Readiness For Implementing Data Warehouse of Higher Education System With Sodano's Perspective

Ade R Iskandar
Universitas Widyatama
Informatic Engineering Department
Bandung, Indonesia
ade.rahmat@widyatama.ac.id

Ichsan Taufik
UIN Sunan Gunung Djati
Informatic Engineering Department
Bandung, Indonesia
ichsan@uinsgd.ac.id

Abstract— **This research focuses to measure readiness of a Data Warehouse of Higher Education (in Indonesia it's called "Sistem Pangkalan Data Pendidikan Tinggi" or PDPT System) with Andrea Sodano's perspective as publish in Fortune which have domain of the research in Higher Education of Nation of Indonesia. A model that is used to asses the readiness of Data Warehouse of Higher Education or PDPT System before it's implemented is Sodano's perspective to make sure whether new technology implementation will be success or not. This research presented a new argument of science research and Change Management of IT implementation through research on measuring readiness score before implementing in all Universities both government and private universities in Indonesia. The result of assessment is focused to have readiness scoring of Data Warehouse of Higher Education or PDPT System. It is finally pointed out the significance for the implementation research of Data Warehouse of Higher Education in Indonesia to integrate all academics of universities in Indonesia based on Indonesia Directorate General of Higher Education policy.**

Keywords— Data Warehouse, readiness, Sodano's perspective

I. INTRODUCTION

Data Warehouse of Higher Education of Indonesia or in Indonesian it's called "Sistem Pangkalan Data Pendidikan Tinggi (PDPT) is a Data warehousing that integrate all academic system of universities not only private universities but also goverment universities in Indonesia. The research have already been done since 2009 up to now to make sure that readiness of implementation of Data Warehouse of Higher Education or PDPT System is going to run well in all universities in Indonesia. In the previous time, Indonesia Directorate General of Higher Education (called Ditjen DIKTI) was already built the application called EPSBED which is based on single user system[1].

Because of the system could not cover all the requirements of the academic systems for universities in Indonesia, for example the system just run for one operating system, the system was only for single user system and the system just handled for a little of data, therefore it couldn't handle all accademic services of universities in Indonesia which have more than one thousand universities in Indonesia.

It's for this reason Indonesia Directorate General of Higher Education or Ditjen DIKTI tried to implement Data Warehouse of Higher Education called PDPT System which is based on Data Warehouse concept, integration system and run under web based application. So right know all the universities in indonesia both private and goverment universities can access direct to the System without giving drafts to each representation of directoral general of higher education in Indonesia.

II. THE MAIN RELEVANT TECHNOLOGY

A. Change Management

These days organizations are experiencing to change their system or technology to gain competitive advantage. As a matter of fact, Implementation of change management and resistance to change has become a recurring topic of discussion during several periods ago, it is normal when management of changes are considered to bring people into new environment, system and culture. Change manager must be able to know some of the causes why people resist to change, what should be done by the supporters of change that reference to a change management model that is used [2]. The paper conducted to measure the readiness scoring before implemented as a change for previous IT system. Output of the readiness is to define whether the implementation of Data Warehouse of Higher Education will be success or some resistancies can block its new technology implementation.

B. Data Warehouse

Inmon WH in his book (EIS and the Data warehouse) declared that a data warehouse is a repository of integrated information, preparable for querying and analysis [3, 4]. The basic idea behind the data warehousing approach is to extract, filter, and integrate relevant information in advance of queries. When a user-query reaches, the query does not have to be shipped and translated to the original sources for execution. It's for this reason, warehousing can be judged as an eager or active approach to inform the integration when compared to more traditional or passive approach, where processing and integration starts when a query arrives [5]. The process of the data warehousing was notoriously enabled by improvement in

hardware performance development as well as by the success of price drops[6].

More over William H. Inmon explained data warehouse as: "a subjectoriented, integrated, time-varying, non-volatile data collection to support management layer of decision-making process[7]. in his book of (Building the Data Warehouse), in 1993. Based on the whole structure concept (Figure 1), a variety of data warehouse architectures are set up to meet different practical necessaried.
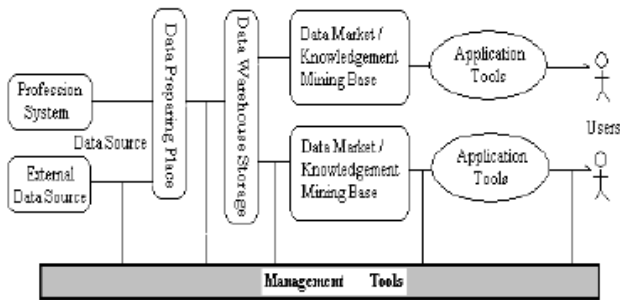

Fig. 1 Structure of the whole concept of Data Warehouse

In generall, the strides in the construction of a data warehouse have the following five sections: a) the modeling of data - data model is a blueprint for a data warehouse, that is mainly staked out for the user requirements based in the data warehouse[8].

b) extraction of data – to realize data extraction for business source in the ways of established-time or triggered-event, and transfer data to the data warehouse. The extraction methods include complete refresh and increamental extraction methods encompassing the source range of data as large as posible[8].

c) management of data – to perform a solemn operations on the source data extracted, such as eliminating bias and the redundancy of data, and also altering the data format, so as to make sure data consistency, as well as data aggregating and operating to make the data appropriate with the data model requirements[8].

d) management of data storage - fetch into account of extensive data volumes in the data warehouse. System of database for data storage should advocate the large amounts of acces and data process[8].

e) access of data – a client who access the data warehouse usually has the features of large volumes of data at one operation, there is no updating but only querying, and alterable operating mode [8].

C.   Readiness for Change with Andrea Sodano's instruments

Palmer et al explored that knowing what we needs changing is only part of the story. The degree of attention to the process of managing change is a reflecton of the fraught nature of the process. This regard, readiness for change is a mediating variable between change management strategies and the outomes of those strategies (the desire outcome usually being successful implementation). As a result, a prechange audit of the readiness of an organization for change can provide an indication of the like outcome of a change initiative at a

particular point in time. It also may identify key areas where further ation could significantly enhance the prospects of success.[9]. The instument provided in Table 1 is an adapted version of one designeted by Andrea Sodano as published in Fortune[10].

III. DATA ANALYSIS AND SCORING

In implementing new Technology such as Data Warehouse of Higher Education is needed valid infomation which was gotten from analysing the readiness with Andrea Sodano's perspective as a publish in Fortune to count data readiness in implementing this Data Warehouse. With Sodano's perspective is hoped that implementation of IT Change Management can be measured whether the implementation is success or not. To score the readiness with Sodano's perspective is conducted by interviewing employees in Directorate General of Higher Education (not only principles but also middle or operational employees) to get the information accurately.

Then identify and access readiness for implementing Data Warehouse of Higher Education or PDPT System at Directorate General of Higher Education with Sodano's perspective that have some indicators to count in quantitive data. The result of the Date Warehouse of Higher Education's readiness will be appealed with deep interview and observation that already had been done.

The last is giving recomendation from information that had been gotten to the principles Directorate General of Higher Education. The recomendation is hoping to help Directorate General of Higher Education in implementing the Data Warehouse system to become success integration system for all universities not only goverment universities but also all private universities in all Directorate General of Higher Education branches in Indonesia, up to now Indonesia has twelve Directorate General of Higher Education branches.

This research was done by conducting deep interview with chief of director of Directorate General of Higer Education IV West Java and Banten, some managers of Higher Education, IT staff and Data Warehousing's developer team. The result of the interview will be filled into to Andrea Sodano's perpective[10] which has seventeen indicators. Here are the readiness scorings from the research conducted.

Table 1 Information of Interviewing's score

No	Category	descriptive
1	**Sponsorship**.	1. In this phase, change sponshor is not regularly its operational leader; he or she is cheerleader, bill prayer and the visionary[11]. 2. The one who has the directionary to colaborate the group of change when they meet resistance. In this scoring phase, give three points if change is going to be easier when sponsorhip comes from a senior level such as CIO, CEO, etc[11]. *Result of the Research :* Based on deep interview with Principle of Directorate General of Higher Education IV West Java and Banten, it can be given score three (3), Planning to implement of

No	Variable	Description
		new technology change came from principle of Higher Education of Nation.
2	**Leadership**.	1. In this stage, this means the operational leadership, the man who set the objectives and call the meetings, and they also can work overtime[11]. 2. It must be remember that the successfull of change is usually if chief of director is in high level, has "ownership",and has a clear business result in mind[11]. *Result of the Research :* In general leadership of principles of Directorate General of Higher Education IV West Java and Banten about Data Warehousing readiness can be scored two (2) or midlle. It's because all the policies about change management of IT is totally conducted by central of Higher Education of Nation.
3	**Motivation**.	1. In this section there are two conditions of the level. Give good point or high if senior management has a strong sense of urgency, that is shared by institution or the rest of the company, and for a corporate culture that have been deemphasized to continu improvement[11]. 2. Give the low scoring, if some managers and workers have been in their posistion more than fifteen years, and they also in conservative culture which discourages risk taking[11]. *Result of the Research :* Based on interview and observation. Exeutives level of Directorate General of Higher Education IV West java and Banten supported to each employee to succeed IT change (Data Warehouse System), it can be scored two (2).
4	**Direction**.	1. In this phase, senior management thinks whether he or she strongly believe that future condition is going to differ from the present, and also asking how clear management's picture of the future is[11]. 2. In another side, senior manager assume that manager can conscript all the board of directors, relevant parties, and customers for action? Give three or high points for positive answers to those questions, if managers thinks that only partial change is needed, score yourself low[11]. *Result of the Research :* In general, instructions that have been done can be scored three (3). As a matter of fact Directorate General of Higher Education IV West Java and Banten have always given direction in routinely workshop and training since 2013 up to now about the Data Warehousing System.
5	**Measurement**.	1. In this phase, It looks like in qualilty assurance team. Give three points if there is performance indicator such as using metrics and encouraged by total quality management[11]. 2. The second one is, give two points or your middle scoring if there are some measures exist but reward system and compensation do not explicitly corroberate them. The last is if you don't know what we are talkng about or no measurement standard in place, score your self one for the lowest point [11]. *Result of the Research :* Based on the result of the interview with priciple of Directorate General Higher Education IV West Java and Banten, it can be scored two (2) because operational measuring have been done routinely but had no reward given.
6	**Organizational Context**	1. In this phase, manager of change should explore whether effort of change will relate to other major that goings on in the institution?[11] 2. Change manager also must analyze whether it fits with strategic actions or in line with new product?[11] *Result of the Research :* Implementation of the Data Warehouse of Higher Education can increase administrative and academic services efficienlty and effectively, because all universities not only government universities but also private universities can access directly the system real timely and the private universities wouldn't give the academic report to Directorate General of Higher Education branch any more. Give it three (3).
7	**Processes/ Functions**.	1. In this functions major, it must be explored about major changes which almost invariably requires redesigning business processes which cut across functions such as account payable and marketing[12]. 2. It also should be explored, if functional of the boards are rigidly turf conscious, change is going to be difficult. You can give high point if they have good encouragement of the group although they think that it would be difficult to implement the change[12]. *Result of the Research :* In general, the readines for change to implement Data Warehouse of Higher Education wasn't perfect. one of the factors is infrastructure, but the willing of principle was higher so that can be scored three (3) based on the deep interview conducted.
8	**Competitor Benchmarking**	1. In this phase, you have to think whoever you are, a principle in your company or just follower, give yourself high scores for comparing ojectively about your program to other company's performance[12]. 2. Score your self low or one point if ability of competitior's prosperity is primarily just being concept[12]. *Result of the Research :* In general, planning to change for

		implementating new technology was totally managed by Directorate of General of Higher Education of Nation. It can be scored two (2) based on the interview and observation conducted.
9	**Costumer focus**.	1. In this phase, it should be explored , the more employee in the enterprise is brainstormed with knowledge of customers, the more likely that the enterprise can agree to serve them change better[12]. 2. Ih this stage, give high or three points if everyone in the department knows who her or his customers are, they know their needs, in another side, give low point if that kwled just keep in their single departemt (human resource, marketing, etc)[12]. *Result of the Research :* All employees at Directorate General of Higher Education know about planning to implement Data Warehouse of Hhigher Education (PDPT System in Indonesia). Give three (3) points, the scoring came from the observation and interviewed conducted with principles and and employees.
10	**Rewards**.	1. In this stage, change is easier if managers of change and workers are rewarded for taking risk, being inovative, and looking for new solutions. Remember that rewarding for team based is better than its individual achievement[12]. 2. Decrease point if the enterprise reward over change and if failure condition wil be punished[12]. *Result of the Research :* Giving rewars in Higher Education of Nation was not good enough, because all the policy about the rewards is determined by Directorate General of Higher Education, it can be scored two (2) or middle, in this case. All employees were hoped to support a success of the Data Warehouse of Higher Education's implementation because they are government's employees.
11	**Organizational Structure**.	1. In this phase, organization had better have flexible churn, it means that it must be easier to manage well[12]. 2. In another side, give yourself little score if your institution have a stiff structure which has been unchanged for more than five years or our institution has endured frequent reorganization with the little success[12]. *Result of the Research :* In general, based on the result of interview and observation conducted, it can give two (2) scores, because Directorate General of Higher Education of West Java and Banten usually do for change especially for operational management.
12	**Communications** .	1. In this phase , an enterprise is going to adjust to change most attentiously if has many means of two-way communications that attain all the

		organizations levels and used and understanded by employees[12]. 2. Give yourself low, if media are few, these days media used to communicate employees in the organizations such as using email, and other social media, and almost exclusively single-way and top-down, in this condition change would be more difficult[12]. *Result of the Research :* As a matter of fact, communication in Directorate General of Higher Education is good, the communication run two ways, not only by spoken but also use some communications media such as email, telpon and other communication tools, it can be scored three (3).
13	**Organizational Hierarchy**.	1. In this phase, if your organization is in the fewer degree hierarchy and the fewer staff grade levels, it means the change is more likely tobe success[12]. 2. It must be remembered, if thick of middle management and staff can make block of the change and decision system be slow[12]. *Result of the Research :* Based on observation conducted, it can be scored two (2) where levels of hierarchy at Directorate General of Higher Education IV West Java and Banten had fewer employees from their unit.
14	**Prior Experience with Change**.	1. This stage, you can score high or three if the institution has successfully implemented big changes in the recent past[12]. 2. Score low or one, if institution have no experience with major change in the previous time. In this case, most companies are going to score two, acknowledging equivocal success in previous attempts to change[12]. *Result of the Research :* Change that had been done by Coordinator of Directorate General of Higher Education IV West Java and Banten was in operational management, for example, in the last time to make "Lecturer's academic posisition was in six months but right now to make "lecturer's academic position of 'Asisten Ahli' is just around four weeks. It can be scored two (2), becuase IT change management is directly controled by central of Higher Education of Nation.
15	**Morale**.	1. In this stage change will not be difficult when employees enjoy working in the institution and the individual grade of responsibility is high[12]. 2. Characterisitc of unreadiness to change is little follower, mistrust and low team spirit[12]. *Result of the Research :* In general, levels of individual's performance is good enough. Based on the observation and their services to customers, it can be scored two (2) for the morale.

| 16 | **Innovation**. | 1. In this phase, the best situation is when the entenrprise always try to experiment, new concepts are implemented with little effort and employees work across internal boundaries without much difficulty[12]. 2. In another side, the characteristic of bad signs are lots of new ideas which weren't implemented yet, employees have feel inferior to other division[12]. *Result of the Research :* In general, level of innovation at Higher Education of Nation is good enough, from the observation conducted, Directorate General of Higher Education always try to plan, implement and maintenance new Information Technology to make the services get well to its customer, it can be scored two (2). |
| 17 | **Decision Making**. | 1. In this stage, you can rate your high score if spontaneous are made fast, taking into account an extensive variety of suggestions; it is explicit where spontaneous are made[13]. 2. In another side, please give yourself a low rate if there is much conflict during the process and confusion, after decisionare made[13]. *Result of the Research :* In general, Coordinator of Higher Education of Nation made decision clear, valuable and responsible. Based on the observation and interviewed almost all employees understand and support principle's decision, it can be scored three (3) or high. |

In this research, it can be defined the scoring in quantitative numbers. Some researches argue that result from the research conducted must be scored not only in qualitative but also in quantitatives data. Andrea Sodano in Palmer's et al book[13] defines some score indicators to know whether the readiness of transition of change will be success or not :

41 – 51 : To implement change looks like to be success. Focus resources on lagging the indicators (your ones and twos) to expedite the process[13].

28 – 40 : in this scoring domain, alteration or change is possible but maybe difficult, notably if you have low scores especially in the first sevenredness you have low scores in the first seven readiness measurement[13].

17 - 21 : implementing the change will be virtually out of the questions without a precipitating misfortune. In this dimension, focus instead on (1) constracting change or alteration readiness in the dimensions above and (2) effecting change by means of pilot programs separate from the institution at large[13].

Table 2 shows the result of the data analysis and scoring with Sodano's perspective in measuring readines of Data Warehouse of Higher Education.

Table 2 Scoring of Data Warehouse of Higher Education

No	Category	Number's scoring	Qualitative's scoring
1	Sponsorship.	3	high
2	Leadership.	2	Middle
3	Motivation.	2	Middle
4	Direction.	3	High
5	Measurement	2	Middle
6	Organizational context	3	High
7	Processes/functions.	3	High
8	Competitor benchmarking	2	Middle
9	Costumer focus.	3	High
10	Rewards.	2	Middle
11	Organizational structure	2	Middle
12	Communications.	3	High
13	Organizational hierarchy	2	Middle
14	Prior experience with change	2	Middle
15	Morale.	2	Middle
16	Inovation.	2	Middle
17	Decision making.	3	High

IV. CONCLUSION

In this paper, readiness of Data Warehouse of Higher Education System in Indonesia is presented. According to data scoring result of the readiness based on table 2, it can be predicted that the implementation of Data Warehouse of Higher Education will be success. Total of number scoring is fourty one (41), the high score from the data given are sponshorship, direction, organizational context, processes or function, customer focus, communication and decision making, and the rest are scored middle.

With Andrea Sodano's perspective, its implementation change of Data Warehouse of Higher Education is most likely to be success by increasing to resources on lack indicators (your scoring which have point of two and one) to updgrade the processes.

Therefore, implementation of Data Warehouse of Higher Education in Indonesia must be implemented well to manage all academics, university students reporting, lecturer's research and teaching history and some other functions. In the next session, it's hoping to conduct continuing research of Data Warehouse of Higher Education based on its transformation.

REFERENCES

[1] Iskandar Ade, Surendro K, "Recomendation of implement a data base system of higher education with change management approach at Kopertis IV Jawa Barat and Banten", in Proc of 3rd International on Scientific Issues and Trends (ISSIT), 2011.

[2] Egan, R. and Fjermestad, J, "Change and Resistance help for the practitioner of change", in Proc of the 38th,Hawaii International Conference on System Sciencies, IEEE 0-7695-2268-8-2005.

[3] Inmon WH. Building the Data Bridge: The Ten Critical Success Factors of Building a Data Warehouse. Database Programming & Design 1992

[4] Inmon WH. EIS and the Data Warehouse: a Simple Approach to Building an Effective Foundation for EIS. Database Programming & Design 1992, 5(1 1):70-73.

[5] Widom, J. Research Problems in Data Warehousing. Stanford University Database db. stanford.edu/pub/papcrs/warchouseresearch.ps [10/18/ 1999]

[6] The Two Crows Corporation: Introduction to Data Mining and Knowledge Discovery Potoinac: Two Crows Corporation; 1999.

[7] Chen Jing-min. Data Warehouse and Data Mining Techniques (2nd edition) [M]. Beijing: Electronic Industry Press, 2007: 9, 202.

[8] Ningning Gao, IEEE, 978-0-7695-4115-0/10,© 2010 IEEE, DOI 10.1109/IFITA.2010.286

[9] Palmer I, Dunford R, Akin G,"Managing Organizational Change", a multiple perspectives Approach", 2009, p.141.

[10] Stewart, T.A. 1994. Rate your readiness for change. Fortune, April 23:106-10

[11] Palmer et al.,"Managing Organizational Change", a multiple perspectives approach", p. 144, 2009.

[12] Palmer et al.,"Managing Organizational Change", a multiple perspectives approach", p. 145, 2009.

[13] Palmer et al.,"Managing Organizational Change", a multiple perspectives approach", p. 146, 2009.