

## Implementation of a Research Plan Management System for Research Center of TIU University

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**Abstract:** Mobile apps are always evolving to make our lives simpler. This research study focuses on developing a cross-platform mobile application for TIU's research center's Research Plan Management System (RPMS). TIU currently does not have a mobile application that allows academics to submit their annual research plans and proposals online rather than filling out paper or electronic forms. This study was done at TIU's research center for an experimental object, and it used Flutter as a development platform, Firebase as a backend database, and Dart as a programming language to create a mobile app that serves as a research management system for the institution. It enables related departments to track the research publication process until it reaches the final stage, and staff may electronically submit their research plans and acquire the appropriate permissions, as well as allowing the Research Center and departments to view real staff progress. According to our study survey, more than 70% of TIU staff believe that using a mobile application to submit and follow-up with the research plan is better than the traditional paper-based system.

**Keywords:** Flutter, Mobile Application Development, Cross-Platform Applications, Research Center, IDE, Android Development, IOS Development, TIU University, Research Plan Management System, Research Plan

### 1. Introduction

This Research Plans Management System Mobile App is being offered for Tishk International University in order to decrease faculty and student effort and time. Tishk International University (TIU) in Erbil is a major higher education school that offers undergraduate and postgraduate degrees in Engineering, Science, Business, Law, Education, Medicine, and Technology to students. This university's goal is to be a leader in education, research, and community service in the country and region. As a result, to flourish as an academic institution, they must do research in addition to academic programs, and they may need to go out to the community in order to satisfy the needs of its teachers and students. To improve the quality of research, the institution needs a designed research management system to replace the present manual or paper-based method. The research center, faculties, departments, and rectorate will save a lot of time and have less work to do as a result.

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The primary goal of this project is to develop a cross-platform smartphone application to manage research programs for TIU's research center.

The following are some of the goals of this paper:

- To provide faculty members with more opportunities to participate in a variety of research projects.
- To provide a management procedure that makes it simple for employees to contribute their research plans and track their progress.
- To enhance user management based on staff and research center authority and rules.
- To provide adaptable electronic models by allowing users to make modifications to the data they've entered, such as altering the status of their research plans.
- To provide simple access and communication between academics and the research center by offering a user-friendly system, as well as facilitating speedy and effective decision-making.

## 2. Current System

TIU currently uses manual systems such as paper and online forms, therefore the authors intended to design, develop, and install a new mobile app that would make things simpler for the research center and faculty. The primary difficulty with the current system that we discovered was that faculty had to fill out many application forms on their own, which had to be signed and stored by various departments and divisions, as well as the dean, research center, and rectorate. This results in a waste of time and effort. TIU's existing system lacks a research management system that allows personnel to effectively implement their research plans and advances. The existing system consumes the physical storage space that is required for document storage. If a mistake is made, or if any adjustments or corrections are required, the manual procedure must be performed rather than simply updating, which is inefficient. Producing the reports again takes a long time and costs a lot of money.

## 3. Literature Review

The research management system in colleges and universities is a software that supports the development of scientific research projects and information management in the university (Ji & Zhang, 2019; Velásquez-Durán, Anabel, & Montoya, 2018). In accordance with the actual needs, the management of the scientific research process, researchers, and university management should be included to represent perfect management platforms for universities to solve different problems. For example, the informatization management of scientific research projects, the heavy stress on research units managers, the enhancement of the accuracy and timing of research data, the statistical and analytical capabilities of data, and the sharing of scientific research information (Zuming, Yuezhong, & Yiping, 2018; Wilson, 2018).

Stirling University researchers have proposed a system of active research management and research that is relevant to society's requirements. As a result, they can maintain high-quality standards across all of Stirling University's research activities. Their goal is to enhance research performance and increase research income according to the research plan (2015-2021). Their system comprises project development and research systems management, and it allows faculty and students to make major contributions to research that has both economic and social implications. This system combines sophisticated support mechanisms with a highly efficient online research infrastructure aimed at increasing the capacity to deliver, enhance, and demonstrate an effect. It is critical that the suggested

system be adaptable in terms of advising research and knowledge exchange activity availability (Bruton & Lau, 2008).

According to Kirkland and Ajai-Ajagbe (2013) the administration of research is crucial because it has the potential to increase institutions' impact on larger cultures. Carnegie Corporation of New York funds an African university. The activity revealed that academics are increasingly interested in research management and want to do more research. However, there are challenges with managing all of the research activities, such as a shortage of resources and inexperienced people, as well as identifying funding sources and negotiating contracts and the efficiency with which these operations were carried out. It has collaborated with five other institutions for improving the quality of their research management. Its goal is to raise consciousness and then transfer that awareness into organizational structures so that it may be put into practice (Heras-Saizarbitoria & Boiral, 2013). Cihan University in Kurdistan region of Iraq in Erbil city has adopted a research management system developed by one of their staff (Hamid, 2019). This system aims to manage and monitor of publications in the university to solve many problems of the traditional paper-based system.

These problems related to collecting information from the colleges, generating publication reports, organizing the classification of publications, compiling publication statistics, displaying all details for each publication, and nonexistence of easy-to-use database for all researchers' information. Regarding TIU University, it has a University Management System (MIS) called Personnel Information System (PIS) which manages students' records, transcripts, courses, attendances, and many other parts related to staff. In addition, PIS is used to store published research papers of researchers to consider their research incentives. However, PIS is not dealing with other aspects such as faculty yearly research plans and publication process of the university journals. Therefore, the authors will try to develop a research plan management system to make it easier for TIU research center to follow up with the researchers' plans and progress.

#### 4. Proposed Method

The proposed method for this research called Dynamic System Development Model (DSDM) has been explained in Figure 1.

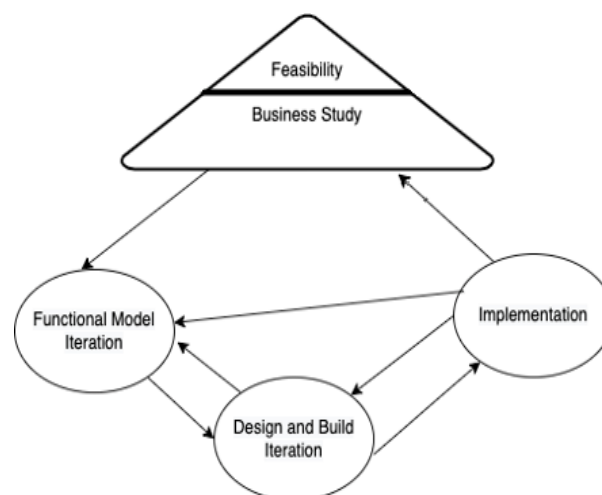


Figure 1: DSDM method

According to Dinata and Marlim (2020) the five stages of DSDM are explained briefly below:

- This stage's feasibility study will explore the potential consequences of continuing to utilize the previous system as well as what measures to take in the project's future.
- The goal of the functional iteration model phase is to create a functional model that includes both a working software prototype and a static model, and it results in the processing of data gathered during business research. This phase may result in functional, non-functional, and time box plans, as well as functional model review records.
- The Design and Build Iteration phase completes the working prototype created in the previous phase by designing a system that meets the demands of the users and creating it.
- Following the completion of the software, and implementation plan is necessary. New system users are educated about users, necessary resources, and enhanced user competency in using computers during this phase of installation as well as determining whether there are any flaws or errors that may be addressed while the system operates.

Both the employees and management must participate in this project to compile the key requirements for efficiently creating and generating the application. Furthermore, both business analysis and a feasibility assessment should be conducted before deployment. Management and employees are provided a user-friendly model for collecting their feedback and opinions so that they may be included in the original design. We discovered that DSDM would be acceptable for this project and that the prototype model is adequate for the proposed project due to the time constraints. Even the Spiral model is deemed insufficient for the planned project due to its high cost and difficult procedures. Furthermore, the JAD model is inappropriate for the proposed project since it demands a significant amount of time and effort for scheduling and planning. Figure 2 shows our proposed model for the methodology section.

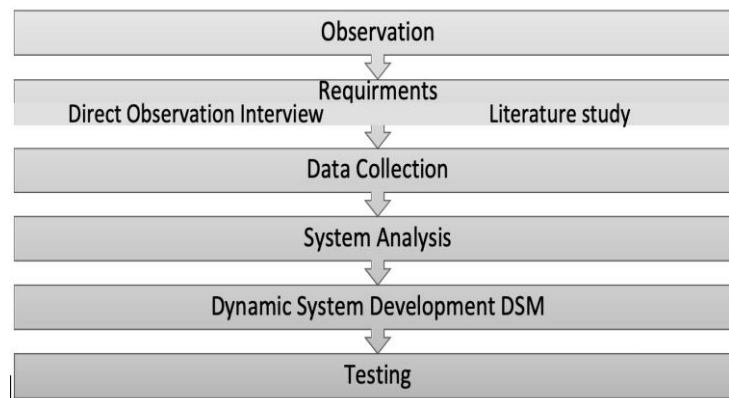


Figure 2: Proposed model methodology

## 5. Data Analysis

We gathered a lot of information during a brief interview with one of the TIU research center's members. The member explained that the purpose of the Research Plan Management System is to keep track of researchers' progress and to obtain up-to-date information on TIU staff publications. To improve the quality of the research plan follow-up process, the university needs a more sophisticated research plan management system than the one now in use, which is manual. This will save a significant amount of time and minimize the workload of the Research Center's management. The personnel will be given an online survey to complete to gather important data and comments for the

development of a research management system for MEC. The analysis for all of the questions asked in the survey is provided below.

Do you prefer to use a Mobile application for adding your yearly Research plan and its progress?  
57 responses

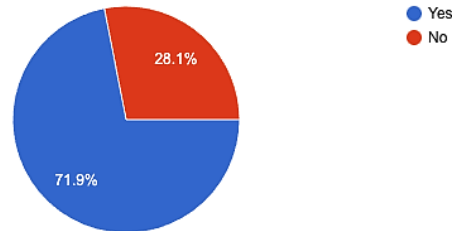


Figure 3: Results of 1<sup>st</sup> question of paper online survey at TIU

In Figure 3, it is seen that around 71% of faculty prefer to use mobile application to add and update their research plan because nowadays everything is done by the mobile.

Do you think Mobile App for Research Management System will be better than a manual system?  
57 responses

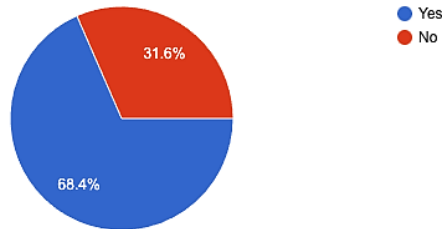


Figure 4: Results of 2<sup>nd</sup> question of paper online survey at TIU

Figure 4 shows that around 70 % of faculty prefer to use a mobile application because the manual system is inefficient to fill and update when they need to work on research.

Do you think Mobile App will be more useful to make a request or fill a form than submitting a form manually?  
57 responses

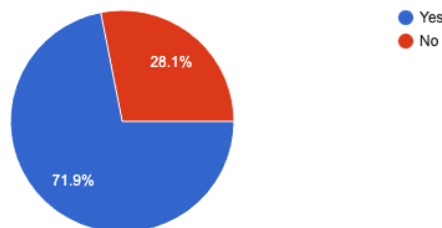


Figure 5: Results of 3<sup>rd</sup> question of paper online survey at TIU

In Figure 5, 72 % of staff responded that the app will be helpful because they think that there is no concern of missing the request form, on the other hand 28% preferred the traditional way of submission.

Do you agree that Mobile App will facilitate research activities at TIU ?

57 responses

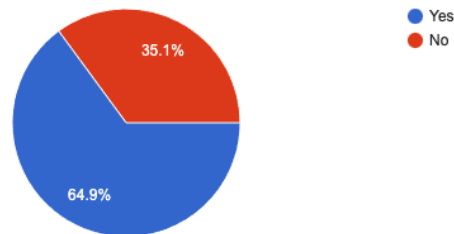


Figure 6: Results of 4th question of paper online survey at TIU

In Figure 6, about 65% of staff were sure that this mobile application would simplify research plan activities at TIU as for those kinds of activities would be simpler when using an electronic system than manual work; conversely only some of them disagreed about it.

Do you prefer to use a Website or Mobile App to manage your research plan and its activities?

57 responses

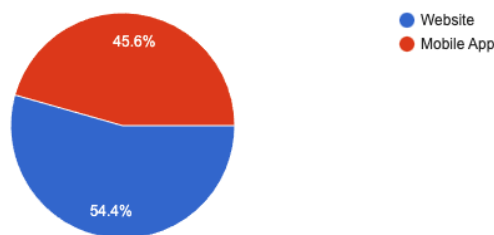


Figure 7: Results of 5th question of paper online survey at TIU

Figure 7 shows that 55 % of researchers responded that the Web application will be more useful since they think using their personal computers and laptops is easier when entering their research plan data, but 45 % preferred the using of a Mobile application.

For what purpose would you suggest the Mobile App to manage:

57 responses

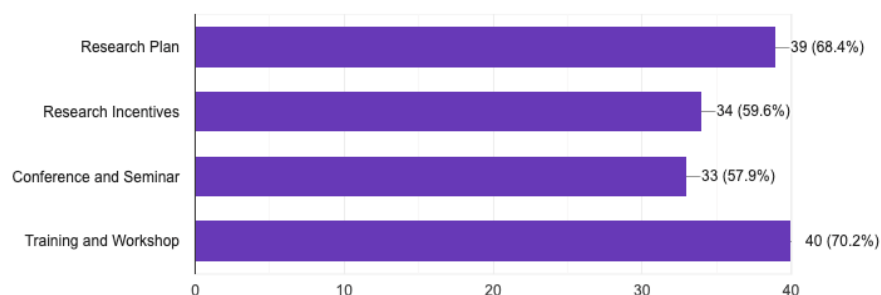


Figure 8: Results of 6th question of paper online survey at TIU

In Figure 8, the question had multiple answers, about 70% of faculty recommended to build an application for covering research plan part, another 70% preferred for the proposed system to deal with training and workshops. On the other side, about 60% preferred the proposed mobile system to handle research incentives, conferences, and seminar issues.

From the above explanation, we can conclude that most of the full-time and part-time staff who participated in this survey have preferred to use a mobile app over the current Excel sheet format. The mobile app can facilitate assigning the research plan and tracking research progress by the TIU research center directly. Tracking the research activities using an Excel sheet has various drawbacks such as changing the research plan anytime especially when they enter the research progress. The participants in this survey have preferred to use an alternative way than the existing one, either website or mobile app, where the percentage of using web application slightly exceed the percentage of using a mobile app. In addition, the survey can tell us that around 65% of the participants supported the idea to use a mobile app to facilitate and track the research activities at TIU.

## 6. System Design

Multiple users, such as deanship, admin, and staff, can use this system. The users, as well as several usage cases and their relationships are depicted in the figure below. Both deans and employees can use this program to access a variety of features, including viewing RMS, creating a research plan, viewing their progress, and adding published research to the plan. Aside from the progress, the deanery may see the present research strategy for personnel. As indicated in Figure 9, they can also prepare reports and examine the recommended study plans.

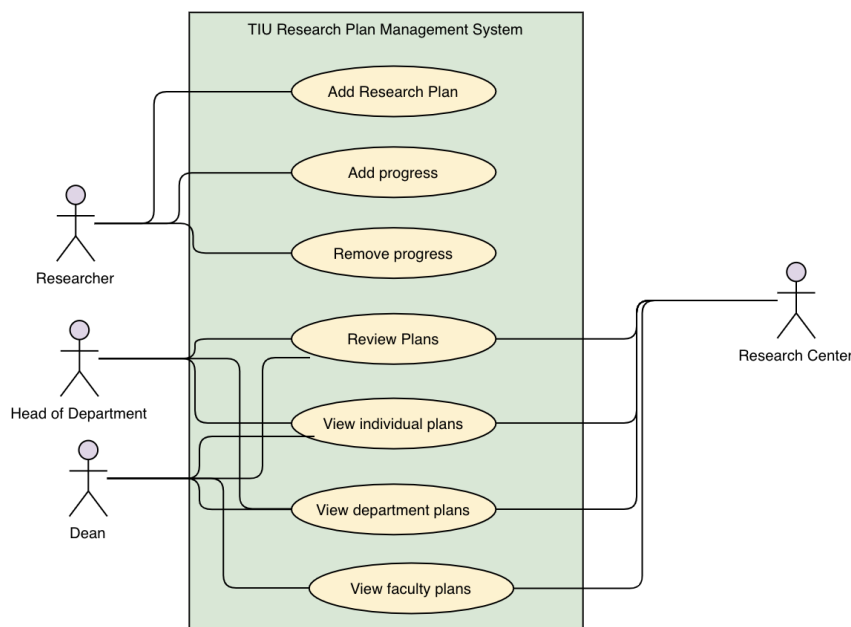


Figure 9: RPMS use case diagram

This section displays some of the program's interfaces, including the login page interface, the RPMS interface, the staff application forms, and the conference & seminar interface, all of which were constructed utilizing the Flutter platform from Google. Users may utilize this platform on a variety of platforms, including Android, iOS, and Windows.



Figure 10: First screen

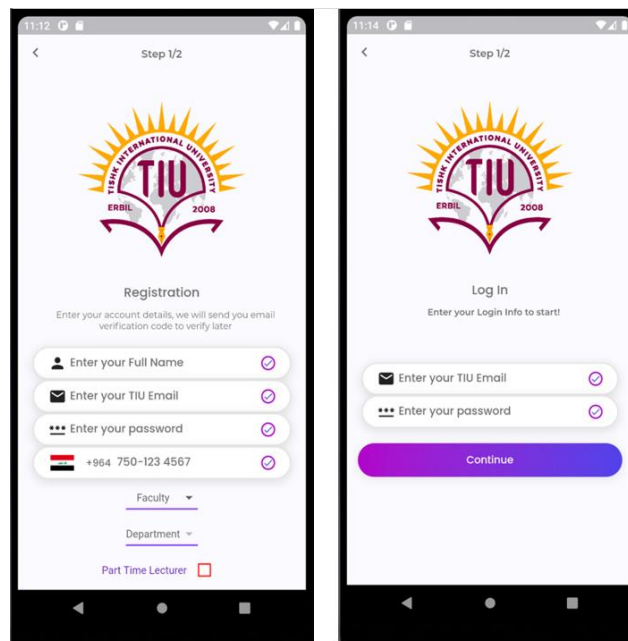


Figure 11: Login and sign-up screens

In Figure 10, the staff can select create an account if it's the first time to use the application, for later they need only the Login process to start using it. In Figure 11, the Login and account registration screens: the staff can access this application by using the username and password if it is valid.



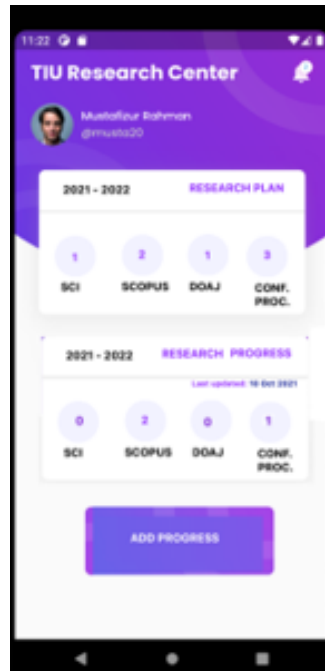


Figure 12: Main staff screen

Figure 12 shows information for the Research Plan Management System and a button to add or update the progress only without modifying the plan itself. The authors tried to solve the RPMS problem by proposing this application which still needs further improvements and testing before distributing it to the staff and management bodies in the university.

## 7. Conclusion and Future work

The major benefit of using a smart mobile application for the Research Plan Management System is to meet the needs of the users because this application leads to an easier way to submit a research plan in a short time without any effort from the admin staff such as deans and research center staff. It is also more useful to add their research work progress according to the submitted plan when they have a smart and good design for the interface. In the future, this application can be more extended to include other different features such as training, conferences, and research incentives. Additionally, adding other languages like the Kurdish language may help in facilitating the use of this application. The suggestions for the future work involve improvement of functionality and quality to offer more functions to the application by meeting the needs of all users such as add chat option that will assist in clarifying the answers needed for staff by the admins.

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