EXECUTIVE INFORMATION SYSTEM MODELLING TO MONITOR INDONESIAN CRIMINAL RATE

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Abstract—Similar to any other governments, Indonesia government has the role of protecting the security of its citizens via the established police unit. However, the executive unit is often unable to provide response in timely manner due to the huge data size. For the reason, an executive information system (EIS) is established in order to provide necessary information to leverage the decision making process. This work intends to establish and evaluate the executive information system and its support to facilitate the efforts to fight crimes in Indonesia territory. The EIS prototype is established and is evaluated on the basis of the six information system success factors where the required data are collected by means of questionnaire. The results suggest that the factors of system quality, information quality, easy-of-use, user satisfaction, and individual and organization impacts are very significant.

Keywords: Information System; Executive Information System; Criminal Rate.

I. INTRODUCTION

Indonesia is an archipelagic country. Currently, Indonesia is divided into 33 provinces that the most western section of the country is known as Sabang, and the most eastern section is known as Merauke. In Indonesian Constitution, it mentions that the Indonesia government should ensure the security, including from crimanility, of all of its citizens. To maintain the security, Indonesia had established a police department.

The general approach to prevent a crime is by analyzing existing data and information, which are fundamental for decision making. The better information obtained and the more data collected can improve the quality of decision made. With precise information and analysis result, allocation resources, amount of personnel deployed and training provided will be more focused and efficient. Anticipating the possibility of an occurring crime can be seen from time, location and environmental conditions.

Currently, the police department faces with the problem of long time of processing information from regions to its headquarter. In addition, the presented reports to the decision makers are often not in the requested form; thus, the reports should be reproduced. These things slow down the police department to respond and prevent occurence of crimes.

Clearly, the executive of the police department requires information system to facilitate their decision making process. The required information should obtain easily, precisely, quickly, and accurately. These information are required and become the basis for the preventive responses to the crimes. To ensure the information can be easy, fast, precise and accurate, the executive needs an executive information system, which should be supported by suitable softwares and hardwares.

An Executive Information System (EIS) is a form of information system that compiles data from various sources and provides a summary important for senior management to perform performance monitoring [1]. By utilizing EIS, the reports can specifically be tailored to the needs of the organization executive. The executive may directly use EIS application without an intermediary and access internal and external data including data filtering, sorting, and probing.

In reporting, the utilization of EIS can deliver the required report occurring issues [2]. The interface of EIS has to be made in such a way that a layman can easily compose reports [3]. The EIS should also be able to present the data in graphic, table, or geographical map of a region [4]. By utilizing EIS, the leaders can decide exact actions as a response to an event or in anticipating a criminal event.

This purpose of this research is to create a report-

ing form for districts to headquarter as a source of data to generate EIS Report. Another purpose of this research is as a reference for executive to build an EIS Application. Moreover this research can be used as an information resource that have quick access and accurate data. Good EIS should be easy to use for the executives who may lack of high level of computer skills. The information displayed on the EIS can be a chart, provide exception reports, and the ability to display data in detail.

In addition, the EIS should provide appropriate information to users to leverage problem identification, decision making process, and extensive analysis. For organizations, the use of EIS should have an impact on the effectiveness of the decision-making process.

In the development, According to Christian [1], the EIS should have the following functions: capable to provide highly summarized data despite the fact that the EIS should access a huge data size, drill down and drill up, data integrations with different databases, and capable to derive new information by aggregating data from different databases. The users should be able to look into deeper details of the data.

II. RELATED WORKS

The use of EIS, is indispensable for the organizationin an effort to achieve organizational goals [5], the EIS should be able to include relevant database with the state and managed by the software. In addition to the EIS must be a software package containing financial models, statistical management science or quantitative models which provide appropriate leadership analysis. The contents of the EIS can be a knowledge management subsystem, which is a subsystem supporting other sub-systems, or act as stand-alone components. In addition to knowledge management subsystem, subsystem user interface can also be implemented the EIS as a tool used by the user to give commands to the system.

EIS is used by managers as a tool in making decisions, and do not play a role as a decision maker or as a substitute manager role of an organization. EIS serves as support decision making half structured to be more effective with the use of analytical models and data available [5]. EIS helps mid-level managers in collecting data, analyzing the data, habits, events and recap the company's activities in the past. With the accumulation of data is certainly the manager would be easier to make decisions.The draft EIS needs to be emphasis on the flexibility and adapt ability is high, so easily adapted to the needs of the user. This application can improve the effectiveness of decision making managers.

In designing EIS is often made with high expectations of the organization, so it is not rare that failed EIS manufacture [6]. It is necessary for the evaluation of the system for leaders who can judge the success of an EIS. According to Poon, the success rate can be measured on the basis of five criteria, namely access in this case access to the EIS system, whether using that standard procedure, or EIS has a complicated procedure for the user. Use, usability factors of the EIS systems built if it canbe usefulfor users. Satisfaction, chairman of the organization's EIS users are satisfied with the existing system or if the user does not want to use this system back. Positive Impact, the positive effects produced by organizations using EIS both individually, as well as from the point of view of the organization. Diffusion, the last factor that indicates the success of an EIS is the number of users of existing systems

EIS-making was made by Majid. In the study belonged to Ref. [7], EIS was made in order to adjust the project managing. Basically making procedures of project management required monitoring of the level of top management to monitor information on the project in a timely manner. Focus of his research is to compute information on utilization by top management to undertake an evaluation of the ongoing project.

The Executive improvement information site monitoring system, using the model classic water fall. Reference [7] starting from identification of system requirements Followed by the system design, coding, integration, system testing, implementation.

From his research, Reference [7] stressed that the use of executive information system can provide managerial information for executives in an urgent situation. It improve the efficiency of on-time monitoring.

Executive information system development is done by Watson other. In his research, Watson [8] analysis of five phases. Organizational objectives, environmental scanning, strategy formulation, strategy implementation, and strategic control. Data research to 51 organizations. EIS success made analyzed based support to the operational objective and strategy implementation. In the Watson's research emphasizes the relationship between management activities and information required.

III. METHODS

The EIS can be developed using methods used by Majid et al. [7]. In the last steps of EIS development methods, the method is followed by Software Development Lifecycle (SDLC) development method (see Fig. 1). In this case, the used method is prototyping method.

Prototyping is rapid development and prototype testing of new application through interaction process and repetition usually used by information system and business experts. Prototyping is also called as rapid application design/RAD since it simplifies and accelerates sistem design [9].

EIS prototype will be made after the information collected through the methods already mentioned above this is intended to allow a user to validate the system to be created [10]. Of draft obtained will be evaluated by the customer, and made prototype iterations to 2 to obtain the proper design to be developed further.

EIS evaluation, see Fig. 2, is done by questioner method with questions referring to reflections of 6 parameter of sistem information success stated in questions. Evaluation questioner is distributed to EIS users.

To measure the success of the EIS can be seen from some of the variables that support that Information Quality which is the quality of the output of an executive information system. These variables relate to issues such as Relevance, Timeliness, and Accuracy. Informationthat generated by Executive Information System. User Satisfaction This section relates to the response of the recipient of the use of the output of an executive information system. Use is defined as the consumption of the receiver outputs an EIS. Use also means implementing executive information systems. Individual Impact is defined as the effect of information on the behavior of the recipient. Research in use three variables to analyze the influence of the EIS to the individual that is the Speed of Problem Identification, Speed Of Decision-Making, Extent of Analysis. Organizational Impact as the effects of organizational information performance. This study uses two variables of Leidner [11] to demonstrate the benefits of the EIS in the organization, namely Shared Vision Organizational Decision-Making and Organizational Effectiveness.

IV. RESULTS AND DISCUSSION

Crime data collection is distributed from the center to the regions. Frequent delays in the implementation of data or lack of data transmitted by the region. Imperfection of data and data delay hampers the reporting process and decisions made by the leadership Headquarters as a command center.

After the data is collected, the next process is to summarize and analyze these data to be used by the executive as a decision-making information. The time required for report creation process cannot be determined because it is associated with the timing of data collection and validity of the information.

The report presented to the Head already has a reporting format, which is set in Regulation but did not rule out the leadership want to see the reporting a form different from the specified format.

The report created will be based of reference in the decision-making leaders. This decision is poured in the form of a warrant which will return to the area in order tobe distributed in the direction of the district.

The existing workflow is defined by this step. People make a report on the events experienced or saw to the nearest police station, these district receive reports and input into the reporting system. Input information in accordance with the provisions contained in the police report criteria. The report is already in the input receipt is then printed in the format of the report given to the complainant. Receipt of reports taken by the complainant as evidence that the person concerned has made a statement. The report will be in summary by the operator and will be given to the regional executive to make an analysis of the incident. This
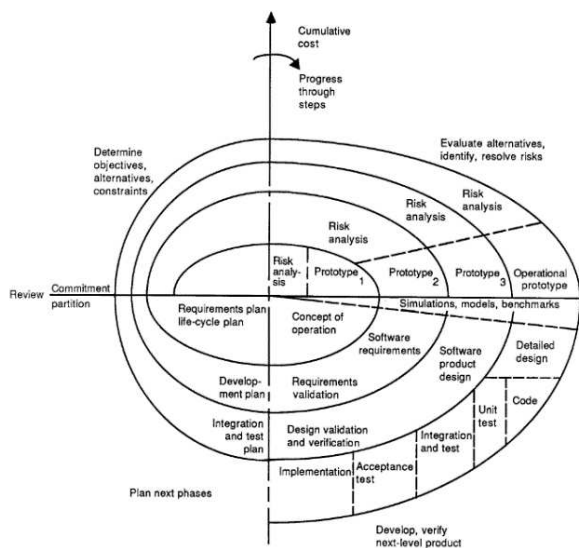

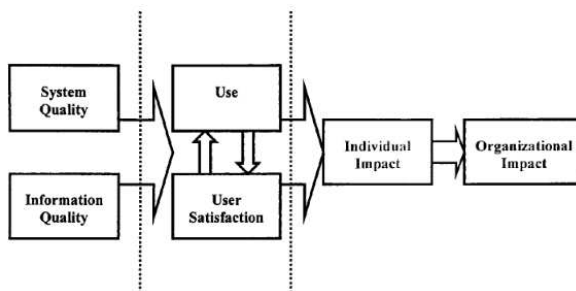Fig. 1. Prototype Software Development.

Fig. 2. Success Keys of Information System.

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report can be used as an initiative of the activities of each area. The incoming reports per area will be sent to the operation control headquarter bureau to be summarized for the executive police headquarters. Before reporting process, the information obtained is validated its validity, before it is made into a national report. Data entry will be made according to a regular report that has been set in the regulations. Statements made in the form of daily, weekly, monthly, three-monthly, quarterly, six-monthly, and yearly. The report will be analyzed by executives from headquarters to be input. District will be set forth in a letter called a warrant. This letter contains a summary of the problem, and action should be taken against any problems experienced by each region. The warrant is printed and distributed through headquarter bureau according to their respective regions. The Executive received the regional police, executing, and controlling the existing directives on the warrant.

The main problem is to monitoring the level of crime rooted in data collection and processing crime. Data is sent from the area to the center are sometimes incomplete and should be returned to the area to be repaired. In data processing, bureau in charge of collecting the data criminality and make a report to the executive of criminal of the data collected is also experiencing difficulties in processing the data and thus require substantial time to process the requested report. This makes the executive to be very dependent on this bureau, whereas in taking decisions, executive must act quickly and appropriately and efficiently.In order to know the need of EIS information in criminal event analysis, an interview with executive was done. Based on corresponding interview, indicators in criminal event analysis which variables are forming crime event analysis which are: crime number development, criminal case settlement, calculations on citizen risk of exposed to a crime, intervals between crimes were obtained.

Problems in data collection can be minimized by providing a daily report system forms the stuffing from the reporter's identity, details of events, laws that regulate, the identity of the perpetrator, the victim's identity, the identity of witnesses, until the action taken. Not only with the daily report application, by using this system, operators in the region will not make the mistake of sending a report is not complete, because the data must be sent by the operator has provided the format in the system. The data input by the operator directly transmitted and stored to the server at the Headquarters via the internet.

In the process of data analysis, the collected data must be converted into standard reporting format that

has been set in the Regulation. However there are times when the leadership require supporting data with different formats, in this case the bureau must return in order to process data in accordance with the information needed The number of crimes is one important aspect in monitoring the level of crime in a region. The high level of development will make an area becomes prone area of crime. The numerical value of the growing amount of crime is the percentage increase in the number of crimes in a certain period compared with the previous period. Completion of crimes monitored in order to measure the performance of investigating cases of crime in one particular area. The higher the settlement value of the case, will increase the sense of trust. The numbers of crimes settlement value is the percentage of cases successfully solved compared with the number of crimes reported within a certain time period.

The population exposed to the risk of crimes is a strong measure in determining the personnel that will be placed on a particular area in order to anticipate the occurrence of a crime case. The higher risk of population exposed to the greater of crimes probe of personnel who will be deployed to operate in the area. Figures population exposed to the risk value is calculated from the occurrence of crimes in a certain area and period compared with the total population of the region.

The time interval is a measure of the crime in determining the time picket. In this determination operation, which was held to be more effective within a certain time in order to anticipate the occurrence of a crime case. The lower interval of the crime indicates an area has a higher potential for crime. Figures interval value is calculated from the amount of crime in a given period of time monitoring of events than the number of crimes that occurred during the same period. The value figures are calculated in units of seconds

Other EIS data sources are from some other applications such as Daily report system this system is used as main information in creating information and reporting in EIS. Operation System which contains personnel action or activities data in handling an event. GIS (Geographical Information system) containing geographical data of Indonesian regions. EWS (Early warning system) is a system connected to BMKG (Indonesian Meteorology, Climatology and Geophysics Agency) on Indonesian geographical condition.

The people make a report on the events experienced or saw to the nearest police station. These areas receive reports and input into the reporting system. Input information in accordance with the provisions contained in the police report criteria. The report is already in the

input receipt is then printed in the format of the report given to the complainant. Receipt of reports taken by the complainant as evidence that the person concerned has made a statement. Executive region can directly see the incoming data in real time from different places, and receive notification when there are events that have Urgency status. Report the incoming per area can also be seen by the operating control headquarter bureau for the contents of the report is validated. The report will be analyzed by executives from headquarters to be input to the district. Put to police the area will be set forth in a letter called a warrant. This letter contains a summary of the problem, and action should be taken against any problems experienced by each region. The warrant printed and distributed to the local police through headquarter bureau according to their respective regions. Executive policing areas receive, execute, and control the existing directives on the warrant.

Any data that is entered into the EIS, is converted in the form of periodic reports and analysis in accordance with the relevant executive needs. The resulting report is easy to read and understood by the executive. Reports generated by the EIS will be used as a reference in making decisions on a crime in progress, or as a preventive measure in anticipation of a crime that may occur. The form of reports and analyzes can include images, maps, graphs, tables, or text. The resulting output can be saved into a file that can be used by executives.

The resulting reports can be displayed in certain categories ranging from the class of crime, type of crime, crime name, date of incident, time of incident, the scene, provincial, city, district, village, report date, time reporting, and the case of the leadership attention. In this case, every indicator of crime must be seen by the above categorization. This is necessary so that the leadership got detailed information.

Reports resulted can be drill down based on event location and can display details of occurring events and overall data input by regional members can be seen. This is in order for EIS to provide complete data as per executive need. This ability is seen to be able to help in processing and analyzing reports faster, correct and accurate.

EIS prototype is produced in accordance with the results of previously conducted analysis system where the output can be made. User access to this application is limited only to those users who have access rights. For that created the login page as a security system.

Once entered into the system, the main display On this screen there is a mapping of the entire distribution point at coordinates regional office of the national police force, and has details of which contains a summary of the indicators of crimes against each area. From this screen the national police leadership can see by monitoring the area, and can drill down to look into the monitoring area smaller. Data is shown on the map will refer to the permissions granted. For local leaders, the data that appears on the map only the data on the area under the leadership of the region.

In addition to the EIS on the map, provided a menu to be able to see the report indicators of crime. In this menu will display the results of calculation of all the indicators of crime in the entire system with a pre-determined period is one month. The resulting report to the leadership of the national police headquarters is a report that displays data every police, which can break down into data Police. Whereas the level of the region, leaders at the local level can only see the data on the area under the leadership.

Other menus are provided for the leadership to be able to see the report indicators of crime with more specific categories. On the menu is displayed filter to a report in order to generate more specific data. The report called Anev (analysis and evaluation) produces three types of reports, namely the report as a whole, the report per region, and reports per scene. The report is a report that has been shown in filtered with categories that have been set in the filter.

To evaluate function of EIS, questioner was distributed to executive. The questions in questioner reflects 6 parameter of Information system success. By using this method, there are 6 parameters of success which are system quality, information quality, use, user satisfaction, individual impact, organizational impact.

From system quality side, it can be concluded that the system has a good quality which is seen in the system which is able to provide report per requirement, system can produce accurate and relevant information. But there are 7% of dissatisfaction for this EIS system. Dissatisfaction occurred in application access bandwidth factor.
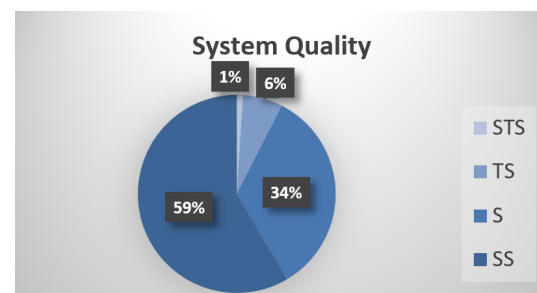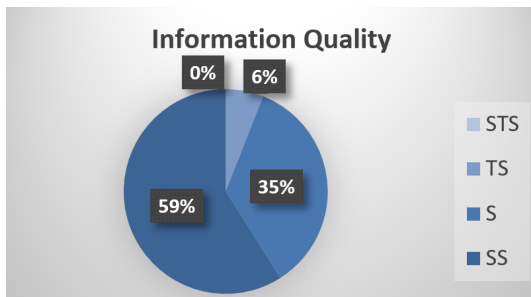

Fig. 3. EIS Evaluation: System Quality

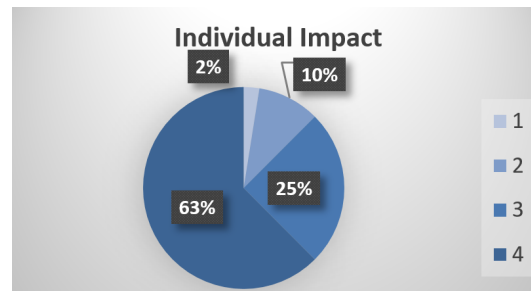Fig. 4. EIS Evaluation: Information Quality

Fig. 5. EIS Evaluation: Use.

Fig. 6. EIS Evaluation: User Satisfaction.
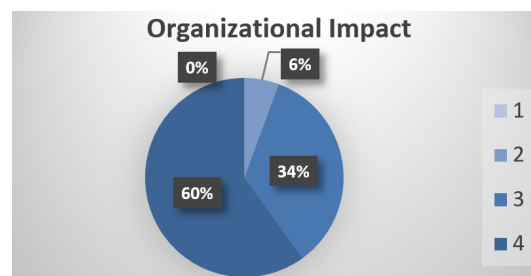

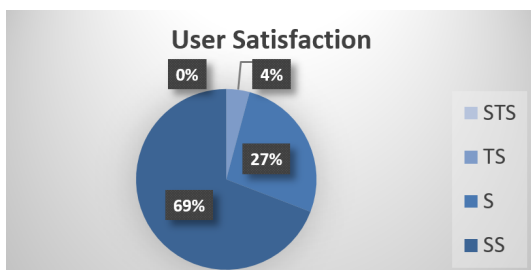Fig. 7. EIS Evaluation: Individual Impact.

Fig. 8. EIS Evaluation: Organizational Impact.

From the information quality, 59% of total responded were very satisfied with the information obtained. The outstanding factor in the information quality is the freedom of each division to choose appropriate information based on its needs and restriction to access rights in using this system

In the utilization part, 54% of users feel satisfied in using this system, the outstanding factor in using this system lies on the easiness on things that should be done to produce an information. But there are 3% of dissatisfaction in using this system which happened in system velocity in processing users need simultaneously.

In the user satisfactory sector, 69% of user feels satisfied in using this system. The outstanding factor is seen from user satisfaction in system's ability to support in providing information related to decision making.

In the individual impact side, 63% of users feels the individual impact after using this system. The outstanding factor is seen from the confidence on information provided by the system. This shows that user can refer to result provided by the system in doing its job or as a facility in obtaining information for decision making.

In the impact to organization part, 60% of users feels a positive impact for the organization by using this system. Outstanding factors in the impact to organization is the ease in information searching. Its impact reducing time needed to search information impacts on the amount of fund expend by the company.

From this descriptive analysis, conclusion to be drawn is the result of EIS application has positive impact in aiding executive and beneficial in supporting their work. EIS users also feel comfort in using this system hence users are confident that by using EIS can improve quality and work speed.

V. CONCLUSIONS

With the presence of EIS, it is easier and faster for executive to obtain strategic information regarding crimes occurring in In Indonesia from the operational data. From the EIS evaluation result, it is able to conclude that EIS has fill the needed of leaders and EIS application users in monitoring crime rate in Indonesia. Existing information is presented in forms

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of distribution map and reports as per leaders need in decision making and determining policy direction. EIS application can be optimized in the performance section especially in response time between application and database.

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