INTERNATIONAL JOURNAL OF INNOVATION IN ENTERPRISE SYSTEM

Clockify and BOT Telegram Integration in Employee Performance Measurement Applications Development

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ARTICLE INFO

ABSTRACT

Employee performance can go up and down without realizing it because of an understanding of the concept of performance and concern for the achievement of underperformance. Poor performance decreases productivity and if left unchecked, employees can be judged as not credible in carrying out their work. The Organization has not paid attention to these employee performance issues because there is no reporting system that allows employees to track the ups and downs of performance based on their operations (productivity). The Clockify app as a daily operational tool cannot be used as a benchmark for performance improvement or decrease, so it does not offer any real motivation for employees to gradually improve. Quantitative data analysis was carried out based on informant interviews, employee observations of Clockify, and studies of Clockify output documents themselves. This research aims to identify the problem and develop a system to solve it. It is a system to complement Clockify's capabilities in visualizing employee performance and preventing continuous decline due to unconsciousness. Build an employee productivity reporting system using Google Apps Script, Telegram Bot, and Clockify to present productivity reports in a graphical representation instantly and systematically, helping employees see performance as an increase and decrease and preventing continuous decline with a productivity analyzer service that calculates employee productivity based on a quantity of daily work that can be tracked and accounted for accuracy.

1. INTRODUCTION

Employee performance reporting is a form of achievement or work results both in quality and quantity achieved by an employee in carrying out tasks in accordance with the responsibilities given to him. Assessment or measurement of performance is one important factor in the Company, Agency, Government, etc. Thus, performance appraisal can also be used as a basis for evaluating the work results of employees from each period [1]. It is crucial for employees to consciously view and monitor their own performance as an increase or decrease so that they can respond with appropriate action. When performance goes up, employees are motivated and try to continue to improve or maintain, but if it's the other way around, it's better to seek improvement as soon as possible. Measuring productivity enables organizations to compare the performance of different teams, departments, or individuals.

This comparison can be valuable for identifying best practices, fostering healthy competition, and promoting a culture. Productivity Defined as the ratio of output to input [2]. Employee productivity is measured by comparing the number of tasks completed with the number of tasks assigned [3]. It is a way to quantitatively analyze employee performance by measuring productivity over time and plotting it in the form of trend lines on a graph. In this research, application development using Clockify is mainly focused on reporting services, without replacing Clockify as the main system in daily work operations. This development is based on the capabilities of reporting services to provide insights to employees about their operational performance (up and down) and increase employee understanding of the concept of performing. Clockify allows employees to manage work hours and track time spent on projects, while the system developed in this study allows employees to analyze their productivity over time through infographics in the form of productivity trend graphs. Measuring productivity over time and shaping it into a trend allows increases and decreases to be tracked, quantified, and accounted for accuracy. To avoid a continuous decrease in performance due to employee unconsciousness, the system uses the Google Apps Script service which allows the system to operate automatically according to a schedule and receive infographics of employee performance achievements instantly, without having to wait for employees to do it themselves. This aims to prevent continuous decline due to self-consciousness with an organized (systematic) independent system as an increase or decrease so that they can respond with appropriate action. When performance goes up, employees are motivated and try to keep improving or maintaining it, but if it's the other way around, it's better to seek improvement as soon as possible.

Several previous studies have been conducted to support this research. Basically, productivity is supported by several elements. As was done in the first study, this study aims to determine the simultaneous effect of discipline on work motivation and the work environment on employee productivity. By using multiple linear regression tests, this study concludes that the variables of motivation, work discipline, and work environment have a positive and significant effect on employee productivity simultaneously [4]. Next, there is research that discusses the relationship between work experience and employee productivity. The purpose of this study was to determine the effect of work experience on work productivity at the Regional Secretariat Office of Gowa Regency. The research method used in this study is a quantitative research method with a survey research type. The results showed that there was a significant positive effect between work experience on work productivity at the Regional Secretariat Office of Gowa Regency with a regression coefficient of 0.683 in the interpretation of the regression coefficient in the medium category so that it can be said that there was an effect of work experience on work productivity at the Regional Secretariat Office of Gowa Regency [4]. Information technology platforms are also used in order to make it easier to measure employee productivity in government organizations. Based on research conducted by [6], A study shows that design of an information system for performance achievement reports at the Regional Office of the Ministry of Religion of Papua Province, making daily employee performance achievement reports to make it easier for superiors to monitor the performance of daily employees who are carrying out these activities so that at the report inspection stage it will be easier and more effective. The same result was shown by a study discussing information technology support in implementing work from home as an implication of e-government in the new normal era. The results of this study indicate that technological support such as WhatsApp, zoom, clockify has proven to support employees in ease of attendance [7].

This research aims to measure employee performance from an operational perspective by measuring productivity and generate statistical reports. Clockify has been used to enable detailed control of tasks duration, schedule, effort, and cost [7]. Clockify is a common application used by development teams as employees of the Property Application Managed Services (PAMS) department to assist with day-to-day work operations, enabling employees to manage work hours as well as track time spent on projects. This application can be used from anywhere with data that is synchronized online and in real-time. These Apps have been widely used by various groups such as freelancers, small businesses, consulting agencies, government agencies, NGOs and universities. As shown in Figure 1, Clockify consists of several entities, each with its own role in measuring performance.
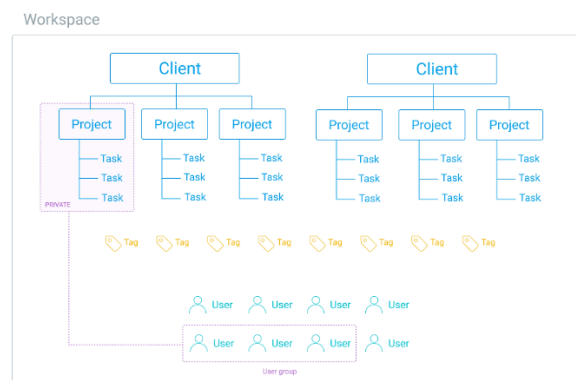
Figure 1 – Basic Entity in Clockify Application

Each employee as a Clockify user can join or own multiple workspaces. Each client can have multiple projects, but each project is owned by only one client. Each project is usually owned by multiple clients, or projects without clients (e.g. for internal company use). Tasks Function as sub-projects, mainly to define more specific types of activities such as design or coding. Tags Used to organize time not covered by projects or tasks, and are available throughout the workspace. Used across multiple projects and can be used as keywords to filter reports with more precision. Time input is the result of tracking the time worked directly by the employee. Furthermore, Users can create groups that will be assigned to projects, eliminating the need to add team members one by one to projects. Assist in managing team members on projects more efficiently. Clockify provides reporting that allows employees or companies to analyse their time in more detail. This helps to know who is working on what, how much money is being made, review team time, and export data. Clockify provides three types of reports that can be used to help with time analysis: summary reports, detailed reports, and weekly reports. Each type of report has its own uses and advantages in helping users analyse their time.

2. METHOD

2.1 Research Flow

In developing an application or information system, the use of models is very important to build a framework to suit the goals and benefits to be achieved [8]. The selection of the model used in building the system also determines the yield and quality of the product to be developed as well as determines costs and other requirements. System Development Life Cycle (SDLC) is the process of creating and modifying systems and the models and methodologies used to develop these systems [9]. Referring to Figure 2, this research starts with collecting data and what information is needed to get a point of view. In order to understand the user needs, we collecting data from participatory observation or direct observation of the daily activities of involved employees at the Lippo Cyber Park head office, Lippo Village, Tangerang and the Araya branch office, Malang from PT. VisioNet Data Internasional, especially employees from the PAMS (Property Application Managed Services) department. Data collection was also carried out through guided free interviews with informants as department heads and the development team included in the property application development department. Furthermore, to find out trends or patterns of activities that occur repeatedly, a document study or literature study is carried out, namely by studying sample data from the export of default work reports from the Clockify application.

The data needed is employee operational data and productivity management procedures at PT. VisioNet Data International. This company is an IT company that offers software-based managed IT services. In the software development process, there are many roles involved in each focus of work. To help manage, monitor, and keep track of employees' work activities or operations in the software development process, Property Application Managed Services (PAMS) uses Clockify as a tool. Clockify allows team members to manage working hours and track how much time they spend on projects. Based on the data obtained, an application design will then be made using Google Apps Script, Clockify, and Telegram BOT. Telegram BOT are used because they can be configured to work automatically based on user interaction, eliminating the hassle of running commands manually. Used to create new bot accounts and then manage them. Managed through Bot Father, the official bot service of the Telegram app. The finished application will be tested in the field. Results of field testing will be evaluated by functional testing. Once the VSN X Clockify Bot Analyzer system design has been successfully implemented, testing must be performed to verify the functionality of the built system. The testing strategy used is to integrate test cases from several existing techniques into a series of planned test steps. The goal of this testing strategy is to achieve efficiency and effectiveness. Efficiency means speeding up testing time, while effectiveness means not only speeding up but also reducing the chance of errors occurring.
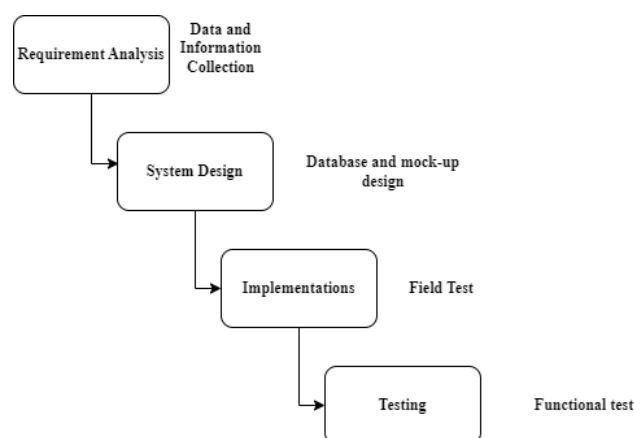

Figure 2 - Research Flow based on Waterfall Method

For integration purposes, Telegram bots can be configured to work automatically based on user interaction, eliminating the hassle of running commands manually. Used to create new bot accounts and then manage them. Managed through Bot Father, the official bot service of the Telegram app. After creating a Telegram bot app, developers can use Telegram libraries to integrate the bot app with Google Apps Script. Thus, the Google Apps Script application can communicate with users through Telegram messages and manage inputs and outputs from users through logic defined by the developer.

2.2 Workflow Diagram

Workflow diagrams are a graphical representation of the flow of information that occurs during a business or manufacturing process. In other words, A workflow diagram is a visual layout of a process, project or job in the form of a flow chart [10]. Outlining the stages that must be passed from start to end, allows organizations to track the progress of the process quickly and clearly. According to figure 3, users use the telegram bot as a user interface with google apps script as an application programming interface (API). Furthermore, clockify acts as a data source processor, namely employee operational data and other basic information with the support of Google Apps Script which acts as an API.
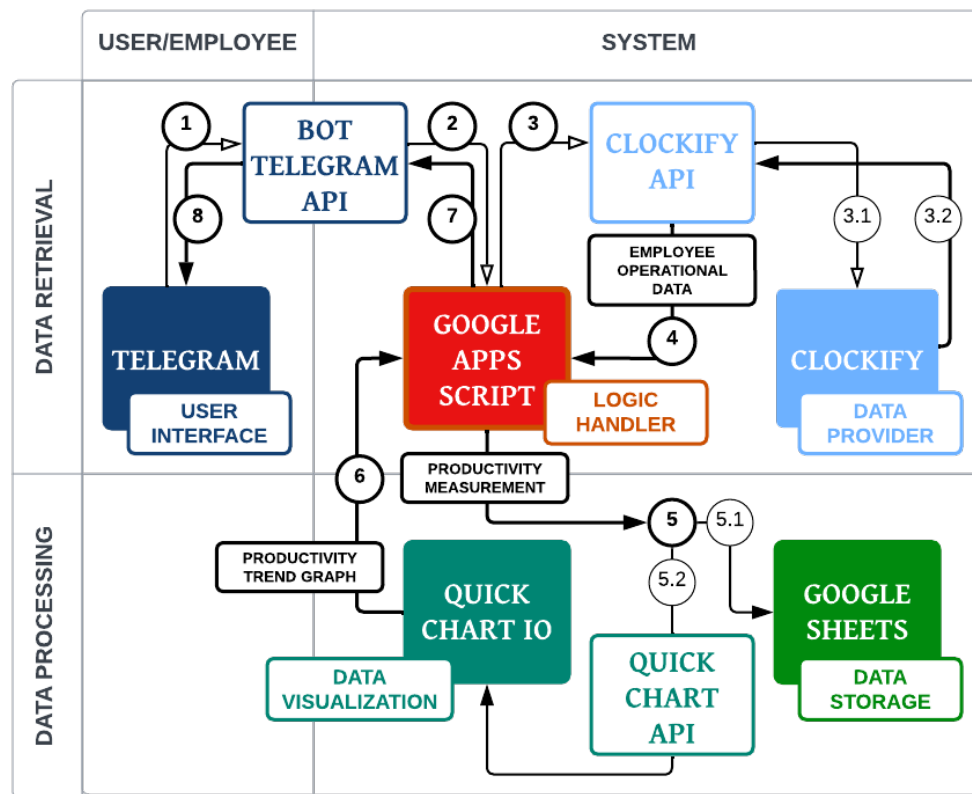

Figure 3 - Workflow of Application

3. RESULT AND DISCUSSION

3.1. Use-Case Diagram

In this research, the Unified Modeling Language (UML) was used as a tool in carrying out the design and design stages of the application. UML was created to provide tools needed by software developers in analyzing, designing, and implementing software-based systems [11]. At this stage, the business processes of the system will be defined. Business processes can be understood as a collection of activities that can define business events and work performed by a system to transform inputs into outputs that add value to users [12] [13]. In the design and application design stages, use case diagrams will be used to define what activities will be carried out by the system. Figure 4 shows the activity and actors that involved in the system. This system has two actors, they are users and employees. The user has a process of authenticating to clockify and specifying the active workspace. While employees have the function of accessing the service menu, analyzing productivity, and printing productivity reports.
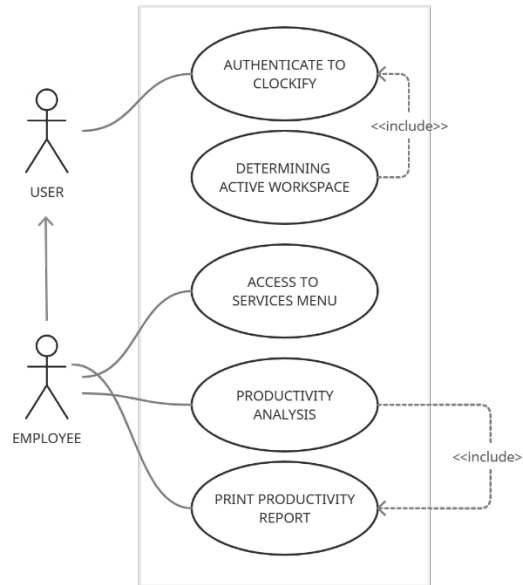
**Figure 4 - Use-Case Diagram of Application**

The actor description describes someone who interacts with the system. An actor can provide input to the systems, and receive information from the systems. Table 1 describes the role of each actor and what process they go through.

Table 1 - Use-Case Diagram Actor Description

| Clockify		VSN X Clockify Bot Analyzer	
Role	**Description**	**Role**	**Descriptions**
Workspace owner	Employees as Clockify users who create workspaces.	*Clockify users*	All types of users in the Clockify application, have access to run the employee productivity reporting system on projects, and development results.
Workspace admin	Employees as workspace owners or ordinary users who serve as an administrator.		
Project manager	Employees as Clockify users who manage projects.		
Team manager	Employees as Clockify users who manage teams.		
Regular user	Employees as Clockify users who track time.		

3.3 BOT Telegram and Clockify Configuration

Telegram bots are small third-party applications that run entirely within the Telegram application, this allows anyone to create bots that can respond to their users based on command messages or requests [14]. Users interact with bots through a flexible interface that can support any type of task or service, which is one of the most popular services today with the many uses it offers [16]. Meanwhile, Bot API is an interface developed by Telegram to make it easier for developers to build bots (automated applications) for the instant messaging service. This interface is HTTP based and allows data to be pushed and pulled to and from the Telegram bot as well as integrated with other systems. Figure 6 shows the clockify telegram bot display. By using the Bot API, developers can create bots that are capable of performing various activities, such as sending messages, fetching data, and so on. API bots are especially useful for developers who want to take advantage of the capabilities and features available in Telegram to build useful and attractive applications. Each bot created on Telegram will be assigned a unique authentication token which is a string like **110201543: AAHdqTcvCH1vGWJxfSeofSAs0K5PALDsaw** which is used to grant bot permissions and send requests to the bot API. This token must be stored securely as it can be used by anyone to control the bot. If the token is lost or compromised, the developer can use the /token command to generate a new token. All requests to the Telegram bot API must be served via HTTPS and must be served in a predefined format.
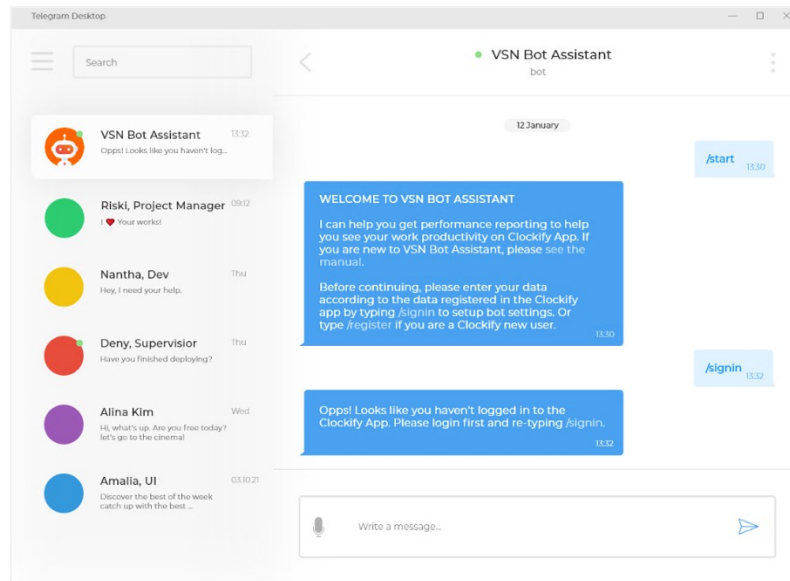
Figure 5 - Bot Telegram "VSN X Clockify Bot Analyzer"

After creating a Telegram bot application, developers can use the Telegram library to integrate the bot application with Google Apps Script. Thus, the Google Apps Script application can communicate with users via Telegram messages and manage user input and output through logic set by the developer. Figure 7 shows how telegram libraries added into google apps script. The library will help establish the relationship between Google Apps Script and Telegram but make sure the project is saved and named before adding the library.
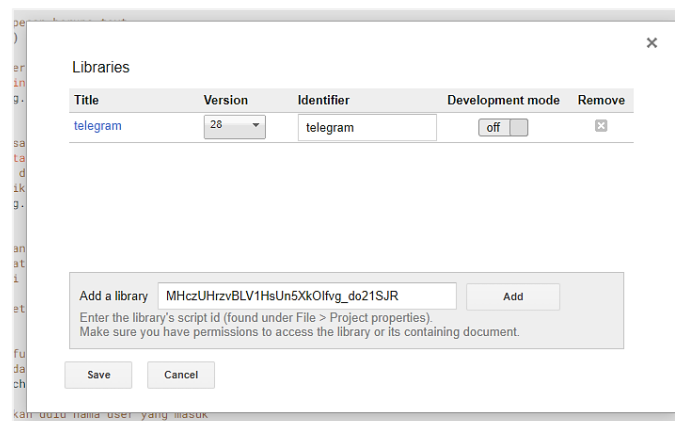

Figure 6 - Adding and Configuring Telegram Libraries in Google Apps Script Library Resources

The next step in the Google Apps Script development process is to create and manage a versioned deployment as a web application. Deployments are executable versions of scripts as web applications, add-ons, or APIs. By creating and managing deployments, developers can walk through the code, track changes, and control the exact version of the code that users have access to. Version-based deployments allow developers to make changes to code while users can still use a working version. If the app is to be published for public consumption, always use a versioned implementation. Developers can enable multiple active version deployments at the same time.
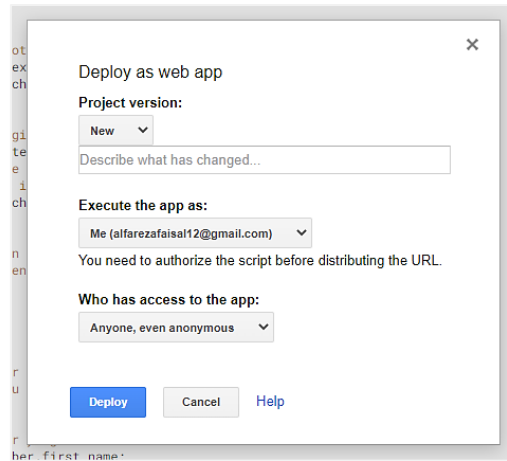
**Figure 7 - Deploy Google Apps Script into a Web Application**

After successfully configuring BOT Telegram and Clockify on the google apps script, the next step is user authentication. The Clockify API key can be found in the Clockify app profile settings. Related information can be found at the bottom of the screen, in the section titled API. This API key allows Clockify to be connected to other applications and vice versa. After a user submits a Clockify API key, the system accepts the interaction by detecting a forced reply. After the main authentication process is complete, Clockify connects with the Telegram Bot as an interface, Google Sheets as processed data storage, and Google Apps Script as the link between the three via the Clockify API key.
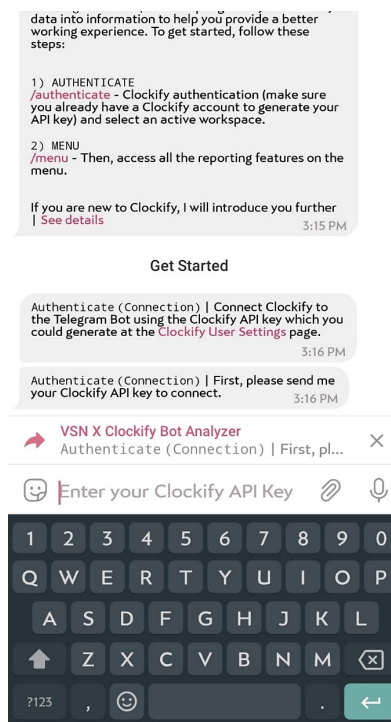
Figure 8 - Request User Clockify API key input to initiate the first stage of User Authentication

The system was developed to complement Clockify's capabilities in measuring employee performance. This includes identifying increases and decreases related to employee motivation and improvement efforts. For this reason, it is necessary to analyze employee work productivity through advanced data processing from Clockify to provide new information and insights that can be used to improve and enhance employee performance. The system was developed to immediately communicate achievements so that continuous decline can be avoided due to employee unconsciousness. By using the Bot Father Telegram and Google Apps Script services, the system can send information on a scheduled and automatic basis to employees as users without having to wait for their actions. It aims to avoid continuing decline due to

unconsciousness by using systematic services. Users can run on a scheduled basis via a trigger from the google apps script. Productivity analysis results appear on the notification screen of the user's device. In addition to announcing that their productivity has been calculated and analyzed, push notifications are a way to grab user attention and have a great opportunity for users to see and review them. The results of the productivity analysis are presented in formatted text and line charts showing the achievements to date.
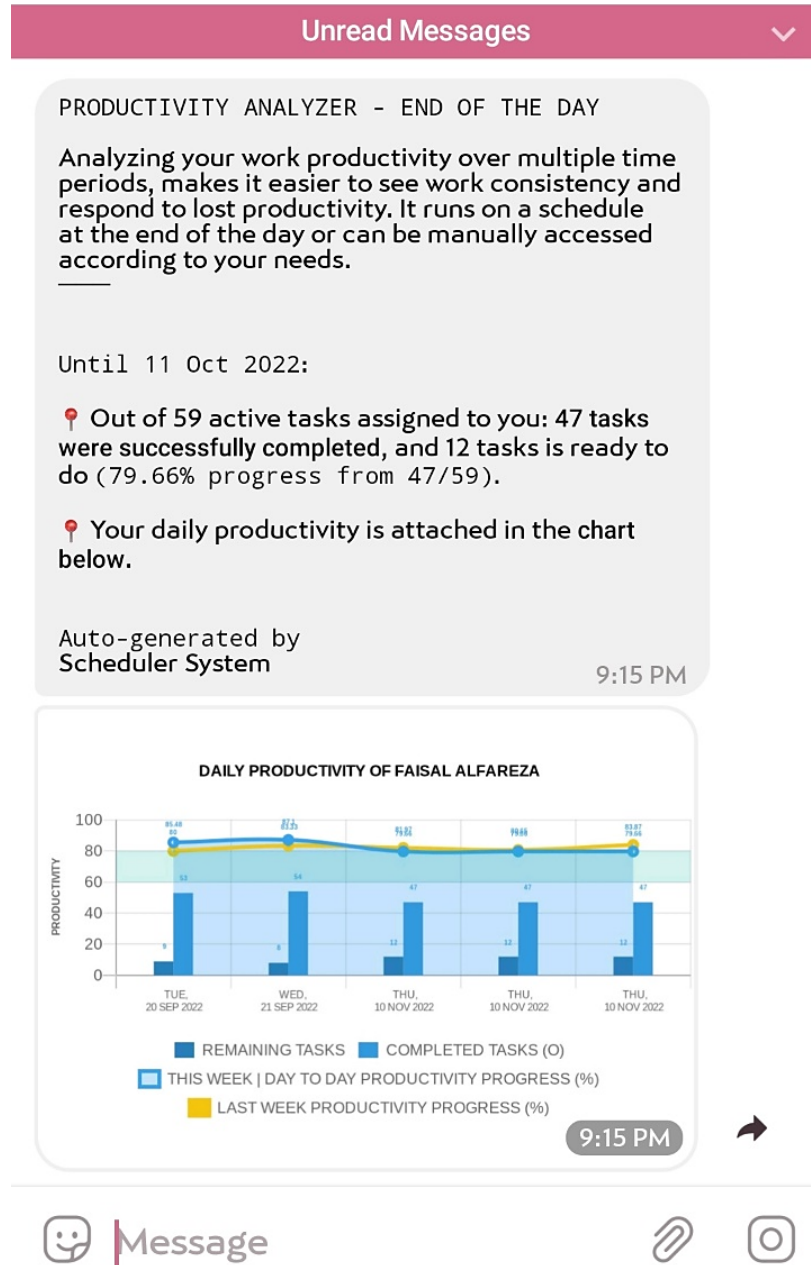
Figure 9 - Productivity Analyst Information User work as Employee by Google Apps Script Trigger

The second option, the user accesses the work productivity analyzer service by tapping the Productivity Analyzer action button at the very bottom in the middle of the keyboard, then the handler in step 2 of the workflow is executed.
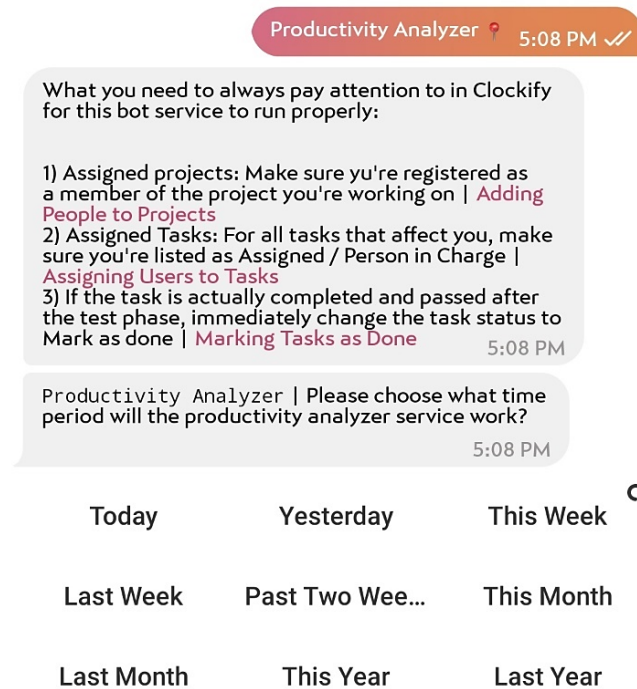
Figure 10 - Access the Productivity Analyzer service by tapping the "Productivity Analyzer" button

According to the first breakdown analysis point, the system is created to display employee performance visualizations from Clockify, to show performance increases or decreases. The goal is for employees to easily understand their performance and take appropriate action in the form of repairs or enhancements if necessary. Figure 5 shows the uses of quick chart of employee's productivity.
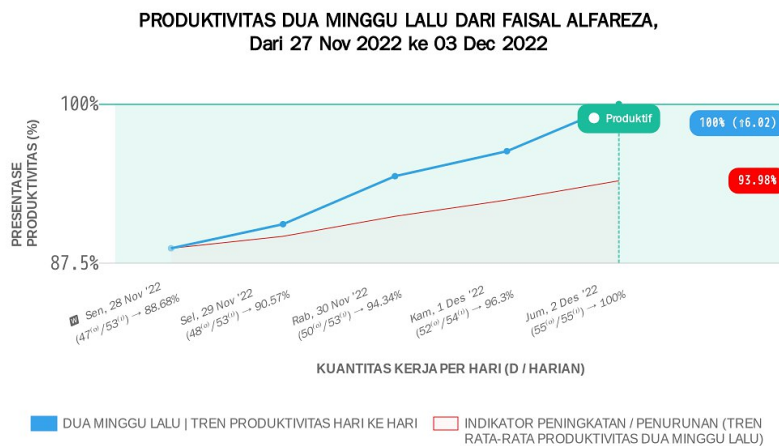
Figure 11 - Employee Work Productivity Report in Graphical Form

3.4 Black-Box Testing

Testing will be carried out with a black box approach where the black box testing technique is a simple approach to use because it only requires a lower limit and a higher limit than the expected data [16]. Black box testing is an examination of basic aspects of the system without access to the source code or not very relevant to the internal logical structure of the system [17] [18]. Testers don't understand the internal workings of the app. Can detect malfunctions, data structures, interfaces, initialization, and termination. Testing will be done by involving 12 employees. Table 2 shows the results of black box testing on employee performance measurement applications using the integration of Clockify and BOT Telegram.

Table 2 - Black-Box Testing on Application

Objectives	Case Test	Test Objectives	Result
Open the work productivity analysis automatically by schedule	Activate the google apps script as a trigger to analysis the employee productivity	System will display the result of the work productivity automatically in line chart every day between 5 pm to 6 pm	Successfully
Open the work productivity analysis manually	User sending command messages directly (`/productivity analyzer`)	System will ask for time period to be display by user	Successfully
Displaying work productivity message based on time period	User accessing the productivity analysis menu and choosing the time period	System will display the message about the result of work productivity in line chart based on its time period	Successfully

4. CONCLUSION

Based on the results and discussion as well as the results of field tests, it can be concluded that the application Produces work reports that accurately represent the actual performance of employees. The results of work reports can be displayed in the form of descriptions or line graphs. Reports can also be displayed within limited time periods. Based on the 12 employees involved in the black box testing, all agreed that the integration of Clockify into the Telegram BOT application had successfully displayed a summary of employee performance productivity.

However, each research certainly has its own limitations, such as the current apps platform is not yet able to perform early detection of employee performance decline and its follow-up. Furthermore, it is necessary to collect more productivity data for long-term analysis. The longer the time period is observed, the more valid the movement of employee performance progress is known because it shows how employees work from time to time. Then Added filter options that let employees track performance for clients, projects, or markers needed for specific analysis.

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