

Development of To-Do List and Monetary Management System

1st Diana anak Ringgau
Department of Electrical Engineering
Politeknik Mukah
Mukah, Sarawak, Malaysia
dianaringgau@gmail.com

2nd Chen Wong Keong
Department of Mechanical Engineering
Politeknik Mukah
Mukah, Sarawak, Malaysia
chenwk2012@yahoo.com

3rd Bong Siaw Wee
Department of Electrical Engineering
Politeknik Mukah
Mukah, Sarawak, Malaysia
shaweibong2016@gmail.com

Abstract—Currently, most of the available “To-Do List” Applications on Android or iOS are just consisted of a “To-Do list” and integrated with an electronic calendar. These applications are just suitable for individual use for keeping alert daily “To-Do List” and its functionality is limited to update the status of each task. The other limitation of these applications is the “To-Do List” could not be easily shared and updated if involved other group members. Therefore, a new “Group To-Do List” plus Monetary Management System application was proposed. The proposed application can be shared and updated by group members of interest in communicating and monitoring “To Do List” and fund management. This application was developed based on Rapid Application Development Method (RAD) by understanding the natural practices of task management and quantities of tasks taken on by team members. Therefore, this app can be expanded and customized to integrate other attractive functions based on user requests. This new application is suitable for family members, project group members, or even individuals from all walks of life who are interested in managing a total integrated “To-Do List” plus finance management system. Some of the important features of this application are its ability to identify tasks that need to be completed on daily basis with indications of which tasks need financial support, and which tasks could generate income. An interactive table and bar charts have summarized all of these tasks with details of expenditure/income and are integrated into an electronic calendar. The status of these tasks could be updated by group members with ease on individual tablets/handphones/computers/laptops. This application can be expanded/customized to integrate other attractive functions based on user requests.

Keywords—group, to-do list, finance management system

I. INTRODUCTION

In the modern era, technology devices have become mobile portable, and networked to the point that they have become pervasive in everyday life [1]. The knowledge expansion system is quickly changing due to the rapid development of mobile devices based on next-generation information technology (IT) convergence technology, and information acquiring is progressing actively and swiftly as well [2-4]. From notepads to digital to-do list apps, the world has changed drastically [5]. Fully-enabled, powerful to-do list apps not only offer quality assistance for task management but improve your productivity too. There are lots of to-do list apps available. Some of these apps are free, some are fee-based, but the primary objective of all of them is to offer classic task

scheduling assistance to help users to manage and finish the tasks with ease and on time. Statistics suggest that there are 17 million to-do list software applications and websites available but not all of them will be useful for users. There are tools available on how to organize one’s time and prioritize work, however, many people worry about whether they are prioritizing and meeting their many tasks effectively. Thus, To-do lists are more than simply a list that gives an impression of the amount of work to be done; they are also a resource for consultation, linking to project objects or task objects, and indicating the status of tasks. Moreover, since the beginning of the year 2020, the world tackles the highly infectious respiratory disease called Covid-19. Many industries had declared work-from-home to aid with the containment of the coronavirus and to prevent its spread from overburdening healthcare systems. The invisibility of home productivity and its infrastructure is supported by traditional productivity measurement methods, thus an app is needed to manage and monitor non-face-to-face or work-from-home team members.

Currently, most of the available to-do list apps on Android or iOS are just consisted of to-do list apps and integrated with electronic calendars [6, 7]. These applications are just suitable for individual use for keeping alert daily to-do list apps and their functionality is limited to update the status of each task. The other limitation of these applications is the to-do list apps could not be easily shared and updated if involved other group members. The technology acceptance model is used to predict an individual’s intention to use the to-do list application. We believe that developing an application with user engagement would better fit user requirements and capabilities. Users can choose the best to-do list software to suit their needs by answering questions shown in Fig. 1. It may be easy to find an answer to a specific question, a solution to the overarching problem may be more elusive. Based on Fig. 1, mobile apps have an important role because they allow the user to assign tasks personally or by a group [8]. User and group members are also able to use e-mail, electronic instance messages, and database management systems for task completion’s notification method. Measuring Perceived usefulness (U) will involve respondent’s agreement that using the application with such features should make them easier to manage their mini-project. Moreover, the respondent believed that data-driven apps can bring many opportunities to support the need of users by allowing others to add additional details for better decision-making. The data or task can be recorded via a cloud database system [9] making it easier for the user to access the

app. Thus, using the application should enhance their effectiveness on the tasks. Usefulness (U) is the user's subjective probability that utilizing the app would improve his or her tasks performance within an organizational environment.

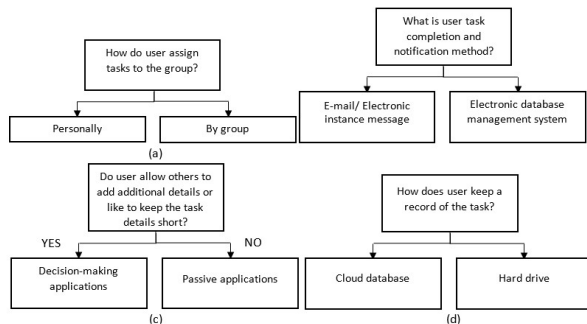


Fig. 1. Identifying user's most basic task management

A brief online training session is compulsory for the proposed app's user. The training sessions should demonstrate how to use the application. This is to give the user some opportunity to interact with the application and to facilitate understanding of the app. Measuring one of the Perceived ease of use (EOU)'s elements will involve the respondent's agreement that the training sessions could lead a user to operate the application easily. Ease of use (EOU) is the degree to which the user expects the proposed app to be effort-free. However, (U) is affected by (EOU). Both EOU and U can predict user's attitude (A), which is defined as the user's evaluation of the desirability of utilizing the app. (A) and (U) have an impact on a user's intention to utilize the proposed to-do list application.

Therefore, a new "Group To-Do List" plus Monetary Management System or iDo\$\$ application was proposed. A systematic approach to address these issues and present a solution – A cloud-based database system, with a custom made graphical user interface (GUI), that any group member can access from their mobile phone at any time, powered by AppSheet (AppSheet Seattle, Washington, USA), Google Forms® and Google Sheets® (Google, Mountain View, California, USA) that gets instantly updated upon data entry and store data on Google Drive® in a retrievable format for data analysis [10]. The proposed application can be shared and updated by group members of interest in communicating and monitoring "To Do List" and fund management. This application is developed with user-friendly application development software and the data is stored in free google drive. This new application is suitable for family members, project group members, or even individuals from all walks of life who are interested in managing a total integrated "To-Do List" plus finance management system.

Some of the important features of this application are its ability to identify tasks that need to be completed on daily basis with indications of which tasks need financial support, and which tasks could generate income. An interactive table and bar charts have summarized all of these tasks with details of expenditure/income and are integrated into an electronic calendar. The status of these tasks could be updated by group members with ease on an individual mobile smartphone. A group member can also seek consultation from their group leader or manager based on the indications of their task's

status. Besides that, the apps also allowing other group members to add additional details for better decision-making.

By understanding the natural practices of task management and the quantities of tasks taken on by team members, the proposed application should be expanded and customized to integrate other attractive functions based on user requests. This proposal gives an easy understanding of how to create a database management system with AppSheet and Google Sheets® in a step-wise manner. An app called iDO\$\$ was fabricated to manage and monitor non-face-to-face or work from home team members. The app was implemented based on Fig. 1 and the prediction of a user's intention to use the proposed app. A survey was conducted among students at Mukah Polytechnic to identify the effectiveness of the app.

II. METHOD

In application development, basically can be divided into three approaches, there are waterfall, rapid application development (RAD), and agile approach. In this application, rapid application development (RAD) is selected as the main methodology because of its flexibility to produce a working version of the application as quickly as possible, and then to continuously finetune the application. RAD is willing to change or upgrading the application that is suited to the needs of the user. Following is the detailed explanation of the rapid application development approach provided.

A new Google account was created for this purpose. Google spreadsheets® were used to design the data tables and were linked to AppSheet® software to generate the graphical user interface of the mobile app of the database. Appearance and features of the App were designed through options provided by the AppSheet® without writing codes using computer language shown in Fig. 2. Once the app was ready, the email address and password were shared among the authorized team members and the mobile app was installed into their phones.



Fig. 2. Three important steps for To-Do List and Monetary Management system App development

This section will contain a step-by-step guide to create a custom-made mobile app to enter personal/ group data on a mobile phone using Google services and the AppSheet platform.

Step 1: Establish a Google Account:

It is advisable to have a separate Google account for the management of the database management system so that the password can be shared among the members of your team who are certified to handle data. A Google account could be created by visiting <http://account.google.com/>.

Step 2: Creating a Google spreadsheet based on the necessary data fields:

Once the Google account is created, log on to it and access the Google Apps grid on the top right-hand corner of the screen and select Google drive from it shown in Fig. 3. Once

the Google Drive page opens, click on the +New button on the top left-hand corner shown in Fig. 4 and select Google Sheets and then, blank spreadsheet. Rename the Google spreadsheet [11, 12]. Then, Design the data tables which are needed to be included in the database within the Google spreadsheet. Use the “+” button on the bottom left-hand corner in the Google spreadsheet window to create several data sheets (data tables) within the user’s spreadsheet. Designing these tables is the key step to create the database as well as the Mobile App of the database. The data sheets/tables you will be designing this way will be the data fields of the App you will be creating later

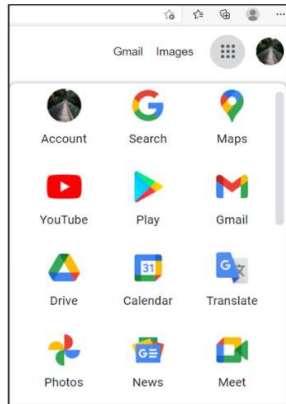


Fig. 3. Opening a Google apps

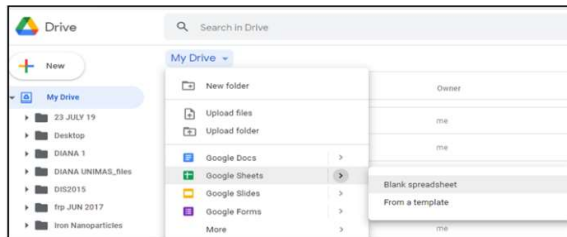
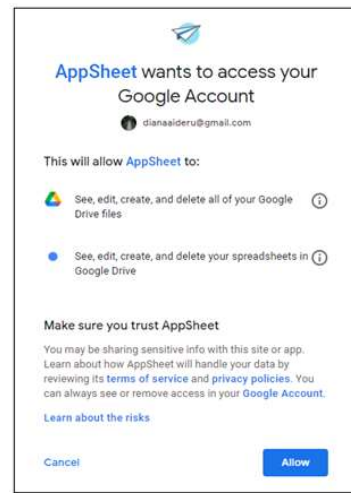


Fig. 4. Creating a Google spreadsheet

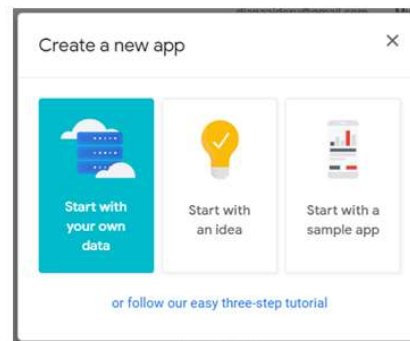
Step 3: Link the Google Spreadsheet to AppSheet to create the Graphical User Interface of the mobile app.

Upon finalizing the Google spreadsheet, it should then be linked to AppSheet software to create the Graphical user interface of the mobile app. Go to <https://www.appsheet.com/> to get the free version of the AppSheet software shown in Fig. 5. Then, click the button “Start for free”.

Then, Select Google sheets and forms. Then Sign in to the newly created Google account (As mentioned in step 1) with the e-mail address and password. Then, Fig. 5(a) shows giving access to AppSheet to use the Google account by clicking the “Allow” button. Then, AppSheet Window will appear and select “Create a New App”. Once you click that, three options will be provided, and select “With Your Own data” shown in Fig. 5(b)



(a)



(b)

Fig. 5. Link the Google Spreadsheet to AppSheet to create the Graphical User Interface of the mobile app.

Step 4: Modify the GUI of the Mobile App using AppSheet.

Then, Make use of the various options available such as “Data”, “UX” to build up the GUI of the newly created app. Users can use the “Data” option, to add new tables to the database.

- Select “Data”
- Click “+ Add New Table”
- Select the Google spreadsheet from the drop-down menu in the “Source ID “field.
- Select the Table/Sheet from the “Worksheet name/Qualifier” drop-down menu.
- Click “Add this table”

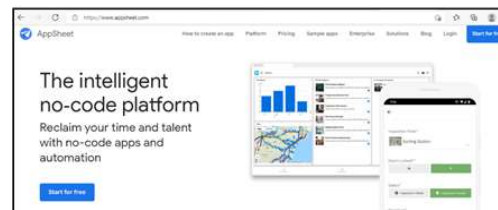


Fig. 6. Homepage AppSheet Software

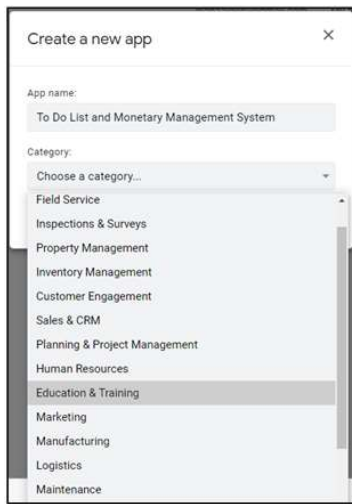


Fig. 7. Naming app and select related category.

Once the user adds a new table, select the table and click “Updates, Adds, Deletes” from the “Are updates allowed” menu as in Fig. 9. Always click “Save” after each change which user has done in the AppSheet.

The AppSheet web-based platform allows the users to change the external appearance of the app by adding color themes, custom app logos, launch images, and background images [13]. User can explore the “UX”, “Data” and “Behavior” options on AppSheet to further customize the app to user own taste. App formulas, Slices, References between Tables, and incorporating them into the app would further enhance the capabilities of the app, but it is beyond the scope of this proposal. The AppSheet web-based platform will open up in a new tab on the user web browser with a basic mobile app interface displayed on the right-hand side shown in Fig. 8.

The present app interface in Fig. 8 shows the “Form View” of the app. It is based on the Google Spreadsheet that the user-created earlier. Users can click the “+” golden button to add new data. The added data records of individual patients will appear as in Figure 8. Users can see the data by clicking the data records name in the form view of the app.

This form view shows “Name” – as a short text field, “Amount of income” as a numeric field, “Expenses” – as a multiple choice. Once user-entered data, click “Save”. When the user clicks the “Plan” tab, he can enter data into the table. Upon populating the spreadsheet, which is saved in Google Drive, the user can access it anytime for data analysis. The Google spreadsheet can be connected to SPSS through Microsoft Excel.

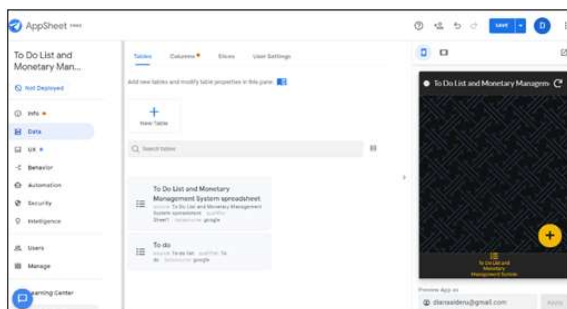


Fig. 8. GUI of the new app

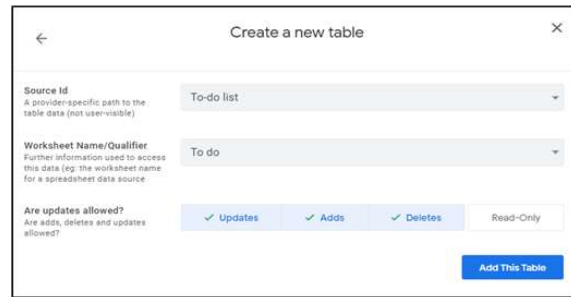


Fig. 9. Create a new table

Step 5: Finalizing and launching the mobile app among authorized team members.

Once the app is ready to be shared with the user team, head over to the “Users” section of the AppSheet web platform and enter the email addresses of the team members and send invites. When the team members receive the invites to their corresponding email accounts, they should click the link on the invite. This will prompt them to install the AppSheet App on their phones from the App Store (iOS) or Play Store (Android) on their devices. Once it is installed, open the AppSheet app on their phones and log in using their own Google email address or the Google email address that was created earlier to create the database. The team members will now be prompted to install your database apps shortcut to the home screen of their mobile device. Maintaining the database in the cloud can be considered a limitation as it requires an internet connection always, although it is what makes this approach more secure and available across multiple devices at the same time.

The mobile app was launched and introduced to students of Mukah Polytechnic who took Innovation and Invention Club (MPU24021). In this course, team members were expected to demonstrate communication skills, leadership, teamwork, problem-solving skills as well as organize activities such as planning by writing papers, appointing committees, conducting meetings, implementing activities, writing activities, and financial reports. However, due to the pandemic, team members had to experience with non–face-to-face coordination for project or task management. We have provided online training sessions for iDOSS’s users. All users had attended the training sessions demonstrating the use of the application. Survey questions on the effectiveness of the app were constructed and distributed to all users at the end of the academic June 2020 session. The survey was distributed among iDOSS’ users. The respondents consisted of seven (7) mini-project groups. Each group consisted of a team leader and four (4) group members.

III. RESULTS AND ANALYSIS

This app enabled the team members to add, edit and view information. Fig. 10 shows the appearance of the front page on the smartphone.

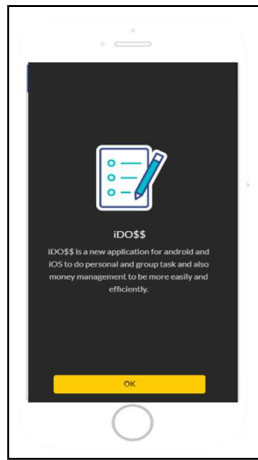


Fig. 10. Short description and explanation of the developed App at the About Function



Fig. 11. Main user interface with four main buttons at the bottom of the app, there are calendar, planning, monetary, and chart

Fig 11 shows the user interface of this application. At the bottom of the application, there are four main buttons. The first button is the calendar button which integrates all the events/ tasks into one integrated and synchronized calendar as shown in Fig. 12. The second button is the planning button which was used to input all the important tasks into this cloud database by more than one user in different users' handphones/ personal computers as shown in Fig. 13-16. The third button is the monetary button used to summarize all the income and expenses in an interactive interface as shown in Fig. 17. The fourth button summarized all the tasks and related to their income/ expenses in an interactive graph as shown in Figure 18.

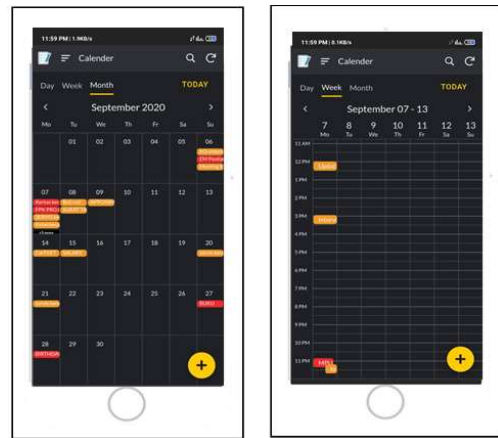


Fig. 12. An integrated data shown in monthly and weekly calendar (Calendar button)

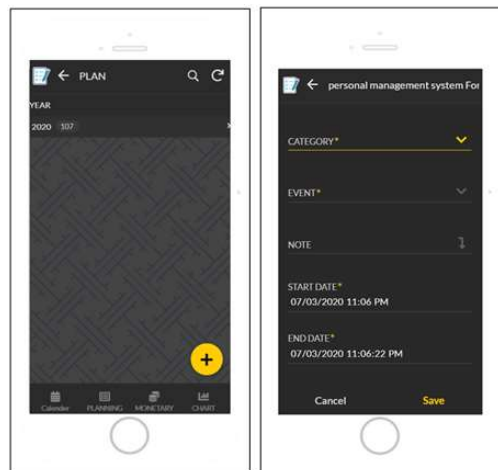


Fig. 13. Press on the "+" button to add a new task to the "To-Do List" (Planning button)

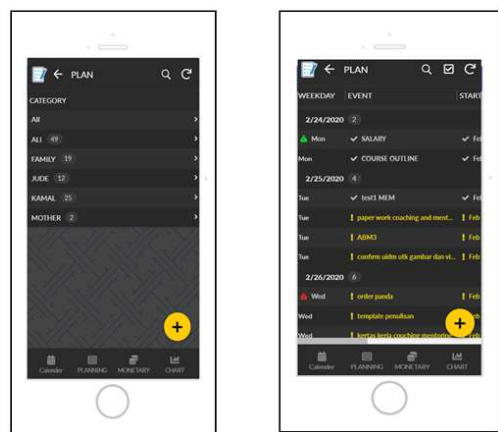


Fig. 14. Users could view several lists in each individual and its detail (Planning button)

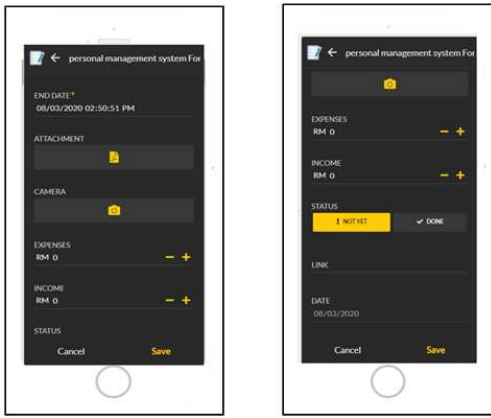


Fig. 15. Users could insert files, pictures, expenses, income, and links to the list (Planning button)

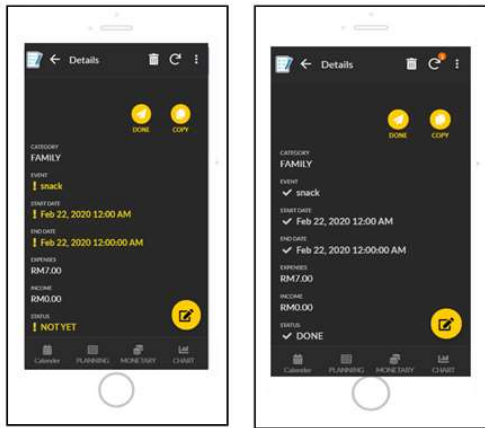


Fig. 16. Users could update the status of the list by simply press the “DONE” button (form ! To ✓) (Planning button)

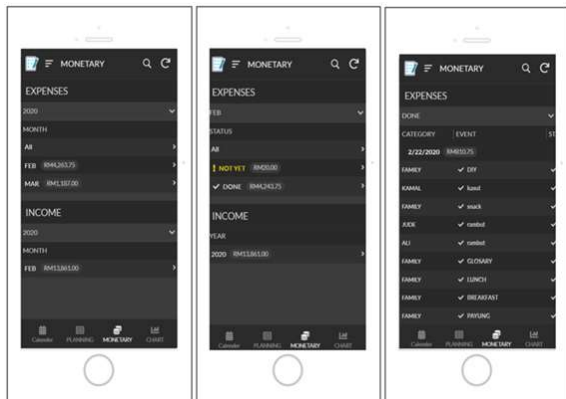


Fig. 17. Monetary button shows the expenses and incomes in detail (Monetary button)



Fig. 18. An interactive chart to display the details of expenses and incomes (Chart button)

The survey was distributed among iDO\$\$’ users at Mukah Polytechnic. The respondents consisted of seven (7) managers or group leader that managed seven (7) mini project groups. Each group consisted of five (5) members. The survey questions are divided into two (2) parts, namely part I: To-do List application (iDO\$\$)’s Function and part II: To-do List application (iDO\$\$)’s Features. All sections included 21 Likert -scale questions, in which the alternative responses were (1) to strongly disagree, (2) to disagree, (3) to be neutral, (4) to agree, and (5) to strongly agree. Descriptive statistics are used to measure the mean and to summarize the data collection. The rating scale questionnaire was designed to facilitate the data evaluation in the analysis stages. Thus, the score helps in identifying the level of functionality and the quality of features of the application. Furthermore, total average score mean values and ranking were analyzed using Landell’s scale (1997). Landell’s classification scale, described low as around 1.0 – 2.33, moderate around 2.34 – 3.68, whereas high is classified around 3.69 – 5.00. Therefore, Landell’s classification scale was used to determine the scale of all the variables from the rankings such as the functionality and the quality of features of the application.

TABLE I. DATA ANALYSIS AND FINDINGS FOR THE FUNCTIONALITY OF THE APPLICATION

No	items	Mean	Interpretation
Part I: To-do List (iDO\$\$)’s Function			
1	The app is capable to record tasks that need to be carried out easily by users as well as group managers.	4.55	Good/Agree
2	Built-in electronic calendar assist me to identify the appropriate date and period to complete the task	4.36	Good/Agree
3	The application displays information on assignments given by the project manager to group members.	4.45	Good/Agree
4	The application notifies me of assigned tasks given by the manager to me and my members.	4.45	Good/Agree
5	This app helps me to assess priority tasks.	4.45	Good/Agree
6	The app is capable to monitor and display the status of tasks that have	4.36	Good/Agree

	not been completed by my members even without having to meet face-to-face.		
7	This app is capable to evaluate the division of tasks is done fairly and transparently among members.	4.45	Good/Agree
8	The scope of tasks on this application can be added according to my group's requirements/ objectives	4.36	Good/Agree
9	This app helps me to update the status of my assignment in real-time to the club advisor/ chairman.	4.55	Good/Agree
10	The app shares information on names, emails, and mobile phone numbers that can be contacted by each group member.	4.45	Good/Agree
11	This application helps me to ascertain the problems that will be faced if a task that has priority is not solved first.	4.18	Good/Agree
12	This application is capable to calculate total allocation received by the highest committees as well as budget allocations in each group	4.55	Good/Agree
13	This app helps me to manage and record the financial status of my group quickly.	4.36	Good/Agree
14	This app will notify me of financial problems that will be faced if one task is overspending.	4.36	Good/Agree
15	This app helps me to organize a program.	4.36	Good/Agree
16	This application can record tasks that need to be carried out by users as well as group managers	4.45	Good/Agree
Overall average Mean Part I		4.42	Good/Agree

The highest mean score was 4.55 given by respondents for questions number 1, 9, and 12. The respondents are very aware that the To-do List app may display the completion status directly to the project manager. The status can be shared among other group members so that the next task or link can be performed quickly. The app was also capable to calculate total allocation received by the highest committees as well as budget allocations in each group. However, question number 11 gain the lowest mean score, 4.18. Certain respondents were not aware that the app can be able to help them in identifying an encountered problem if a priority task is not completed first. Questions number 2, 8, and 13 got the same mean score of 4.36, where these three items indicate that it is likely that the respondents do not yet have practical experiences with the application or are not well-informed about the app thoroughly and in-depth. This situation may have occurred due to the absence of a user manual, although all respondents had attended brief training sessions demonstrating the use of the application.

TABLE II. DATA ANALYSIS AND FINDINGS FOR THE FEATURES OF THE APPLICATION

No	items	Mean	Interpretation
Part II: To-do List app (iDO\$\$) Features			
1	I am not charged a fee for using this app.	4.64	Good/Agree
2	This app can operate using android and ios systems.	4.55	Good/Agree
3	This application can be used on any device such as smartphones and PCs, laptops, and tablets	4.45	Good/Agree

4	This application can be used easily (user-friendly) without the need for any expert help.	4.45	Good/Agree
5	This application is beneficial to manage a project	4.55	Good/Agree
Overall average Mean Part II		4.53	Good/Agree

Based on Table 2, the highest mean score was 4.64 given by respondents for questions number 1. Marketability of iDO\$\$ App to clients, this new application is suitable to family members, project group members, student study groups, or even individuals from all walks of life who are interested in managing a total integrated "To-Do List" plus finance management system in a group with minimal or no cost at all. Questions number 3 and 4 got the same mean score of 4.45. This innovation project is a new platform to gather all the related users to contribute "To-Do List" and "Monetary Management". Users can easily upload and share the latest task with other users or group members. Users could access this app easily through a variety of devices, such as smartphones, tablets, personal digital assistants (PDAs), i-pads, mobile phones, and others. This app can be achieved anywhere and at any time without limit. By using this app can reduce the use of raw materials, cost savings, and be environmentally friendly. The app developers could receive feedback from time to time from users for further improvement of this app. However, some of the respondents may not be well-informed about the app. All respondents were between 18 to 21 years old and not familiar with nor used any To-do list application to manage mini-project efficiently.

The To-do list app was helpful in industries with work-from-home policies to contain the spread of COVID-19. The app created home productivity visible to team leaders and other group members. The management and non-face-to-face monitoring became more transparent. For example, the app provides real-time notification of the task and budgets that have been used and recorded for future audits. Applications have also been developed to allow a group member to stay in touch with colleagues. However, users involved in sharing data across the app should be able to handle group members' data with care.

IV. CONCLUSION

Based on Table I and Table II, the overall average mean for the app's functionality was 4.42 and the quality of features was 4.53 respectively, which shows that the mobile app has been tested as an effective solution for non-face-to-face projects or task management apps among group members. The app was useful to support the needs of users by allowing others to add additional details for better decision-making or a resource for consultation. The application was used for real-time online monitoring of activities planning such as appointing committees, task delegation, conducting meetings, budget/expenses updates and tasks progress. This app-enabled the team members to add, edit and view data from these tables. Telephone calls could be taken and group members' locations could be accessed through the app. Since the database is accessible through phones, group members' past tasks could be reviewed and new records can be entered. These spreadsheets could be linked to SPSS software to analyze data for research purposes. Even though this provides adequate confidentiality and security to data, all the authorized team

members who share the app have unrestricted access to add, edit or remove data.

REFERENCES

- [1] S. Caballé, F. Xhafa, and L. Barolli, "Using mobile devices to support online collaborative learning," *Mobile information systems*, vol. 6, no. 1, pp. 27-47, 2010.
- [2] Y. Chen and D.Z. Wang, "Knowledge expansion over probabilistic knowledge bases," in *Proceedings of the 2014 ACM SIGMOD international conference on Management of data*. 2014.
- [3] M. Craglia, M. F. Goodchild, A. Annoni, G. Camara, M. F. Gould, W. Kuhn, D. Mark, L. Masser, D. Maguire and S. Liang, "Next-generation digital earth," 2008.
- [4] M. S. Hossain, C. Xu, Y. Li, A. K. Pathan, J. Bilbao, W. Zeng, and A. El-Saddik, "Impact of Next-Generation Mobile Technologies on IoT-Cloud Convergence," *IEEE Communications Magazine*, vol. 55, no. 1, pp. 18-19, 2017.
- [5] Miller, M., *Cloud computing: Web-based applications that change the way you work and collaborate online* 2008: Que publishing.
- [6] E. Ramadani, A. Memeti, F. Imeri, N. Sejfuli-Ramadani and F. Idrizi, "Social media-based app organizing daily events," in *2017 6th Mediterranean Conference on Embedded Computing (MECO)*. 2017. IEEE.
- [7] M. S. Ahmad, N. E. Musa, R. Nadarajah, R. Hassan and N. E. Othman, "Comparison between android and iOS Operating System in terms of security," in *2013 8th International Conference on Information Technology in Asia (CITA)*. 2013. IEEE.
- [8] N. Yorke-Smith, S. Saadati, K. L. Myers and D. N. Morley, "The design of a proactive personal agent for task management," *International Journal on Artificial Intelligence Tools*, vol. 21, no. 01, pp. 1250004, 2012.
- [9] X. Cheng, L. Fang, L. Yang and S. Cui, "Mobile big data: The fuel for data-driven wireless," *IEEE Internet of things Journal*, vol. 4, no. 5, pp. 1489-1516, 2017.
- [10] C. Ilacqua, C., H. Cronstrom, and J. Richardson, *Learning Qlik Sense®: The Official Guide* 2015: Packt Publishing Ltd.
- [11] M. Miller, *Using Google Spreadsheets (Digital Short Cut)* 2002: Pearson Education.
- [12] I. Lamont, *Google Drive and Docs in 30 Minutes: The unofficial guide to the new Google Drive, Docs, Sheets & Slides* 2015: i30 Media Corporation.
- [13] A. J. Quinn and B.B. Bederson, *Appsheet: Efficient use of web workers to support decision making*.