KNOWLEDGE MANAGEMENT SYSTEM WITH GEOGRAPHIC INFORMATION SYSTEM USE 5C4C METHOD IN TELKOM UNIVERSITY ADMISSION DIRECTORATE

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Abstract

Data will be as a core of the decision if it has a good treatment or process, which is process that data into information, and information into knowledge to make a wisdom or decision. Today, many companies have not realize it include Telkom University Admission Directorate as executor of *Seleksi Masuk Bersama* (SMB) Telkom that during the time, the workers only uses their feeling to make a decision. Whereas if it done, then that company can analyze the data to make a right decision to get a pin sales from student candidate or registrant that follow SMB Telkom as many as possible. Therefore, needs Knowledge Management System (KMS) with Geographic Information System (GIS) use 5C4C that can process that company data becomes more useful and can help make decisions. This information system can process data into information based on the pin sold data with 5C, and convert information into knowledge with 4C that has been several steps until these data can be useful to make easier to take a decision or wisdom, resolve problems, communicate, and quicker to learn to the employees have not experience and also for ease of viewing/visualization based on spatial data that equipped with GIS functionality that can be used to indicate events in each province with indicator that facilitate in this system. To make and build this system be used a Waterfall method that have several steps from system modeling, analysis, design, coding, verification, and maintenance. The system also have a function to save the tacit on the system then to be proceed into explicit in expert system based on the problems that will be found from the consequences of information. With the system each team can make a decision with same ways, structured, and the important is based on the actual event/data.

Keywords: Knowledge Management System, 5C4C, Geographic Information system, Admission Directorate

1. Introduction

Seleksi Masuk Bersama (SMB) is one of assignments of Telkom University Admission Directorate that has been going on since 2006 until 2014 give good results against the new admissions process in all institutions under Telkom University. SMB Telkom held the selection start from sale the pin for registrant of student candidate. Total of pin sold data become indicator and achievement of this division. Therefore, total of pin sold must meet the target as much as possible. However, based on the interview, during the time there are many problems that difficult to be solved if the total of pin sold have not meet the target. Thus, needs a right and objective decision to decide a problem solving.

A good decision is a decision that has a clear base. The base usually takes from the real information that is converted by data. Generally, data represent a structured codification of single primary entities, as well as of transactions involving two or more primary entities [6]. Besides represent the fact, data also represent the object or event [4]. Thus it can be concluded that information is the result of data processing which is more easily understood and meaningful that describes an event and facts. All this time all of worker in Admission Directorate find the potential market rely on his/her feelings that they get from his/her experience, that means they have not yet make the data as the basis of a decision and the data are only for reports and documentation that is not used at all to support the productivity of employees in decision-making and there is no an evaluating performance. Whereas a lot of benefit if use a history data to determine of decision and evaluating a performance. During the time, all of worker always just feeling to make a decision and it is not good if it is not guided by the data, because the perception everyone could have been different, or someone could be wrong if the data does not take sides in it. It is necessary for execution of a system that can help improve their productivity and make a decision that will be based on the data with easy and convenient to use and all workers in this division could use it. Later the system will be created based on variable attribute data to be displayed, making it easy for workers to seek what data they need to help them decide something. If this information system does not exist or is not used then the workers will not get the productivity effective and efficient decisions in their work. Thus, a decision that they do just based on the views of their thoughts and feelings.

The solution is an information system which is Knowledge Management System (KMS) with Geographic Information System (GIS) that needs feature or tools which have 5c4c Knowledge Conversion to convert data become information then information become knowledge [3]. GIS in this case, only use to make visualize data that adjust to make condensed and comparing process in Knowledge Conversion in order users can better understand their customers and prospects, where these customers or prospects are located, and target them with tailored messages designed just for the target segment [1].

2. Research Methodology

2.1 Waterfall Method in Conceptual Model

To build the information system needs some method that in this case uses waterfall method. Methods are classic and systematic which is build the software or application regularly[5]. Based on the name "Waterfalls" are step by step to do next process must be done in the previous process.

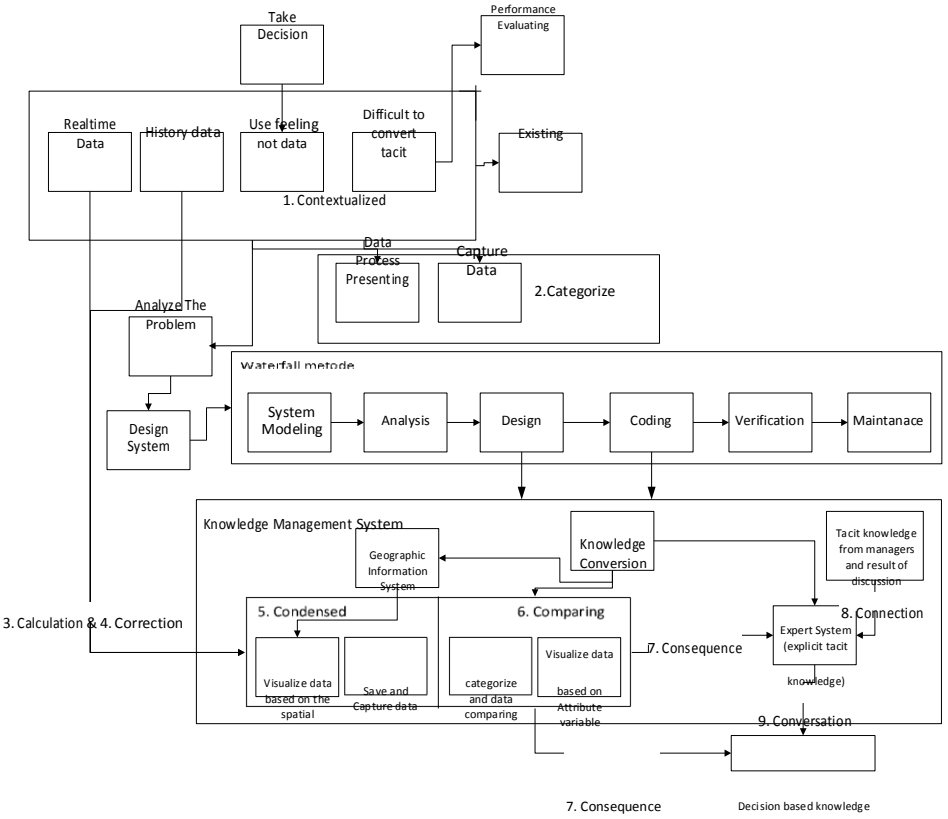

Figure 1 Conteptual Model

Based on the problem, this study want to help the admission directorate team to answer the problem. The solution is to make a system to help the admission directorate team make decision knowledge based on the Knowledge Management System (KMS) with Geographic Information System (GIS). . With the system each team can make a decision with same ways, same mind, and same data also this information system will be learning information for regeneration and troubleshooting if it is found the same problem.

2.2 How System Working (Rich Picture)

To support the system and application needs the data as a decision and output of application. A data include province data as a base of venue exam and high school data (school from), path of selection, major data, and information data (pin sold data).

The output is based on the user identification like comparing data between historical data and currently data, analysis data that help entities to decision from evaluate the performance admission directorate team, and the system can define and represent how applications distinguish targets are met and unmet pin each province. This data can show the condensed and the comparing with visualize data use graphic and others that can indicate how data target met or not. This output can be translated by coding. The programming is use Object Oriented Programming that make a procedural and function based on the user needed.

Based on the Figure 1 to make a Knowledge Management System with Geographic Information System (GIS) start from define spatial layer that explain province until the attribute data Attribute data that describes characteristics of the spatial features. These characteristics can be quantitative and/or qualitative in nature. Attribute data is often referred to as tabular data [2].

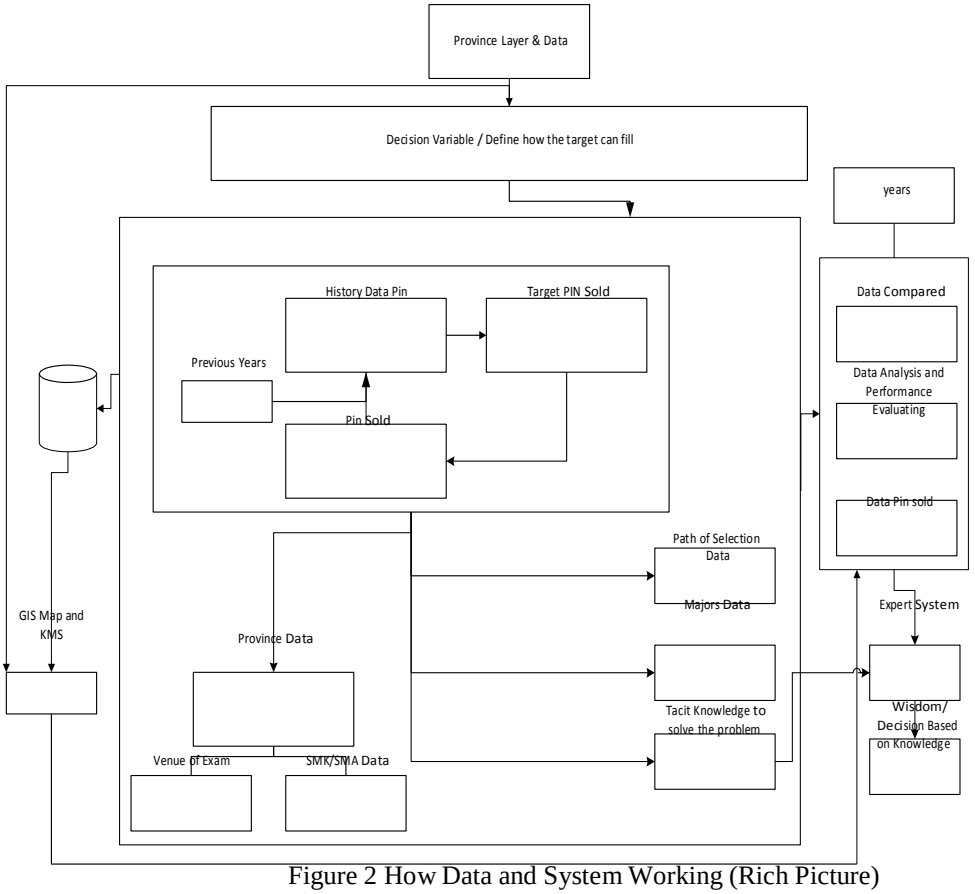

Figure 2 How Data and System Working (Rich Picture)

3. System Analysis

Information system is a system that provides information for management decision-making and also to run the company's operations, in which the system is a combination of people, information technology and procedures are organized [7]. Based on the statement known that information system must be managed to make a decision making so that needs a analysis system before the development of software. To make an analysis needs some diagram like Data Flow Diagram (DFD) on the figure 3 to define the process and Entity Relation Diagram (ERD) like explain in Figure 4 to design the database.

3. System Analysis

3.1 Data Flow Diagram (DFD)

Table 1. describes process specifications used to describe all of process that found of data flow diagram level 1 in details. Process Specifications will explain how data come and out in one of data or entities in accordance with the existing processes in the data flow diagram and The DFD Level 1 that will explain process of the generally system can be seen on Figure 3.

Table 1. Process Specification Data Flow Diagram Level 1

No.	Process Name	Input Data Flow	Output Data Flow	Information
0	Login	Admin data	* Admin data * Major Data * School Data * Venue of Exam Data * Path of Selection Data * Information Data * Target Data	1. Before input all of variable or data, admin must input their data to use system 2. After that, sistem will send the data to databse make the appropriating with the database data 3. Admin can use the system, adjust with his authorized.
1	Input Major	Major data	* Major data * Info Major data	1. Choose the menu input data, then it will split into all input menu 2. Choose the input Major, then add, edit, and delete it. 3. Then system will send the data into database, and as the info major data in admin system to controlling

No.	Process Name	Input Data Flow	Output Data Flow	Information
2	Input High School	School data	* School data * info School data	1. Choose the menu input data, then it will split into all input menu 2. Choose the input School data, then add, edit, and delete it. 3. Then system will send the data into database, and as the info School data in admin system to controlling
3	Input Venue of Exam	Venue of Exam Data	* Venue of Exam Data * Info Venue of Exam	1. Choose the menu input data, then it will split into all input menu 2. Choose the Venue of Exam Data, then add, edit, and delete it. 3. Then system will send the data into database, and as the Info Venue of Exam in admin system to controlling
4	Input Province	Province Data	* Province Data * Info province	1. Choose the menu input data, then it will split into all input menu 2. Choose the input Province Data, then add, edit, and delete it. 3. Then system will send the data into database, and as the Info province in admin system to controlling
5	Input Path of Selection	Path of Selection Data	* Path of Selection Data * Info Path of Selection	1. Choose the menu input data, then it will split into all input menu 2. Choose the Path of Selection Data, then add, edit, and delete it. 3. Then system will send the data into database, and as the Info Path of Selection data in admin system to controlling
6	Input Target	Target Data	* Target Data * Info Target	1. Choose the menu input data, then it will split into all input menu 2. Choose the Target Data, then add, edit, and delete it. 3. Then system will send the data into database, and as the Info Target data in admin system to controlling
7	Registration	Users Data	* Users Data * Info Users data	1. User make the registration with fill the biodata into the system and the system will save into database 2. Then system will send the data into database, and as the Info user data in admin system to controlling and cek for the security
8	Insert Information each path on each province	* Admin data * Major Data * School Data * Venue of Exam Data * Path of Selection Data * Information Data	* Information Data * Info Information	1. Bos admin will insert/upload the data from registrant in its system. 2. The information data saved to the database in that system, Then the system will send the info information to all of entity to be processed
9	Report information	* Target Data * Managers data * Information Data	* Report of Pin sold * Managers data	1. All of information data be processed become a report of pin sold 2. Then Target data compare with the information data t get the difference of target data or just total of pin sold 3. Then report of pin sold be processed adjust with the variable that requested by entities in the system too see the information or visualizing data

No.	Process Name	Input Data Flow	Output Data Flow	Information
10	Input Knowledge	* Knowledge Data * Info Knowledge	* Info Knowledge * Knowledge Data	1. Managers will input the knowledge data from his/her experience or result of discussion 2. Knowledge data is saved to the database , then the knowledge data become the info knowledge to make a test or controlling of expert system in the system that conducted by managers
11	Access Knowledge	Knowledge Data	Access Knowledge	After users in the system, users can acces knowledge of expert system if their have a trouble in marketing activity based on the data and information.

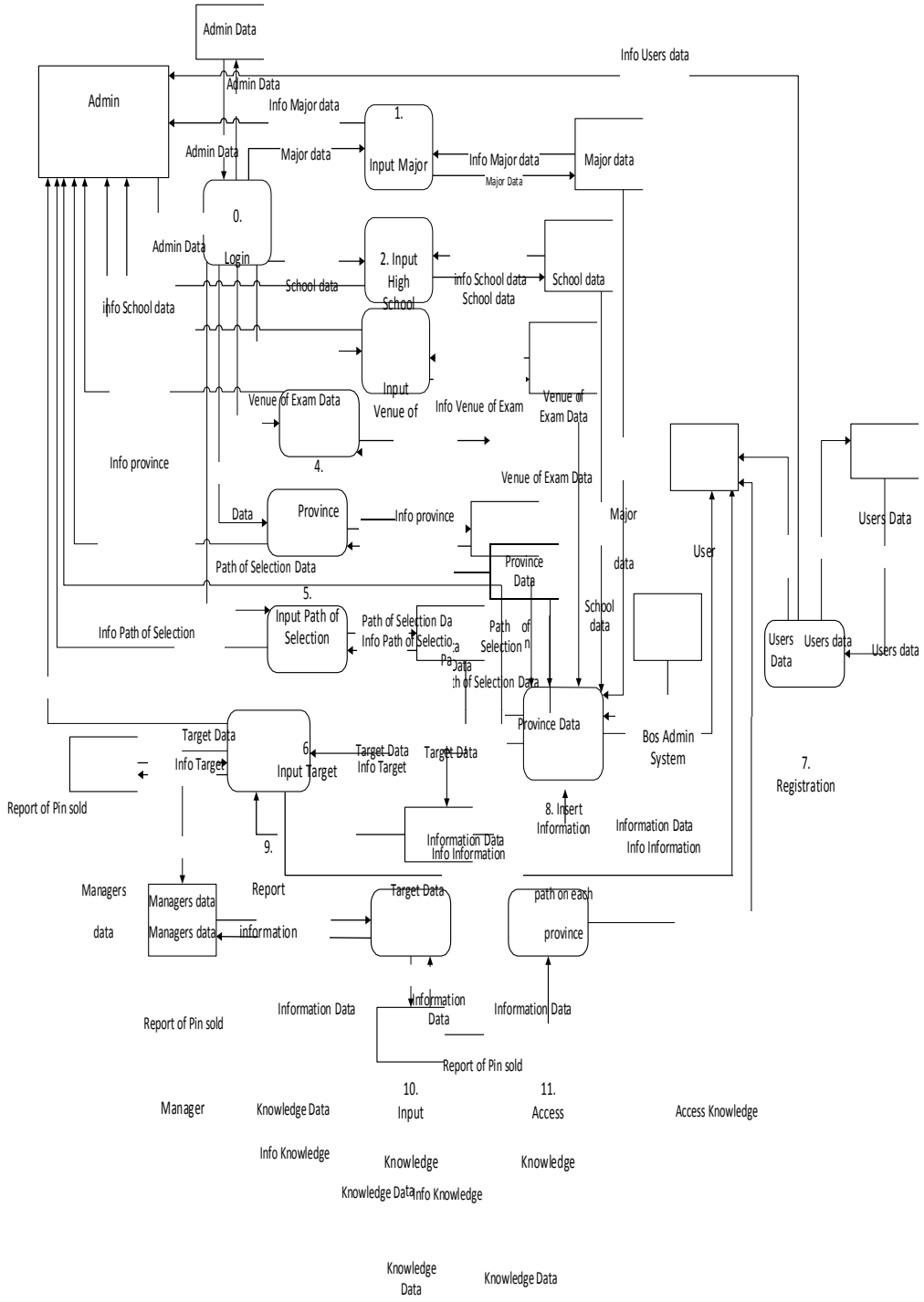

Figure 3 Data Flow Diagram Level 1

3.1 Entity Relationship Diagram

1. Venue of Exam data

Venue or exam data select by marketing team in each province as lace for exam. Usually use the school that has relation with SMB Telkom or Telkom University. This data on the system can add, change or delete by admin to

define venue of exam on each province. Data dynamically adjust with team needs. The data have relation with information data.

2. Target Pin Sold in Each Province Data

Target pin sold is to define target in each province to achieve goals of the marketing team in each province based on sold pin. Target becomes indicator in each province to define how many pin sold and rest. So, it becomes evaluation of marketing team to implement, modify, change, or determine the next strategy to achieve the target. Usually the marketing team define the target by Pin sold at the previous year, but on the system, target can change

with adjust user/marketing team needs. Target pin sold data have relation with spatial province data.

3. Type Path of Selection data

A Type path of selection define path of selection on the system. Path of the selection is usually held in each province on the same time and have a different type. The marketing team can held one of the paths of selection more than one like as has been done USM-1 and USM-2 or UTG-1, UTG-2, UTG-3. Each type of selection have a different exam and treatments like price of pin until other things technically until the student candidate become official students. Numbers of each path selection adjust with the strategy or target Pin sold would be achieved on each province. Each year marketing team also usually proposes new type of selection like at 2015 have *Kemitraan*. So, system must adjust this data to input dynamically.

4. Choice of Majors/Department Data

Majors that offered for registrant or student candidate very much that divided by faculty and majority. Telkom University have seven faculty and 25 majority include postgraduates, undergraduate and vocation school. As a condition to improve and quality of teaching, University usually look their registrant to choice their majority, and it is one of indicator of assessment of Badan Akreditasi Nasional Perguruan Tinggi (BAN-PT) to define how quality of this department/majority. Therefore, system that is made must be able to store the data history and shows the data of choice for student candidates and comparing with each priority choices.

5. High School Data

High School from is define registrants from. This data must be stored to define which school from of registrant which follows path of selection Telkom University selection. This data must be processed into information to define which school has the potential to be used as if it were tests, roadshows, try-out, or other marketing activities or the school can be cooperative with Telkom University. This data have relation with province data to define location province of the high school.

6. Information Data

Information data is data that will process to get the information or knowledge. Information data obtained from number of registrants that buy pin to follow the exam in each path of selection on each province. This data input by registrants with the others marketing division system namely BosAdmin system that has a function for registration of applicants. BosAdmin system then uploading the data number of applicants to the GIS system 5c4c with a database that has been appropriate. This data then count the number of registrants processed and compared with the target data and data will become the information for the users to analysis, trend market on each province or each type of selection path, define next strategy after information convert into knowledge and other. This data will be save on the database management system dynamically in order previous data can be used to the purposes analysis by users or entities. Different with the BosAdmin system that every year data have removed. So, system not only process single data but can process multiple data without deleted previous data in every year to use the system even using the data for analysis for users or entities. Information data have relation data with all of attribute data.

7. Tacit Knowledge Information

Tacit Knowledge is get from the Manager that has an experience to solve problem, besides manager have discussion with other worker. Actually this data to make explicit data use SECI model data, but this research make assumption to explicit tacit and save the knowledge into system that can tacit knowledge based on the discussion or manager experience can be communicated. Therefore, this research passes several steps to convert tacit on the explicit like internalization. We stiil do some proses like socialization to transfer the knowledge on other worker, externalization make the tacit on the system and save as database, and Combinations to organizing the tacit systematically on the system in order can used by workers. Tacit knowledge then, can use on the expert system function on system.

8. Spatial Data/Province

Data spatial collected from enactment of Indonesia that Indonesia administration divided by 34 provinces. This data used to define the spatial data as based on the map to define strategy and target which is usually done by a SMB Telkom team. Marketing team usually use the province to define location of the target to sell Pin, location of examination, and find potential school. Each province has different treatments to choose the right strategy because each province has different condition. This Data only define province in Indonesia because segmenting marketing division in all of around it.

9. Entity Data

To make the system work properly and in accordance with its function, System need entity. An entity is a person, place, event or concept that the information will be recorded. Entity differentiated by role that carried each in the system. The entity has an important role in Database Systems, because if there is no set of entities Database Systems will not be formed. Database System formed from a single data and put together then connected to produce clear information to users of the Data Base Systems. On this system based on the research, system needs several entities to carry out their respective roles.

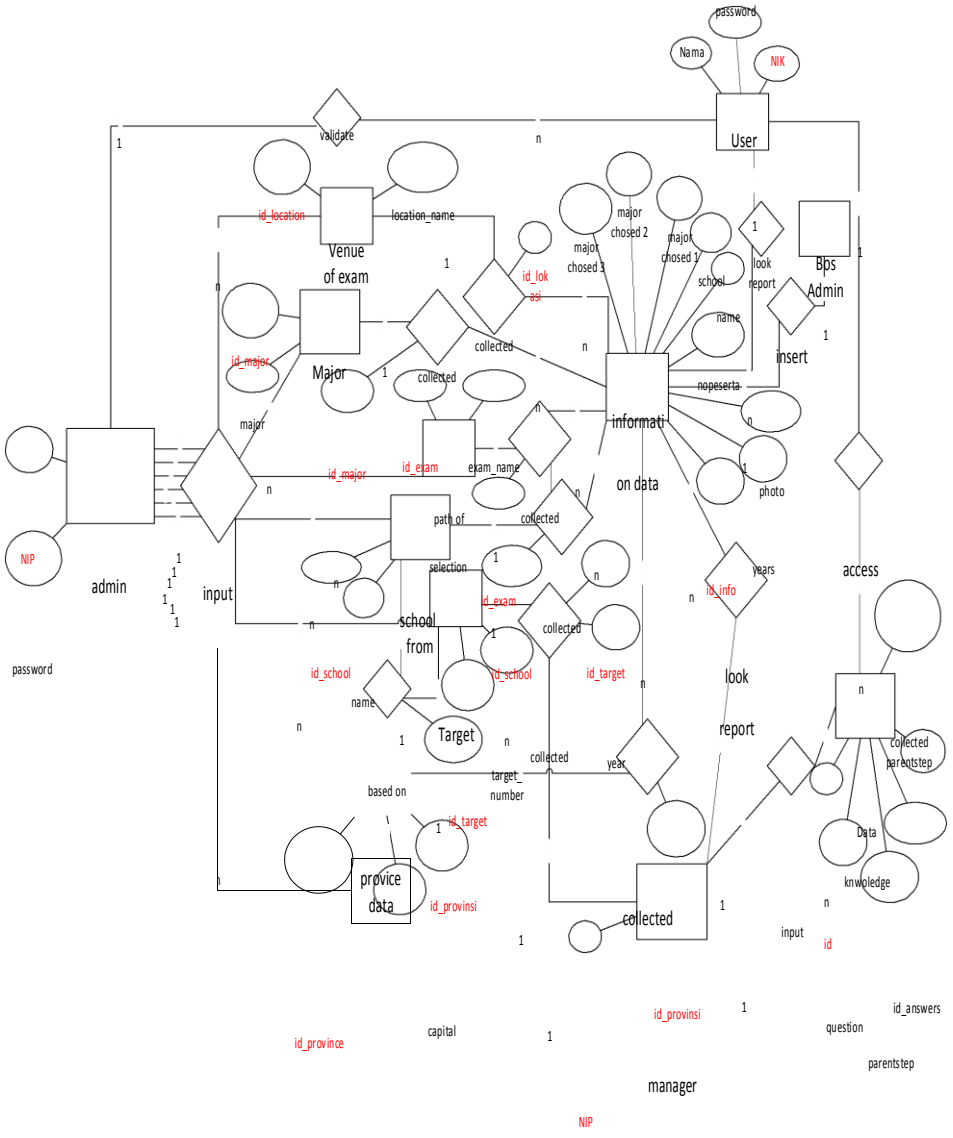

Figure 4 Entity Relation Diagram

4. Interface of the system (Coding)

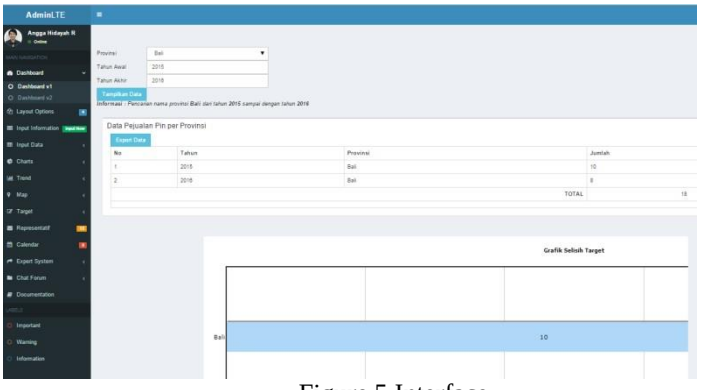

Figure 5 Interface

This chapter will explain the function of the system to answer the problem. One of interface represents the function on the Figure 5. The information system must have functions that adjust with the problem background and have several steps that have been done until build the system. Interface of the information system can be seen on Appendix E. There are the functions of this information system:

1.Input function

This menu is having function to input data needs. However, data pin sold is not directly input from entities on this system but insert directly from BosAdmin system. Besides, this information system can edit, delete, and read the data based table view model.

2. Chart Menus

This menu has function to show the chart, calculation, categorized of variable and other based on 5C method to convert data into information which is contextualized to collected the data in all of pin sold after data transferred by BosAdmin System to this information system, categorized to process to make category data based on the variable like path of selection or others, calculated to calculate the total pin sold based on the category, corrected to is removal errors that in this case this value not done because the data does not contain the elements of the

error, and condensed to summarize the data based on the chart that facilitate on this function based on selected categories by entities to be used. Moreover, this functions perform comparison between any information that has been summarizes known as comparison and consequences to find the consequence, event, and problem from information to help the entity find the best decision or wisdom. That value as of 4C method to convert information into knowledge in order that data and information that have a more meaning as knowledge. Chart menu have mathematic model with count the data information and comparing with the target to indicate target have or not achieved.

3. Map Menu
   Map menu is show the data based on the spatial data that can indicate how targets that achieved on each province and known as Geographic Information System (GIS). There are some indicator to show level of importance and priority, which province should be treated first. The indicator based on the color. Red indicate dangerous, it means pin sales are still far from the target, yellow indicate pins are sold almost reached the target, and green indicate target achieved or more. Besides chart menu, Map menu also as one of function to generate 5C method especially condensed to visualize the information based on the spatial data.
4. Expert System
   After the information have compared from previous menu, the information must be have connection to find the connection or relation between the information and the problem based on the consequence of information to find the best decision or answers of the problem as value of 4C method. Therefore, needs the function to find the connection and the right answers to the problem based on the information. This menu has function to input the tacit knowledge of problem solving based on the manager experience or discussion from the problem that found of information, but input menu is only duty of the manager. Users/workers can access the expert system to solve their problem that has connection of information that had found earlier and find answers from tacit knowledge which already on explicit form on expert system.
5. Chat Forum
   After discover connection and decision of the problem, to make the decision is better needs the conversation function to find views, opinions and actions relating to information to others. This menu has function to make a conversations and coordination among worker and manager that access this system. Chat forum is a representing of 4C as knowledge management especially on conversation steps.
6. Calendar
   This function is actually is not the main thing of this information system. This function is addition to help communication among entities relating to the event and targets based on the specified time.

5. Conclusion

To manage the data of pin sold and help marketing division to talk about data and make the data more understandable, system have to convert data into information and information into knowledge, and method that can solve and meet the requirement is make the system with knowledge conversion 5C4C method. With this information system, the team will be easier to decide something, resolve problems, communicate, and quicker to learn if there are employees who do not have experience. To build that system needs some tools that can define the process, function, needs and others of a system before develop the system. Until the completion system development also requires testing by performing user acceptance test to indicate functions within the system works well, according to the process that was made before, and in accordance with customer needs to answer their problem. From the research that has been done can be concluded as follows:

1. To make a knowledge management system that convert data into information needs the information system that can function as the knowledge management system 5C method that visualize data based on the some variable in order all of entities make the decision or wisdom based on the data.
2. To make a Geographic Information System that can make visualizing on spatial needs the system function that can visualize comparing between reports of pin sold and target based on spatial data layers that have indication that can help managers to make a decision or wisdom based on the events that occur in every spatial layer.
3. To make a knowledge management that can save tacit knowledge of managers and result of discussion as the function of convert information into knowledge 4C method needs the expert system function that can use by users that can explicit that tacit knowledge in the system function to help them in deciding issue even employees who do not have experience and also prevent the discussion of recurring problems if found the same problem.

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