

Towards Tax Administration 3.0: Bracing the Challenges in Mobile Application Development

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Abstract

Tax Administration 3.0 calls for tax administrations to be a high-tech adaptive organization with human touch. To that extent, tax administrations worldwide have developed mobile app as a taxpayer touchpoint. As the results of tax administrations' digital maturity assessment shows major room for improvement, the mobile app development also faced with challenges. This study aims to investigate challenges in tax services mobile app development using M-Pajak as a case study. The descriptive qualitative approach used as our research method is composed of literature review, semi structured interview, open coding, and thematic analysis. Our study finds that M-Pajak development faces challenges related with project management and application requirements. To mitigate the challenges, it is important to ensure that projects are sufficiently staffed. Furthermore, change management must be implemented by focusing on user needs, who largely determine the application success. Meanwhile, fragmentation can be considered as the most critical challenge as it affects other challenges. Diversity of platforms and devices in which the mobile application will be operated potentially affects other factors, such as interoperability, user experience, privacy, and security. This study is important for tax administrations to anticipate challenges in developing their mobile app. Finally, this study also enriches the literature through the investigation of the mobile app development challenges in the context of tax services mobile app.

Keywords: Tax Services, Mobile Application, Project Management, Government, Public Administration.

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1. Introduction

Mobile internet connectivity has become quite widespread across the globe. By the end of 2022, 4.4 billion individuals will have utilized mobile internet access. In addition, by 2030, 5G internet access is predicted to benefit multiple sectors, mainly the services sector, including the public administration. Furthermore, mobile connectivity also aids public administrations in working toward sustainable development goals, primarily through digital inclusion [1], [2].

The digitalization of many aspects of life, including the use of mobile devices, whose functionality and speed are rapidly increasing, is changing citizens' expectations regarding aspects of daily life. These new expectations impact tax administrations as well. These changes offer a chance to address some of the structural shortcomings of the current tax administration system [3], [4].

1.1. Tax Administration 3.0

Tax Administration 3.0 envisions tax administrations to be integrated into taxpayers' natural systems. This is so that they can provide tax certainty in certain manners. It is expected that tax certainty provided in a real-time, reliable, and transparent manner [3], [5]. For achieving the vision, it is indispensable for tax administrations to be a part of a robust "system of systems", be integrated with the whole of government, and be an adaptive

organization with high technological competency while retaining human touch. Mobile apps primarily support the taxpayer touchpoints building block as shown in Figure 1.

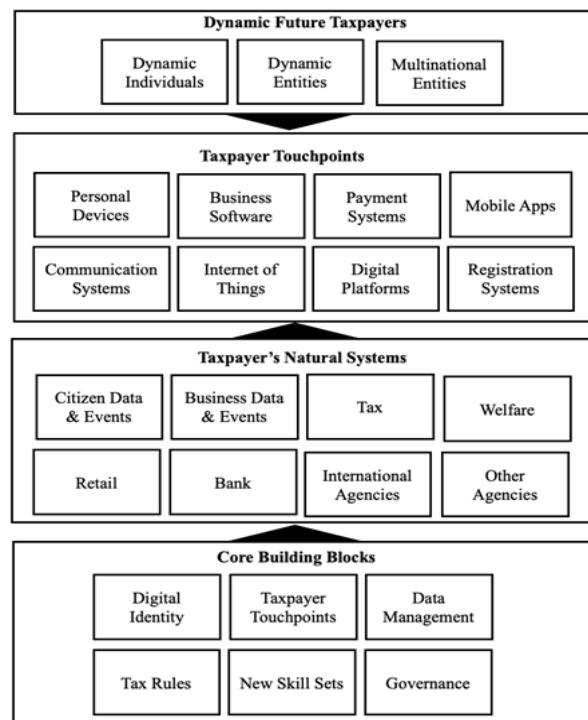


Figure 1. Framework for Building Blocks towards Tax Administration 3.0 [3]

Taxpayer touchpoints allow taxpayers to interact with the tax administration process as needed. This achieved by providing real-time help. Tax administrations must strive to integrate these touchpoints, especially in more automated ways, into taxpayers' natural systems [3], [5].

The OECD's Tax Administration 3.0 vision is in line with global society digitization. It advocates for a thorough digital redesign of procedures pertaining to tax administration. It goes beyond just adjusting to ongoing changes in society. It also seeks to decrease compliance gaps, promote policy innovation, and lessen administrative responsibilities by utilizing digital innovations. In order to create an effective and simplified tax administration system, it presents six essential building blocks: data management and standards, digital identification, governance frameworks, new skill sets, tax rule management and application, and taxpayer touchpoints [3], [6].

As an action plan in working towards Tax Administration 3.0, a maturity model for tax administrations' efforts in digital transformation was conceived by OECD. Table 1 illustrates the average results of the pilot self-assessment compiled and analyzed by OECD from 55 tax administrations worldwide. A digit score represents each maturity level as follow: emerging (1), progressing (2), established (3), leading (4), and aspirational (5). It can be inferred from the results shown in Table 1 that averagely, tax administrations assess themselves at established level (3) which provide a significant room for improvement [7], [8], [9].

Table 1. Tax Administrations Digital Transformation Maturity Assessment Results, 2022 [7]

| No | Building Blocks & Attributes | Average Score |
|------|---|---------------|
| 1. | Digital Identity | |
| 1.1. | Digital identity creation | 3.09 |
| 1.2. | Digital identity utilization | 3.04 |
| 2. | Touchpoints | |
| 2.1 | Channels types | 3.07 |
| 2.2 | Services accessibility | 3.05 |
| 3. | Data | |
| 3.1. | Data standards & availability | 2.93 |
| 3.2. | Privacy & security of data | 3.31 |
| 4. | Regulations | |
| 4.1. | Tax legislations | 2.85 |
| 4.2. | Assurance for regulations compliance | 2.76 |
| 5. | Skills | |
| 5.1 | Function & strategy for human capital | 2.62 |
| 5.2 | Development of skills | 2.82 |
| 5.3 | Planning for the administration's workforce | 2.58 |
| 6. | Governance | |
| 6.1. | Formulation of strategy | 2.91 |
| 6.2. | Mechanism for governance | 2.71 |

Previous study has reviewed the literature and found that in majority, research in electronic tax services has been centered around electronic platforms for tax reporting and payment. However, the growing sophistication of electronic tax services, involving various disruptive technologies and innovations, create new research opportunities. There are gaps in the literature on e-tax

concerning the variety of digital technologies examined, including the mobile application technology [8], [9].

1.2. Mobile Application for Tax Administration 3.0

Serving as a taxpayer touchpoint, mobile application technology can assist the improvements of effective communication, interaction, and engagement facilitation with taxpayers to increase the tax administrations' operation efficiency. Other touchpoints, such as in-person interactions, phone conversations, multipurpose websites, e-services, and business management systems, are also used to manage and support tax administrations' operation. These taxpayer touchpoints assist in resolving conflicts as they emerge, such as misunderstandings, atypical situations that need for more communication with the administration and malfunctioning procedures [3], [10].

Mobile apps also support the digital identity building block. This component facilitates individual identification of citizens and taxpayers in a coordinated, seamless, and secure manner. Consequently, it also eases administrative load and assists in the background processing of taxpayers' natural systems [3], [11].

In order to improve the mobile application development process, it is necessary to consider industry's standards and best practices. Guide to the Project Management Body of Knowledge, or PMBOK, up to its sixth edition, is a standard that specifies and conceptualizes knowledge domains, processes, tools, and approaches in project management. With the release of the seventh edition in 2021, the publication's customary format was broken along with some paradigms. Project best practices were moved to a digital collection and later rebranded as PMI Standard Plus. Meanwhile, knowledge areas and process groups of PMBOK were suppressed in favor of principles and performance domains [12], [13], [14].

1.3. Mobile Application Development Challenges

Multiple studies have been performed to identify challenges in mobile application projects. Literature review have been employed to investigate the challenges. In addition, text analysis and inferential statistics have also been utilized to explore the topic [15], [16], [17], [18], [19].

One of the most often mentioned difficulties encountered by developers of mobile applications is the fragmentation issues. This is caused by the fact that every mobile platform has its own graphical user interfaces, standards, programming languages, APIs, capabilities, and SDK that sets it apart from the others. The fragmentation problems arise not just between platforms but even inside them. For example, there are devices with unique characteristics such as memory, speed, and graphics resolutions [15], [16], [17], [20].

The interoperability of a mobile application to other systems or components also becomes a challenge for developers. In order to link systems and services, it is necessary to make use of standards, interfaces, protocols, and suitable software engineering methods and procedures. In that regard, interoperability issue might be worsened by fragmentation problem [21], [22], [23].

Another challenge that is also often identified is testing. Several factors that contribute to testing difficulties including unavailability of automated tools and testing environment, integration problems, mobile-specific features, usability, managing rapid updates, resolving crashes, and complexity. Similar to the interoperability challenge, the testing challenge also have the possibility to be negatively impacted by fragmentation problems [15], [17], [20], [24], [25], [26].

Change management is also a challenge that is important to be tackled by developers. Updates or changes to the mobile application pertaining to functional or non-functional requirements increase the difficulty for the application development. The application might need to be changed as a result of enhancements, dissatisfaction from users, or the implementation of imprecise and confusing requirements [15], [18], [19], [24].

In addition, user experience has been reported to be challenging for developers. Platform differences has caused inconsistent behavior. As this problem might sometimes be accompanied by poor reaction times, they often hinder the user experience and performance [15], [17], [18], [19], [20], [27].

Due to the open nature of mobile platforms, it can be difficult to ensure the security of mobile applications. Malwares can disrupt regular device operations. This disruption includes the covert transfer of data through such malware [15], [17], [24].

Developers might encounter issues while ensuring users' privacy during development. There is a possibility for users to encounter privacy issues while sharing their information in the mobile app. Some services pertaining to personal information are geolocation tracking services, real-time personalization, and recommendations. Users may be reluctant to download an app because the service provider may gather, retain, and utilize their personal information [16], [17], [28].

Human resource can also pose as a challenge in the development of mobile applications. The extensive smart features offered in the mobile devices requires significant budget, time, and effort to be implemented in a mobile application. For instance, developing an app with location-based service, virtual reality, augmented reality, 3D printing, and gamification elements would be costly and time-consuming. Therefore, more app developers with the necessary abilities are needed [16], [28].

As mobile application development project has a unique set of challenges, much like other software engineering fields, it is important to investigate the challenges in various contexts. Using the Indonesian tax administration mobile app (M-Pajak) as a case study, our research attempts to investigate challenges in mobile application development within the context of tax services mobile applications. To the best of our knowledge, there have not been any similar study investigating the tax services mobile application. This study's findings will assist tax administrations in foreseeing these challenges as they work to implement the Tax Administration 3.0 vision. For that purpose, a research question for this study is determined as follow: *What are the challenges encountered in the development of M-Pajak?*

2. Research Method

This study is aimed towards identifying the challenges in mobile application development using a specific case study. For that reason, this study uses the descriptive qualitative approach for a single case study. The descriptive qualitative approach has been previously used in multiple studies related with mobile application development [29], [30], [31], [32].

3.1. Case Study: M-Pajak

M-Pajak is the official mobile application of the Directorate General of Taxes (DGT), geared towards simplifying the management of tax rights and obligations for taxpayers. The application offers a variety of tax services for its users. Launched in 2021 on Indonesia's Tax Day, the M-Pajak application has seen several updates. Available on both the Google Play Store as well as the Apple App Store, the application has been downloaded more than one million times [33], [34].

3.2. Data Collection Method

Semi-structured interview has been employed in previous studies for understanding practitioners' experiences and viewpoints on challenges in software development [35], [36]. In our research, we employ the method to gather data in the context of M-Pajak development. The informants for this study are the personnel of Indonesian tax administration involved in the M-Pajak development. Interview was performed online using instant messaging application.

3.3. Data Analysis Method

Collected data is analyzed using the open coding method. The open coding method is also supplemented with thematic analysis to elicit themes relevant to the emerging codes [37], [38]. Both the open coding and thematic analysis are performed using Microsoft Excel.

3. Result and Discussion

3.1. Open Coding Results

Open coding on the interview transcripts has generated the codes outlined in Table 2. These codes have been

mapped into concepts based on a previous study [15], [39]. Additional concepts have been added as well since they do not fit the concepts identified in the previous study.

Table 2. Open Coding Results

| Codes | Concepts |
|--|-------------------|
| Error in other connected applications affect M-Pajak | Interoperability* |
| Handling of user mistakes in filling data | User Experience |
| Fulfilling users' expectations | Change Management |
| Error due to server load in other connected applications | Interoperability* |
| Challenges in convincing users on the benefits of the mobile application | Change Management |
| Challenges in satisfying requirements from different application stores | Fragmentation |
| Timing of the app publishing in different application stores | Fragmentation |
| Users not informed on how to use the application | Change Management |
| Need to create easier user interface | User Experience |
| Need to publish FAQ and helpdesk regarding error | Change Management |
| Challenging requirement to protect security and data privacy | Privacy* |
| Challenging requirement to protect security and data privacy | Security |
| Balancing between protecting privacy and improving ease of use | User Experience |
| Balancing between protecting privacy and improving ease of use | Privacy* |
| Two factor authentication | Security |
| Inconvenience due to increased security | User Experience |
| Inconvenience due to increased security | Security |
| Fulfilling users' expectations | Change Management |
| Necessity to respond user reviews | Change Management |
| Team not dedicated | Human Resource* |

*) additional concept

3.2. Thematic Analysis Results

Codes and concepts identified in the open coding are categorized into several themes as identified in Table 3. Based on the analysis, the concepts can be organized into two themes. These themes are: (1) *Project Management*, and (2) *Requirements Elicitation*.

Table 3. Thematic Analysis Results

| Concepts | Themes |
|-------------------|--------------------------|
| Human Resource | Project Management |
| Change Management | |
| Fragmentation | Requirements Elicitation |
| Interoperability | |
| User Experience | |
| Privacy | |
| Security | |

3.3. Project Management

Planning, organizing, followed with motivating, and supervising resources are among the processes within project management. It is intended to accomplish objectives within certain constraints, typically limited time. Main problem in project management is meeting all project goals and objectives while adhering to limited scope, time, quality, and budget [40], [41]. Project management is one of the themes identified in the

thematic analysis of coded interviews. In the case study, human resource and change management have been pointed out as the challenges encountered.

3.1. Human Resource

In our case study, human resource or staffing has been identified as a challenge, since the team is quite limited and non-dedicated. Our informant mentioned that: "In terms of IT personnel, the M-Pajak IT team consists of only 4 people, and they are not solely focused on the development of M-Pajak. They are not a dedicated team." Understaffing can result in project delays and overspending. It can also cause failure to provide the anticipated results [42], [43].

3.2. Change Management

In the case study, there have been challenges in convincing the adoption of the application, handling uninformed users, as well as managing user expectations and feedback. The informant explained that: "There are also other challenges in convincing users to download M-Pajak to enjoy the benefits." In addition, it is also noted that: "Another obstacle is that users are not informed on how to use the application." Finally, it is also mentioned that: "There have been disappointed users when their purpose is not satisfied."

The success or failure of mobile applications is largely affected by user expectations. Meeting user expectations requires an understanding of user perceptions, emotions, and control [44]. Dissatisfaction expressed by users can push for the need to change the application [15], [24].

3.4. Requirements Elicitation

Collaboration and a high level of understanding are required for the requirements elicitation process. Requirements gathering must also extract implicit requirements in addition to explicit requirements stated by stakeholders [45], [46]. These can be sourced from fragmentation, interoperable applications, as well as privacy and security regulations.

3.4.1. Fragmentation

In our case study, the fragmentation problem is mostly related with application store policies. The policies determined by application stores might cause delay in publishing mobile application. It has been mentioned by the informant that: *"the challenge is to comply with the policies of each OS (application store). There's also a delay, on Android the update is already up, but on iOS, it is still under review."*

The mobile application stores' technology architecture allows mobile content providers to release customized applications and add unique value. End users are drawn to the platform by the ease with which they can download, buy, and utilize applications, which gives application stores the authority to function as crucial gatekeepers and intermediaries. The authority can manifest in the form of policies implemented by application stores which bind both end users and providers of mobile content [47], [48].

However, the different policies also affect the portability. The industry finds it extremely difficult to build native applications with support for every platform. This is because it requires a specialized skill set, additional expenditures, and labor [15], [20].

3.4.2. Interoperability

In the case of M-Pajak, issues in other systems can affect M-Pajak user experiences. The informant explained that: *"M-Pajak is integrated with other applications, such as e-reg (electronic registration), so when there is an error in e-reg or they face issues, users give poor ratings to M-Pajak. Additionally, when the Dukcapil (residency and civil registry service) server load is high, there are errors during data validation with Dukcapil."* In order to create a frictionless experience, tax services mobile application can serve as a touchpoint for taxpayers when interacting with other services, through the backend system of the tax administration [3]. Primarily, interoperability in the mobile application is implemented using mobile API. It has been identified that in terms of mobile API, API requests become the most challenge faced by developers [17].

3.4.3. User Experience

In our case study, user experience has been hindered by security measures employed in the application. The informant stated that: *"users feel frustrated about having to undergo two-step verification."* User experience (UX) components that influence users' overall assessment of IT products include usability, service quality, aesthetics, and pragmatics. Finally, hedonics is considered to be the users' evaluation of the overall qualities of a product [49], [50], [51].

By placing more importance on security, the application usability has been given less emphasis. This difficulty is also impacted by the differences in user interface sizes and access to device functions, among others. In that regard, the challenge is related to fragmentation problem as well [15], [27], [52].

3.4.4. Privacy

In the case study, data privacy of users is of utmost importance. An example of users' personal data that need to be protected is the users' email address data. The informant explained that: *"we cannot explicitly inform users that the verification code will be sent to 'abcdexy@gmail.com' but must blur it to 'abXXXXXXXX@gmail.com.'"*

Indonesian tax law stipulated that it is forbidden for the tax administration to disclose to any other person any information that they have learned or received from the taxpayer while doing their responsibilities or working to enforce tax rules [53]. In addition, as public (government) electronic system provider, the tax administration is also obliged to ensure that personal data is protected within their systems [54]. Furthermore, privacy problems might arise when information is gathered without the individual's consent [55], [56].

3.4.5. Security

As privacy become very important to be protected, security also become a challenge that must be seriously addressed. Security becomes one of the means to protect privacy. The informant explained security as one of the challenges, stating: *"The challenge involves maintaining security and data confidentiality. Additionally, when logging into M-Pajak, there is a request for a verification code to be sent to the email after the user inputs their password."*

Although mobile applications have made it possible for users to access new and extensive functionalities, they also create security threats since mobile devices store private and sensitive data that might be compromised by malicious software [57], [58]. Due to the open nature of mobile platforms, it can be difficult to ensure the security of mobile applications. Malwares can disrupt regular device operations, including the covert transfer of data through such malware [15], [24].

3.5. Limitations

This study is limited in a single case study. Therefore, the findings must be related to a specific context. In addition, the understanding of challenges in mobile app development represents an initial step in attaining Tax Administration 3.0 vision. There is still very wide research avenue to be pursued by referring to each building block of the Tax Administration 3.0 framework. Some possible topics are the digital identity, internet of things, data management, and internet of things with regard to tax administrations context.

4. Conclusion

Based on our research, it can be concluded that in the case study of M-Pajak development, several challenges from previous studies are also present. Those challenges can be related to the project management and requirement elicitation. In our case study, fragmentation can be considered as the most critical challenge as it affects other challenges. Diversity of platforms and devices in which the mobile application will be operated potentially affects other factors. Our findings are useful for tax administrations for mitigating their mobile application development. Our research will also fill the gaps in the literature of challenges in taxation services mobile application development. However, our findings contribute as an initial step in attaining Tax Administration 3.0 vision. Further research and actions pertaining to the remaining taxpayer touchpoints and core building blocks are necessary to realize the vision. For future studies, we recommend extending our investigation by comparing IT project challenges faced by multiple case studies with different characteristics.

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