

# Identification of Key Issues and Challenges in Mobile App Development: An insight in to Pakistan industry

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**Abstract-** With the rapid growth in usage of mobile phones specifically the smart phones, there is an ever increasing demand for latest mobile apps. With this demand, comes the challenge for developers to build apps in such a way as to provide security, easy navigation, efficient memory utilization and reliability to the end users. To find out these and other challenges that are commonly faced by developers, a survey was conducted specifically for the Pakistan industry. It was found that time and budget constraints play vital role in delivering apps to customers at right time. As far as features are concerned security and integration with third party API provide a challenge to the developers.

**Keywords:** Mobile app development, development.

## I. INTRODUCTION

Over the last few years mobile phones have become one of the most frequently used medium of communication. With an ever increasing demand for smart phones, the market for mobile applications is also increasing. A mobile application is designed to run on smart phones. Its main purpose is to provide end user to interact with the system in an easy and effective way. The users of mobile phones demand ease of functionality as is experiences on desktop PCs and along with that they also expect additional features specific to mobility.

However as mobile application development is relatively new concept, it brings about new challenges for the developers. The challenges include factors such as security, resolution, platform management, reliability, ease of use etc.

Initially mobile apps were limited to providing facts such as emails, calendar, weather information etc but now they include everything from games, music, lifestyles to providing health and fitness guides. It therefore becomes even more challenging to cope up with ever changing demands of app users for making novel apps.

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This research study aims to identify problems and challenges encountered by app developers specifically in Pakistan and provides suggestions that can be helpful in future mobile app development.

## II. LITERATURE REVIEW

The development platforms and the tools and technologies that support the mobile application software are different from traditional environments desired in typical software. The most important distinctive features are identified in [1]. The software teams undergo a continuous challenge of accepting changing customers' demands [2]. A lot of variety of different devices is available in market with different specification of hardware, software and firm ware. Some other constraints have been presented by [3]. He describes constraints in terms of evolving and inherent constraints. Evolving constraints include bandwidth, coverage and security issues, inherent constraints include limited screen, reduced data entry capability, memory and storage, limited power and battery reserve etc.

Mobile applications may be divided into many types. Based on the literature we find that many authors have divided the applications into two broad categories namely: native and hybrid apps [4][5][6][7]. Native mobile apps are developed to perform task on a specific environment or platform. An example of such an application would be development of android app using java development kit on a java platform. On the other hand hybrid mobile apps are developed using web technologies such as HTML or CSS. [8].

In [9] authors have divided mobile applications in to twelve classes. Example classes include Mobile financial applications and entertainment services. However, these classes only apply to mobile commerce applications and do not provide guidelines for implementing new applications. For this reason the research conducted by [10] proves more useful. The authors have divided mobile applications into two groups: highly goal-driven and entertainment focused. They have also provided seven guiding principles for the implementation of highly goal-driven mobile services: mobility, usefulness, relevance, ease of use, fluency of navigation, user-centered , and personalization.

There are lots of challenges and features that need to be addressed while making a mobile app. A few of them are identification of target market and market analysis in order to determine the purpose of building app and predicating the benefits to be achieved from app. Choosing the right app type in terms of the benefits it brings to the developing organization and customers is yet

another challenge. At the same time it is important to have an insight of one's own capabilities for developing a product. Companies are therefore sometimes required to do SWOT (strengths, weaknesses, opportunities and threats) analysis to determine the key strengths that can be utilized internally and weaknesses that can be overcome by outsourcing certain features to third party. Once an app is built successfully it is also equally important to decide marketing strategy. Decisions regarding use of ads, banners, app specific offers and use of analytical tools must be taken in order to make an app a successful one. No matter how much effort has been done to make product a perfect one there is still a chance of error and bugs. So it is equally important to test the app. providing a beta version to let customers experience the app is a good option to make it a successful one. The developers also need to address issues regarding the platform, as there are multiple platforms such as android, ios etc.

Another aspect of importance is the decision regarding screen sizes and resolutions and the user interface of apps needs to be flexible enough to get adjusted to these different requirements [11]. Considering issues related to battery life and energy consumption of mobile apps [11]. User interface related issues that includes the contents of pages, the navigation structure etc [12]. Providing translation of user interface to multiple languages is another consideration for developers. The main challenges faced by developers are depicted in figure 1 below.

### III. RESEARCH DESIGN

#### A. *Problem Statement*

Despite of the fact that there is an immense improvement in designing and development of mobile apps, there are still many issues which are unidentifiable and thus cause lack of satisfaction to the customers. It is therefore important to find out all the possible risks and issues that are faced during development and during the final delivery of mobile apps. Finding the key risks factors and challenges will in turn cause developers to develop more robust applications that fulfill user's criteria and is according to the standards.

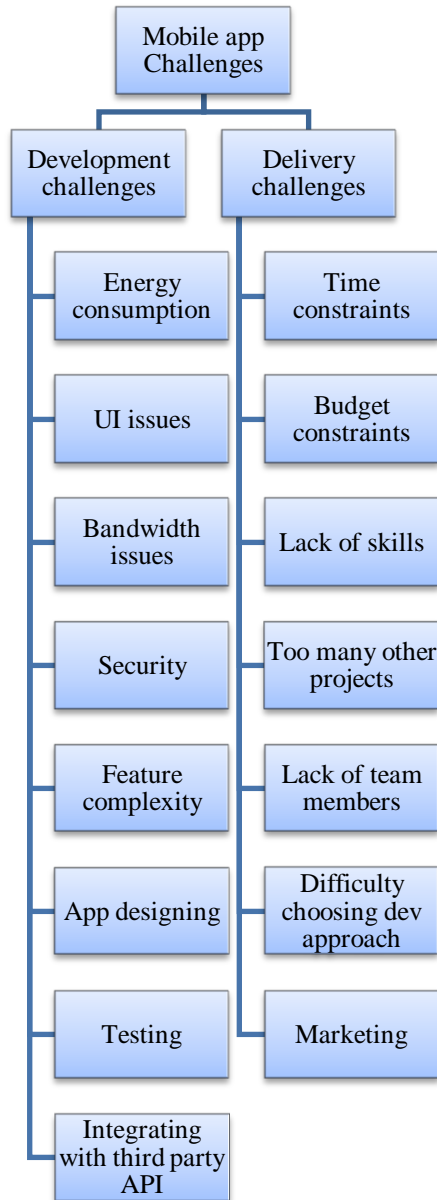


Figure 1:Challenges in Mobile App Development

*B. Data Collection and Analysis*

A Survey was conducted to get required information from industry people. An extensive online questionnaire was built by using Google forms based on available literature related to issues in

mobile app development. This literature was not just limited to internet but also included journals, books and articles etc. The questionnaire consisted of demographic of respondents including name, organization name, organization type, size of organization and types of apps they build. The next set of questions were based on gathering information about different types of challenges the developers face either during the development of app or during delivering product to customers. We were able to reach out 200 respondents, out of which only 70 provided their feedback. The details of respondents and their feedback regarding issues of app development is provided in next section despite of the fact that there is an immense improvement in designing

#### IV. FINDINGS AND DISCUSSION

The data was gathering from two engineers working for the case company. A lot of brainstorming sessions were being conducted during the planning and designing phase of KMS. All the stakeholders were involved included but not limited to board of directors, managers and senior managers, engineers and staff from various departments such as maintenance, system support, supply chain and others. After several meetings, the company identified following challenges and issues:

##### A. Respondents Roles

Questionnaire was submitted to diversified personnel in mobile app development, these included project managers, developers, quality engineers, analysts and others. The response percentage of each of them is given in table 1.

Table 1: Respondents Role

<b>Respondents role</b>	<b>% of responses</b>
<b>Developers</b>	61%
<b>Project managers</b>	10%
<b>Quality engineers</b>	7%
<b>Requirement analysts</b>	6%
<b>Others</b>	16%

### B. Organization Type

The responses were taken from both public and private sector companies. The percentage of responses in terms of organizational type is provided in table 2.

Table 2: Organization type

Organization type	% of responses
Public sector	23%
Private sector	64%
Others	13%

### C. Organization Size

A variety of organizations in terms of their sizes were selected to participate in this survey. He organizations were divided in to four categories on the basis of number of employees e.g. micro (employees less than 10), small (employees 10 to 49), medium (employees 50 to 249) and large (employees greater than 250). The responses show that 45% of the companies were of micro size, 23% small size, 22% medium size and 10% large size. The responses in terms of size of the companies are depicted in table 3:

Table 3: organization size

Organization size	% of responses
micro	45%
small	23%
medium	22%
Large	10%

### D. Company's Location

The questionnaires were distributed to all major cities of Pakistan. The responses were majorly from the areas of Rawalpindi, Islamabad, taxila and wah. The complete picture in terms of location of different companies is provided in table 4:

Table 4: company's location

Location	% of responses
Islamabad/ Rawalpindi	38.5%
Taxila/ wah cantt	36%
Karachi / Lahore	10%
Others	15.5%

### E. In-House vs Outsourced Services

When asked about which services the companies prefer to build in-house and which to outsource, it was found that other than marketing, all other services including application’s requirement gathering and concept making, product design, development are preferred by companies to be built in-house. The exact responses can be seen in the figure 2:

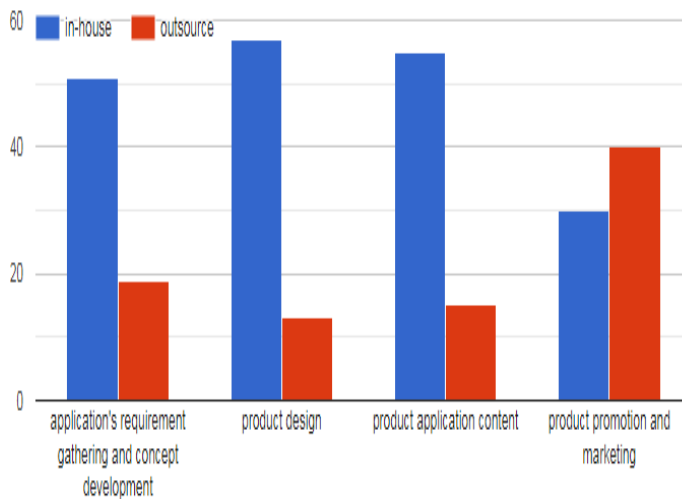


Figure 2: In-house vs outsourced services.

### F. Target Market

The respondents were asked to mention the type of market they operate on, from the feedback it was found that majority of the developers are either working on android (87%) or IOS (22%) with

very few working on other operating systems such as Symbian, mac OS etc.th details are provided in figure 3.

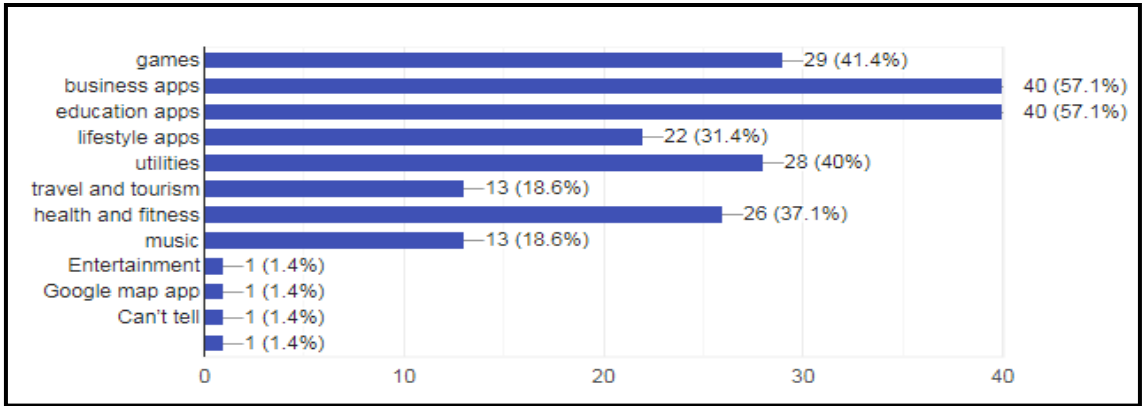


Figure 3: Target Market

### G. Types of Applications

Two questions were asked about types of mobile apps. One generic question asking about app type in terms of native, hybrid or web based and second asking about category in terms of game, business app, educational app, lifestyle app, health and fitness app etc. It was found that majority of market in Pakistan is making business apps and educational apps (57%) along with few developing games (41%), and utilities (40%) etc and the details are provided in figure 4.

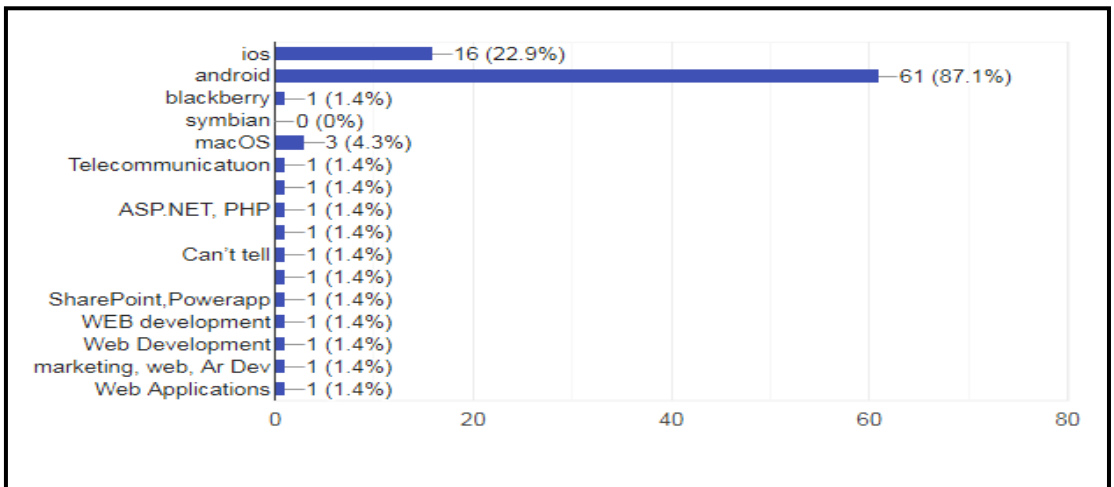


Figure 4: Types of Apps



### H. Challenges in Mobile App Development

The respondents were asked to choose the biggest challenges (at least 3) they face during mobile app development. The responses show that top four biggest challenges in app development are security issues while developing cross platform apps, integrating with third party APIs, user interface issues to provide ease and features complexity. A detailed information is provided below with the help of figure 5.

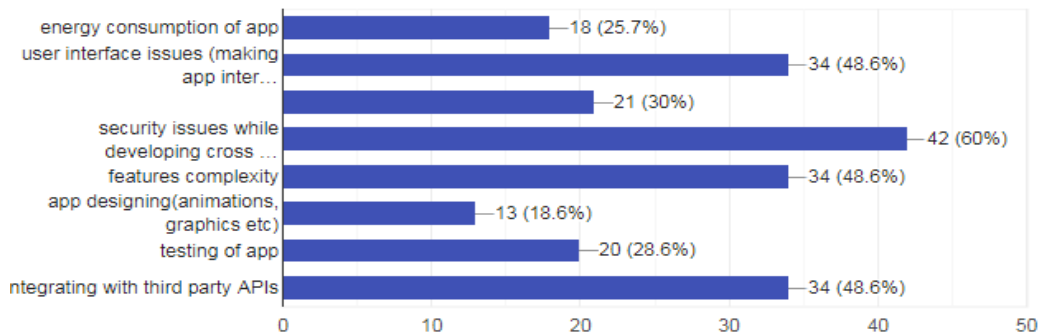


Figure 5: Challenges in Mobile App Development

### I. Challenges in Mobile App Delivery

While providing feedback regarding what issues and challenges the developers face when delivering the system to end user or client the respondents identify time constraints, budget constraints and marketing strategy issues to be the most challenging ones. A complete picture of different responses is provided in figure 6:

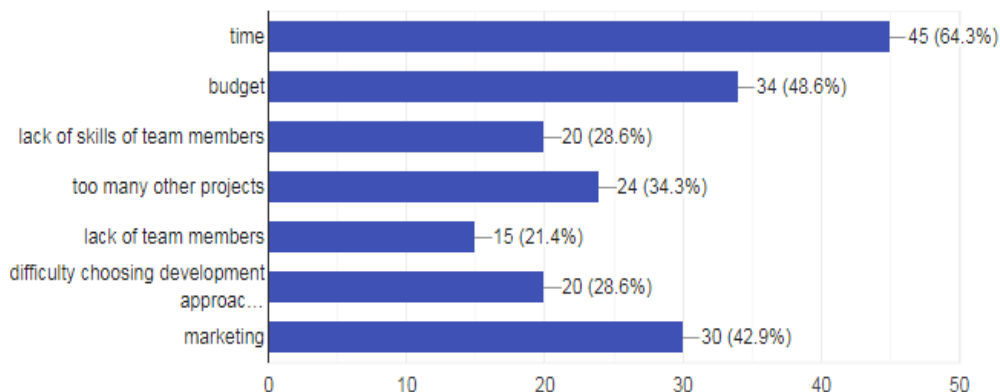


Figure 6: Challenges in Mobile App Delivery

#### V. CONCLUSION

This study provides guidelines for project managers and developers to build better mobile apps. From the results and findings in the above section it can be seen that there are many issues which need to be addressed by developers and project managers in order to provide useful apps to the users. If the major issues such as time, budget constraints are dealt in advance by project managers the final product has higher probability to be delivered to end user on time. For the developers the major concern is to deal with security issues while making cross platform apps. If this issue along with managing customer requirements to better understand the product features are dealt with care, it is possible to provide life time experience to user while using apps.

#### VI. LIMITATIONS AND FUTURE WORK

This study has given a very good overview of key challenges faced by app developers of Pakistan. But there are limitations to this work. Firstly the sample size was not the true representative of entire population. Secondly, this study focuses on identification of app challenges but doesn't provide the complete analysis and practices that can help managers to cope up with the challenges identified. So in future, a comprehensive study of best practices and standards in place can be made to overcome app risks and issues.

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