Dashboard information system development as visualization of transaction reports in the application BackInd (backpacker reservation system)

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Abstract. The accuracy and clarity of information becomes primary source for decision making process to bring effective and efficient of technology utilization. For this purpose, the ‘BackInd’ has been developed as reservation system to help travellers obtain complete information regarding the tourist attractions and any relevant information. Therefore, there are several problems that occur in term of presenting information, such as the use of complex tables as a means of detail information about business conditions, information overload in single page that become deterrent in term of identification of relevant data and unintuitive data presentation that bring exhaustive understanding. Thus, the implementation of dashboard can visualize the key performance and metric in real-time to support the executive gain valuable insight lead to quick and accurate decision making. The results of this study related to the process and context analysis by visualizing the data group into various sections such as transactions, finances, testimonials, visits and business performance to bring resourceful and usable information.

1. Introduction
The demand of providing accessibility, visibility and productivity as the primary attribute of information become extremely critical lead to the development of dashboard as the attempt to visualize all data to provide meaningful information at a glance for the executive. In general, simple activities can bring disaster or huge loss to the organization such when manager want to make the financial statements as the report for business management. Often, it has taken such a period of time due to many stages to be followed by the person in charge in order to generate reliable and relevant information, such as conducting data filtering, grouping data, sorting the necessary information, then grouping again the information based on needs, then making information visualization to get clear picture about the current situation and lastly prepare the result report to the executive. This kind of activities in the decision making process cannot bring optimality even lead to disaster when the timing is not right or pressure of competition take in charge. It is necessary for application to present information effectively and efficiently, which means it contains in acceptable form that become trigger for the process of establishing conclusion accurately where its presentation can be quickly understood. The common approach for simplification in term of analysis process and exploration activity by implementing data visualization techniques, which often in the form of dashboards. Actually, it provides a display of
interfaces with various shapes such as diagrams, reports and visual indicators combined with dynamic and relevant information [1] [2]. It also presents the relevant, customized and related information to monitor business aspects, enabling businesses to quickly identify issues and define corrective steps to improve organizational performance [3].

In this study, the BackInd is an application designed with two types of users, which are traveller (consumer) and homestay (supplier). Currently there are two modules that have been built in this application in accordance with the target use of the administration system namely the service provider and mobile-based system by consumer. In the first module, there is the process of inserting data, updating data and printing data about services, homestay and tours. This module also becomes the central data used in the application's mobile-based system module, which dashboard can be extremely useful to present descriptive statistics regarding the real-time data monitoring. In short, this application can display a table of total sales or transactions that have occurred in the service manager menu. However, the manager as well as the executive have difficulty to read presented information, tendency to provide bias result, lack of accountability, misinterpretation of the pattern or trend, misanalysis of pressure, shortcut option and slow response to make decisions based on the information provided by the application menu. Actually, human have limitation in term of capacities and capabilities when obtaining the detail information, so the error and mistake can be happened regularly. To overcome the problem, this study want to develop dashboard as a visual display of the important and critical information to accumulate and calculate relevant data in order to achieve the objectives that was set by executive through connecting and compiling the related information on single page so that the information can be monitored at a limited glance only [1] [4].

2. Research design

Commonly, the dashboard is grouped by the level of supported management, which are operational (the updated metrics simultaneously in real time to see the daily data), tactical (integrated dynamic table and exercises) and strategic (track performance with respect to KPI for better alignment) dashboard with 6 (six) type of components namely graphic, image, icon, drawing object, text and organizer [1] [3]. On the other hand, the decision support system (DSS) is a computer-based system that assists users in creating and selecting activities through providing data storage and retrieval in order to improve the functionality of legacy access and creating reasoning-based models [3]. Actually, it has three fundamental components, which are Database Management System (DBMS), Model-based Management System (MBMS) and Dialog Generation and Management System (DGMS). The above three components can be found in many DSS architectures and have important roles in their respective structures. Essentially, users interact with DSS via DGMS then DBMS and MBMS that filter users profile and interfaces from the physical breakdown of the base model and the implementation of the database [5]. Unfortunately, the implementation of DSS brings failure, especially when organizations depend excessively on their potential and results, especially when these tools are applied under turbulent conditions and high pressure, while partial understanding and unilateral interpretation are often used to determine the conclusion from the result [6] [7]. For the normal development of information system (IS) application requires a minimum of 180 days but using the rapid application development (RAD) method through numerous type of testing based on the user feedback and emphasizing the working software can lead to the completion stage by only 30-90 days [8]. The stages in software development with RAD related to the identification of requirements, which users and analysts perform a meeting to identify the purpose of the application or system and identifying the need for information to achieve the objectives. Then, conducting a design process and making repairs if there is still a planning discrepancy between users and analysts. Lastly, the developers perform the process of creating applications according to the design. Once the program finishes either partially or completely, the software testing should take place to determine either the program can be applied within the organization or need more time to be improved [9].

Normally, key performance indicators (KPI) have been developed to predict the chances of success or failure of the business processes implemented by the organization, so that it can be used as a dramatic
performance enhancing tool. The success of KPI development is determined by four factors namely cooperation with staff, trade unions and major consumers; transfer of power to the front-line part of the organization; integrating measurement efforts, reporting and work improvement and connecting the performance measurements with the organizational strategy. On the other hand, the RAD application development method was chosen because this method has several advantages such as relatively fast application-time growth, focusing on values that can be value added for software quality tailored to the user and the reusable program code. In this study, the framework should be determine first to develop the application systematically, which Laravel came into the picture as a model, view, controller (MVC) of web development that uses the PHP programming language. It has the advantages among other available frameworks that are supported and adapted to the rapid development of web technologies. Actually, it has some of the features to support RAD, such as the presence of a Blade Template to accelerate the process of creating a Web page view. It also supports the RESTfull for execute unit testing, as well as the existence of artisan as a tool to create faster development by writing only a few lines in the console line [10].

3. Discussion and result

Based on the analysis of business needs in the application, there is a need to create dashboard module that is useful to assist service providers in monitoring and evaluating various types of data, and following proposals for further development [11]. Actually, the previous table contains several data obtained from various tables such as business, order, user, review, merchant, payment and performance where these relationships will form a new table to support the development of web-based dashboards. The business table contains information about the products owned by the service provider while the order table contains the booking information and the transaction done by the user. Meanwhile, the user table contains information about the user such as the name and email or the identity data listed on the booking. On the other hand, table payment contains a list of payments that the user has made after making the booking. Therefore, the review table exists if the user has completed an order in which the table contains the information needed when the post user uses the service. Furthermore, the performance table which contains the index and requirements by the service provider and lastly, the merchant table become as the detail and updated information profile about service provider. At process of requirement analysis that consider people, activities, context and technology, this study explore five important features for visualization page namely transaction, financial, business review, business visitor and business performance. In addition, delivering results in real time by adding and extracting value from each data set can lead to the development of comprehensive key performance indicators (KPIs). This tool simplifies data in easier sets of visual information that allow the executive to see what the organization is doing correctly and where it should be improved.

| Features               | Goal                                                                 |
|-----------------------|----------------------------------------------------------------------|
| Transaction Visualization Page | Know the pattern of transactions in improving the knowledge of transaction history made by customers |
| Financial Visualization Page | Know the financial patterns that have been done by service users in the use of the Backend application to market their products |
| Business Review Visualization Page | Know the user patterns that have made the booking or finished using the service provider. The goal is to improve performance in service that is by service provider |
| Business Visitor Visualization Page | Find out which patterns use the Backend app with the intent to make sales and promotional activities decisions |
| Business Performance Page | Take a track record of the level that the service provider has done in each month, whether in order, promotion to financial |
Figure 1. Use case and activity diagram.

The figure above contains information from transactions that are broken down into sections such as bookings that occurred in this month's paid bookings, completed bookings, expired bookings and cancelled bookings by customer while the value of revenue earned from total all completed bookings. Meanwhile, the pattern of PHP-based framework has completed the separation of user interface and business logic for developing web applications, providing basic methods, clarity of design and realization of structure [12]. Therefore, choosing a web development framework is not an easy task, since this choice involves a wide range of problems such as the interior design of the framework, ease of use attributes to be implemented, technical qualities, future development, etc. In short, the activity involves the process of selection the dashboard menu to show dashboard page and transaction section to present the visualization regarding the descriptive statistics [13]. In addition to the simple qualities of the frameworks in comparison, several constraints should be considered before starting to develop one of these frameworks namely operating mode, development teams, infrastructure and maintenance, current and future functional requirements, hosting platform constraints, queries per second, average system load, memory usage and number of files required [14].

Figure 2. Screenshot of line graph dashboard on performance.
In the dashboard of application, the booking item details are containing date, subscriber name, code, duration, total price and booking history. Financial visualization includes information such as total revenue of the month, revenue source and statistic income history in one month. User testimonials are divided into two groups, namely good and criticism, equipped with statistic in the form of Bar chart as a comparison of good and bad testimonials on each business item. Visualization in the visit section contains information about visitors or users in the application while grouped and processed into sections of history, reference, origin and type of access. Moreover, business performance management in the module of the application provider is developed by following the balanced scorecard model, which is divided into several parts such as finance, customer, internal business process and learning & growth. Then, small information added to deliver more information compare to the previous such as total revenue starting early in the year, business indicator, the number of users and business are most in demand. When used correctly, dashboard panels can be used to help making the informed decisions to the executive that significantly affect business performance, which in turn affects the end result.
4. Conclusion
With the results of the research that has been carried out, the following can be concluded that the implementation of the dashboard information system as data visualization of the process that occurs in the application BackInd for service providers, produce visualizations that can facilitate the service providers to monitor and evaluate the process of the Important parts such as transactions, finances, testimonials, visits, and business performance that can support the decision of service providers to expand their business. Meanwhile, the transaction data is processed into pieces of information that have their own details to adjust with the service provider to facilitate the reading of Data in an effective and efficient visualization. Part of the information is classified as a part of transactions, finances, testimonials, visits and business performance. The transaction section contains information about bookings made by users such as the number of bookings this month, the number of bookings completed this month, the number of expired bookings and cancelled bookings along with the order details respectively. Rapid Application Development (RAD) system development model in the creation of dashboard information system through requirement stage, user design, at the end with construction, produces a relatively fast application module to designed and developed further supported by research systematics conducted by going through the review stages, collection, analysis and construction so that the research is done on target and related to each other.

References
[1] Rasmussen N H, Bansal M and Chen CY 2009 Business Dashboards: A Visual Catalog for Design and Development (New Jersey: John Wiley & Sons)
[2] Sarikaya A, Correll M, Bartram L, Tory M and Fisher D 2018 What do we talk about when we talk about dashboard? IEEE Trans Vis Comput Graph
[3] Few S 2013 Information Dashboard Design: Displaying Data for At-a-glance Monitoring Analytics Press 2nd edition
[4] Janes A, Sillitti A and Succi G 2013 Effective Dashboard Design Cutter IT Journal 26(1) 17-24
[5] Druzdzel MJ and Flynn RR 2002 Decision Support Systems Encycl. Libr. Inf. Science
[6] Arnott D and Dodson G 2008 Decision Support Systems Failure Handbook on Decision Support System 1 pp 763-790
[7] Aversa P, Cabantous L and Haefliger S 2018 When decision support systems fail: insights for strategic information systems from formula 1 The J. of Strategic Inf. Sys. 27(3) 221-236
[8] Naz R and Khan M N A 2015 Rapid Applications Development Techniques: A Critical Review Int. J. of Software Engineering and its Applications 9(11) 163-176
[9] Lubis M, Kdisusumasari TF and Hakim L 2018 The Indonesia Public Information Disclosure Act (UU-KIP): Its Challenges and Responses IIECE 8(1)
[10] Parmenter D 2015 Key Performance Indicators (KPI): Developing, Implementing and Using Winning KPIs (New Jersey: John Wiley & Sons) 3rd Edition
[11] Lubis M, Lubis A R, Lubis B and Lubis A 2018 Incremental Innovation towards Business Performance: Data Management Challenges in Healthcare Industry in Indonesia MATEC Web Conf. 218 04015
[12] Lubis M, Fauzi R and Lubis A R 2018 Enterprise Application Integration for High School Students using Blended Learning System MATEC Web Conf. 218 04016
[13] Pauwels K, Ambler T, Clark B H and LaPointe P 2009 Dashboards as a Service: Why, What, How and What Research is Needed? Journal of Service Research 12(2) 175-189
[14] Laaziri M, Benmoussa K, Khalil S and Kerkeb M L 2019 A comparative study of PHP frameworks performance Procedia Manufacturing 32 864-871