 papers) with numerous filtrations for the literature review and disposed of meeting procedures. Finally, only 26 papers were observed to be fit and relevant in the specific area of research.

2.2 Search Strategy

Table 1 Search syntax on Scopus. Source: Author's compilation

Data source	Search syntax
Scopus Database: Jan 02, 2019 (https://www.scopus.com)	(TITLE-ABS-KEY (mobile AND application AND development) AND TITLE-ABS-KEY (android AND application AND development)) AND (LIMIT-TO (PUBYEAR , 2019) OR LIMIT-TO (PUBYEAR , 2018) OR LIMIT-TO (PUBYEAR , 2017) OR LIMIT-TO (PUBYEAR , 2016) OR LIMIT-TO (PUBYEAR , 2015)) AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (SUBJAREA , "COMP") OR LIMIT-TO (SUBJAREA , "ENGI") OR LIMIT-TO (SUBJAREA , "BUSI")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SRCTYPE , "j"))

Keywords such as "Mobile application development" and "Android" were used to fetch results. The search for the keywords was done independently on Scopus using 'AND', 'OR' operator between the keywords and therefore the outcome of the search of the above-mentioned areas were combined using an 'and' operator. The first stage search resulted in 29580 journal articles when searched with the keywords "Mobile application development" in the Scopus database since the inception of the topic. So, a second level search was initiated by adding keywords "Android Application Development" which finally ended up in 3124 potentially eligible studies results. Then, non-duplicate citations were screened in "Mendeley" reference manager for all the databases combined. This resulted in 2207 non-duplicate citations. The next step was to apply inclusion/exclusion criteria as at this point of the evaluation. The initial inclusion criterion was that the articles must be written in the English language, and the keywords searched must be present in the title, subtitles and abstract of the articles, and this resulted in 322 results. The studies must examine android application development in their theoretical or empirical studies. This led to the exclusion of meta-analyses, unpublished research comments, dissertations, master's theses and language publications not in the English language. So, the final number of relevant papers was 26. These articles have been reviewed to understand the work done in these areas. The results can be copied in their respective databases and cross-checked to provide the results, but as these databases are dynamic and actively updated, the results may vary in the number of documents (Gupta et al., 2017).

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Stage 1 ───────▶  Relevant studies for
                  keyword: Mobile          ──────▶  N = 29580
                  Application Development:
                  #1
                         │
                         ▼
Stage 2 ───────▶  Relevant studies for
                  keyword: Android         ──────▶  N = 3124
                  Application development:
                  #2
                         │
                         ▼
Stage 3 ───────▶  Combining the 2
                  searchers                ──────▶  N = 2207

                  #3:  #1 and #2
                         │
                         ▼
Stage 4 ───────▶  Include studies on the
                  document type(year, article,
                  subject area, journals) and ────▶  N = 322
                  language(English)
                         │
                         ▼
Stage 5 ───────▶  Include studies on the
                  basis of paper           ──────▶  N = 26
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Fig. 1 Stages in data selection (*Source*: Scopus Database, Jan 02, 2019). *Source*: Author's compilation

2.3 Analysis of papers.

The most relevant articles were considered for review which showed the importance of application development for organizations. Also, the blended procedure helps the organization to acquire right cellular technologies which can sync with existing set of operations and can fulfil the operational need. Bartin et al.(2018) proposed a four-stage evaluation framework for mobile ticketing innovations out in the open travel to enhance their convenience and improve their adoptability by the potential clients. The proposed evaluation framework was utilized when New Jersey travel's mobile ticketing application, MyTix, presented in 2013, was being produced. Cristian Ciurea (2010) exhibited the collaborative frameworks in the banking field and the job of specialists in creating portable applications. The Collaborative Multicash ServiceDesk (CMS) application as an auto-versatile and application database is forever kept the number of solicitations enrolled in every classification at once minute. Alin Isac (2013), elucidates in his study that mobile applications are currently an opportunity in IT due to the variety of

areas that can be applied from the banking, financial, guidance etc. and to the commercial, promotional strategies and even entertainment activities. He further explains that in the last three years, in the field of internet banking, the mobile banking applications have been offering various services such as Making money transfers; Paying bills; The establishment and withdrawal of bank deposits; Consultation of the bank account records and transactions history; Consultation of the BNR exchange rates or other banks; Making exchanges. Hussain et al. (2018) expressed their views on the security of mHealth applications, and the fundamental target is to propose a cognizant, pragmatic and proficient framework to enhance the security of restorative information related with Android mHealth applications. The proposed framework gives its planned insurance principally through a lot of security checks. Ferial Khaddage et al. (2016) has proposed a hypothetical framework for mobile learning. Chakraborti et al. (2015) talks about the methodology that can be taken at Mobile application layer, which would decrease the hazard to the enterprises. The framework can help any Enterprise which is setting out on its Enterprise Mobility voyage to lessen the dangers identified with Enterprise Data, imminent customers and statistic subtleties. Rahul D. Sadafule (2014) talks about his company, AppZoy, that is one of those apps' companies focusing on the Indian market, some chipping away at building apps in line with bigger companies and others contending in the open market in the app's stores. Two of their apps give a thought of the chances and difficulties of application development for the Indian market. Hajiheydari and Ashkani (2018) studied the decision making the procedure of users considering diverse factors, for example, abstract norms, attitude, recognition and quality. The theoretical framework of this study depends on TPB (Theory of Perceived Behaviour), TAM and some other related conduct and system hypotheses, for example, IS Success Model and Social Cognitive Theory (Kousar et al., 2018). The study has given a superior, increasingly target comprehension of the genuine challenges looked by the mobile application engineers today, past verbose stories with their proper arrangement. The results reveal that managing different mobile platforms is a standout among the most troublesome parts of mobile advancement. Passini and Affonso (2018) talks about the methodology that can be taken at Mobile application layer, which would decrease the hazard to the enterprises. The framework can help any Enterprise which is setting out on its Enterprise Mobility to lessen the dangers identified with Enterprise Data, imminent customers and statistic subtleties. Ahmed et al. (2018) distinguished the difficulties of native, web, and hybrid mobile applications, which can undermine the effective improvement of such applications. Their examination expects to give mobile application developers, with a far-reaching set of difficulties which will bolster them being developed of mobile applications (native, web and hybrid). Papageorgiou et al. (2018) has given an inside and out security and protection investigation of the absolute most well-known freeware mobile health applications. They have performed both static and dynamic investigation of chosen mobile health applications, alongside custom fitted testing of every application's functionalities. Past researcher (Wei et al.,2017) in their work proposed a machine learning-based approach to recognizing malicious mobile malware in Android applications. Based on the proposed approach, they implemented a malicious app detection instrument, named Androidetect. The test results demonstrate that Androidetect can more readily distinguish malicious applications of Android by utilizing a combination of system functions contrasted to the past work. Lim et al. (2015) estimated that there exists a country differences in mobile app user conduct and leads one of the biggest surveys to date of app users over the world, to recognize the exact idea of those differences. Analysis of the results uncovered new challenges to market-driven software engineering identified with packaging necessities, feature space, quality desires, app store dependency, price affectability, and ecosystem impact. Lee et al. (2004) in his book gave a speedy survey of elective technologies that may intrigue developers officially acquainted with application development utilizing such environments as Microsoft Visual Basic .NET and C#. Alhassan M et al. (2015) has intended to study the practices and methodologies of mobile-based Da'wah al-Fardiyyah utilizing mobile learning technique among youthful grown-ups. The study proposed a model that disposes of spatial and temporal limitations amid the procedure of da'wah. In light of the proposed model, a mobile application was created on android stage to encourage crafted by Da'wah al-Fardiyyah. Kåreborn and Howcroft (2011) inspects the under-looked into the territory of mobile application designers and considers a portion of the present difficulties confronting this sector inside the IT workforce. Drawing on qualitative research did in Sweden, the UK, and the U.S., they dissected designers' encounters to show how they react and adapt to the turbulent condition of the IT sector. Charland and Leroux (2011) examined a portion of the qualities and shortcomings of both Web and native methodologies, with uncommon regard for zones where the gap is shutting between Web technologies and their native partners. In past research (Paul Pocatilu, 2010) fundamental strides is being developed of a distributed mobile learning application for Android. The customer application speaks with the server utilizing Web administrations. The prototype created incorporates the testing module. Caus et al., (2009) presented 'Hydra', a framework to disentangle and abbreviate the improvement of context-aware mobile applications and hence render the advancement of these applications all the more economically practical. It can institutionalize and streamline the execution of these applications and make it more cost-efficient

3.0 Discussion and conclusion

The need and want for the custom mobile application development is genuine, yet numerous undertakings are finding that testing on various fronts like, from the mobile development procedure to choosing the best methodology to make the mobile application successful. For a successful implementation, endeavours ought to have the best possible development process including prerequisite social event, structure, development, quality affirmation, dispatch, and support. The mobile application development ought to be strategized thinking about exhibitions, adaptation, client commitment, and so forth. What's more, challenges like security, UI/UX and execution v/s battery ought to be defeated to make the application successful.

With the aim to assess the current state of practice for the mobile application development we are developing a leave management system app. The proposed leave management system app will make the whole leave management process efficient. There will be no paperwork as users in an organization can apply for leave through the app. Users will now be able to know their leave status. The employees can apply for leave from their home also. For security, users have to first login through their user-id and password which will be sent on the server. The server will then authenticate the data with the stored database. This supporting app will help the management in decision making in case of leave related affairs.

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