

# Development of Key Performance Indicator for Higher Education Management

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## Abstract

This research aims to develop optimal Key Performance Indicators (KPIs) to enhance the management of higher education institutions. KPIs serve as crucial evaluation tools in measuring and monitoring the performance of higher education institutions. Through a comprehensive research methodology, this study will explore various relevant aspects in the development of KPIs for higher education management. Factors such as financial sustainability, teaching quality, research and development, as well as student services will be the focal points of the research. By integrating a participatory approach and collecting feedback from stakeholders, the research aims to generate KPIs that can be effectively adopted, providing a holistic understanding of higher education performance. The outcomes of this research are expected to offer practical guidance and make a significant contribution to efforts aimed at improving the overall management and effectiveness of higher education institutions.

**Keywords:** Key Performance Indicator; Data Warehouse; Dashboard; Higher Education Academic Management

## Abstrak

Penelitian ini bertujuan untuk mengembangkan Key Performance Indicators (KPIs) yang optimal untuk meningkatkan pengelolaan perguruan tinggi. KPIs merupakan alat evaluasi yang penting dalam mengukur dan memonitor kinerja suatu institusi pendidikan tinggi. Melalui metodologi penelitian yang komprehensif, penelitian ini akan mengeksplorasi berbagai aspek yang relevan dalam pengembangan KPIs untuk pengelolaan perguruan tinggi. Faktor-faktor seperti keberlanjutan keuangan, kualitas pengajaran, penelitian dan pengembangan, serta pelayanan mahasiswa akan menjadi fokus penelitian. Dengan mengintegrasikan pendekatan partisipatif dan mengumpulkan umpan balik dari pemangku kepentingan, penelitian ini bertujuan untuk menghasilkan KPIs yang dapat diadopsi dengan baik dan memberikan pemahaman yang holistik terhadap kinerja perguruan tinggi. Hasil dari penelitian ini diharapkan dapat memberikan panduan praktis dan kontribusi signifikan terhadap upaya peningkatan manajemen dan efektivitas perguruan tinggi secara keseluruhan.

**Kata Kunci:** Indikator kinerja utama; Data Warehouse; Dashboard; Manajemen Akademik Perguruan Tinggi

## I. INTRODUCTION

Key Performance Indicators (KPI) are indicators that are often used by stakeholders to understand and analyze business [1]. The collection of indicators can show the performance of the area that needs attention so that stakeholders can immediately make decisions from existing circumstances. KPI is not only used in the business sector but also in the tertiary education sector [2].

Higher Education Management needs to maintain the quality of education. In Indonesia, the quality and quality of a college are valued by the National Higher Education Accreditation Agency (“BAN-PT”), which

is called accreditation [3]. Accreditation is carried out by the University and Study Program Accreditation. Therefore, the accreditation assessment standard is a useful reference for use by the University and Study Program in measuring its performance. The problem is that the standard BAN-PT assessment is comprehensive, so it requires data from all units related to business processes at the University and Study Program, and this requires excellent documentation and an archive system.

An Informatics study program at a university in Indonesia has serious problems; all systems used at the University cannot be adequately integrated. Every information system that is built has no relationship with other information systems. So the user needs to log in on each of these systems. When, in fact, the data on the system can be taken from one data source. Based on these problems, the Informatics study program proposes to build a data warehouse with the results of academic dashboard visualization. Dashboard visualization is considered necessary for stakeholders in making appropriate decisions [4]. Dashboards help provide dynamic information with various needs for stakeholders.

Another problem that arises, the dashboard presented needs to have an appropriate performance measurement framework. So building KPIs is needed to measure performance standards in informatics study programs. The KPI that was built and based on the higher education assessment document from BAN-PT and the latest conditions in the informatics study program.

## II. LITERATURE REVIEW

Higher education is a level of education that can be taken after someone completes his education from secondary education and vocational secondary education. The programs included in the implementation of higher education in Indonesia are diplomas, bachelor, master, doctoral, professional programs, and specialist programs. The government hopes that with higher education, the Indonesian people can develop their abilities and form a dignified nation's civilization and civilization to educate the nation's life, develop academicians who are innovative, responsive, creative, skilled, competitive, and cooperative through Tridharma Higher Education [5].

Supporting the government's goals above is education management. Higher education management is an integral part of managing higher education institutions by utilizing the resources owned by universities. A College requires management that is professional in managing college resources, especially students, curriculum, facilities, finance and public relations [6]

### A. *Key Performance Indicator*

Key Performance Indicators (KPI) are important indicators of the progress of an organization towards the desired outcomes [7]. KPI provides a focus for strategic and operational improvement to create a basis for analysis to make a decision [8]. Besides, the KPI has a series of actions that focus on the performance aspects of an organization that are most important for the success of current and future organizations [9].

In the development of the KPI in the research conducted by Joshi, proposed a way to identify KPIs and evaluate the performance of a Faculty by developing a Performance Management System [10]. The identification of the KPI produced includes all parameters in the academic field. Research conducted by researchers does not only cover the academic field but the Tri Dharma of Higher Education (Teaching, Research, Service) with additional support and academic atmosphere. KPI can also be determined as a description of the critical success factors related to the continuation of an educational institution. Key Indicator can help facilitate the evaluation of implementation at a university and also considered effective for making a management decision[20]

### B. *Data Warehouse*

Higher education management needs to evaluate regularly for the performance of the institution. This evaluation requires a lot of data and must be synchronized [21].The data warehouse is a collection of data from various databases that are integrated and not easily changed to support the decision-making process. The data is changed, reformatted, and arranged properly so that the data set forms an information pattern that can be analyzed [11].

The data warehouse has the primary purpose, which is to support a business with analysis and decision making. Also Beside, the Data warehouse is very helpful in comparing the characteristics and objectives of the data warehouse with operational application systems [12].

### C. *Dashboard Business Intelligence*

A dashboard is a form of visualization of information that is presented attractively. The information component on the Dashboard is monitoring business activities and processes, analyzing existing problems, and managing people and processes to make decisions [13]. The primary purpose of the dashboard is to help users make the right and fast decisions based on existing data [14].

## III. RESEARCH METHOD

The research method used in this study uses literature studies. With this method, the researcher can obtain a performance management model in the Study Program.

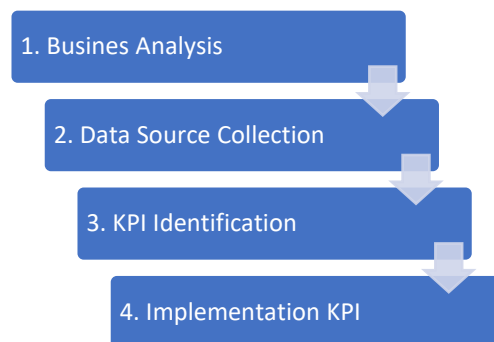


Fig. 1. KPI Research Flow

### A. *Business Analysis*

At this stage, the researcher identifies the organizational structure and strategic objectives of the Study Program as well as the stakeholders that influence it. Researchers collect data and conduct library studies. The data needed is the strategic plan, DIKTI assessment standards for universities and study programs

### B. *Data Source Collection*

Data analysis has several steps that are taken, namely by Focus Group Discussion (FGD), Interview, and Literature Study. FGDs and Interviews will be conducted with stakeholders of the Informatics Study Program. The results of the FGD and interviews are then analyzed by other supporting data that has been explained in the sub-chapter on data collection. Library Study is to find and understand selected journal articles that are in line with the topic of the research to be conducted. This article can be a reference for conducting this research. The data that has been collected will be mapped according to the “Tri Dharma Perguruan Tinggi” domain. At this stage three main domains are research, research and service

### C. *KPI Identification*

#### 1) *Determine the Target of KPI*

At this stage, the researcher builds a KPI matrix consisting of the KPI items themselves, KPI targets and time of achievement. The development phase is based on the results of data analysis and interviews related to the needs of the Study Program. KPIs that are built-in general are adjusted to the needs in filling out the Study Program accreditation forms, in addition to the addition of KPIs built also tailored to the needs of Study Program analysis KPIs that have already been built will be determined annually. Determination of achievement based on standards from the University, Study Program, and BAN-PT

## 2) *Determine of Target Period*

KPIs that have already been built will be determined annually. Determination of achievement based on standards from the University, Study Program, and BAN-PT

### D. *Implementation KPI*

The finalized KPI results will be implemented within the data warehouse schema that is being constructed. The data warehouse team will reference these KPIs to formulate the data warehouse schema. The KPIs will become visible post the completion of the data warehouse construction, where they will be visualized in formats such as dashboards.

KPI evaluation can be seen from the data warehouse schema and the resulting visualization of the dashboard. Implementation of Schema Data Warehouse and Visualization Dashboard is the primary indicator in the success of KPI Development.

## IV. RESULTS AND DISCUSSION

KPI development begins with analyzing the business of objects that will make KPIs. The research conducted by Lie, proposing for business analysis can be done with a systematic approach. In his research, the identification of stakeholders and KPI for multi-level management [15]. The strategic objectives of a company play an essential role in the method of developing KPI. One proposal that has been carried out by other research, namely, recommends a new approach in determining KPI and changing the strategic model to assist decisions based on applicable rules [16,19]. If it is associated with a study program at a university, of course, in each study program has a vision and mission that can be used as a goal and a way to obtain these goals. Development of KPI, it is necessary to pay attention to the objectives of the company and the business processes that are running [17]. The best way to collect all data is by conducting a Focus Group Discussion (FGD). In this way, researchers get much information, especially in the data collection process that is needed. KPI formulation was also conducted in other studies, and researchers tried to propose defining KPIs by creating a system based on the ISO and Eco-Management & Audit Scheme [18].

### A. *Business Analysis*

The Informatics Study Program is one of the units under the Faculty of Information Technology (FTI), Duta Wacana Christian University (UKDW). The Informatics Study Program is led by the Head of the Study Program or often called the Vice Dean 1 Academic. In its organization the Faculty is overseen by the Faculty Senate.

The study program strategy objectives are documented in the Informatics Study Program Strategic Plan document. The document contains the strategic objectives, vision and mission of the Informatics Study Program. In the Strategic Planning document, there is a key vision of the Informatics Study Program seen in terms of students and Informatics Study Program.

The stakeholders of Informatics Study Program are lecturers, employees, students, alumni, partners and stakeholders. These stakeholders play an important role in determining the key indicators of success of the Informatics Study Program.

### B. *Data Source Collection*

At this stage, the researcher conducted several data analyzes of related documents, namely Strategic Plan, Operational Plan, Report of Deputy Dean 1 of Informatics Study Program. Documents outside the Study Program, researchers use the standard Study Program Performance Sheet and Self Evaluation Report from BAN-PT

1) *Strategic Plan (“Renstra”), Operational Plan (“Renop”) & Report Vice Dean*

The documents "RENSTRA", "RENOP" and Report Vice Dean are internal documents for the Study Program to review the work program and the achievements of the work program that has been carried out. These three documents are standard documents that are always seen by stakeholders.

Internal study program documents help to see the current conditions in the study program. The researcher analyzes the achievements in each program run by the Study Program each year. Also, there is one document that can be used as a reference by researchers in determining targets for each KPI that is built, namely the SPMI University book. In this book, the researcher can determine the standard/margin limit determined by the University that exceeds the DIKTI standard

2) *Study Program Performance Sheet (“LKPS”) & Self Evaluation Sheet (“LED”)*

Meanwhile, the LKPS and LED documents are external documents from the Study Program. This document is a standard from BAN-PT which is used to assess and audit the quality of performance of a study program.

The researcher uses the Study Program Performance Sheet and Self Evaluation Sheets as the standard for determining achievement targets in each KPI in addition to internal documents of Study Programs and Universities. KPIs built by BAN-PT standards are useful for study programs in compiling accreditation forms.

C. *KPI Identification*

The KPI produced is divided into eight predetermined domains, namely Education, Research, Service, Finance, PMB (Admission of new students), Tracer Study, Support, Human Resources.



Fig 2. KPI Domain Group of Informatics Study Program

Educational domains are proposed because this domain becomes one of the components in the accreditation of study programs on criteria 5. Components contained therein are curriculum, learning, and academic atmosphere. The second domain, namely Research. This domain is also one component of the assessment of study program accreditation in criteria 6. In the research domain, many stakeholders are involved by lecturers, students, and related partners in conducting research.

The third domain is Devotion, as well as research, and this domain also involves several stakeholders who are the same as research. The fourth domain is finance. The related components of finance are all funding for education, teaching, research, service, and publications as well as infrastructure. The fifth domain is PMB, and this domain is related to all activities at new student admissions. Also, this domain discusses how the strategy for the promotion of study programs to the broader community can increase the ratio of prospective new students to active students.

The competency of study program graduates is also one of the standard assessments of study program accreditation. Therefore, Study Program needs to maintain the ability of graduates, which includes attitudes, knowledge, and skills. Tracer Study is one way of the study program to find out the quality of alumni. The University of ABC Informatics Study Program conducts tracer studies every two years.

Lecturer activities at Informatics Study Programs outside of teaching are supporting lecturers. These activities include awards obtained by lecturers, lecturer organization activities both in the fields that are by the Study Program and nonstudy programs and lecturers who attend seminars or conferences outside the study program both as participants and as resource persons.

Human Resources in the study program have two main components, namely Academic Staff ("PA") and Academic Assistant Staff ("PPA"). The quality of PA can be assessed through a minimum education history of at least S2 and an Academic Position. Also, PPA has a history of education that is following the work assignments in the Study Program.

TABLE 1.  
IDENTIFICATION TOTAL OF KPIS AND DATA SOURCE

Domain	Total KPI	Data Source
Education	41	- Registration - KHS (Study results card) - KRS (Study plan card) - Student Presence - Student Activities
Research	17	- Lecturer Research - Lecturer Research Publication
Service	4	- Lecturer Service - Lecturer Service Publication
Finance	6	Student Registration Loan
PMB	4	Admission Data
Tracer Study	6	- Alumni
Support	8	- Lecturer Activities - Lecturer Recognition - Lecturer Association Organization
SDM	10	- Academic position - Education History - Lecturer Commulative Achievement Index
Cooperation	9	- MoU / Charter of Study Program Cooperation with Partners - List of Study Program, Faculty Activities

The education domain is the domain that produces the most KPIS. Judging from the stakeholders that exist in college students is one of the core businesses of a university. Performance improvement is carried out to improve the quality of education quality for students. Each domain with each other is interrelated, especially in filling out the BAN-PT Study Program accreditation forms.

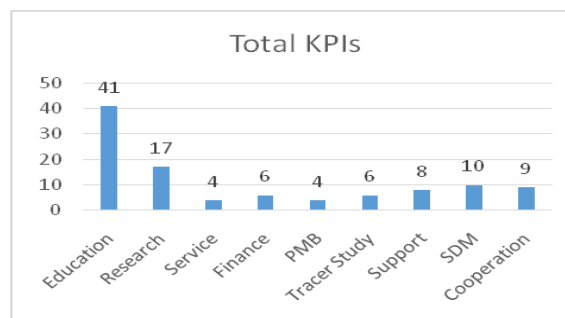


Fig 3. KPI Total Diagram

Fig. 3 shows the distribution of KPIs generated in each domain. The education domain dominates the most KPIs, and it shows if the stakeholders of a university are one of them, namely students. Students become the primary source of higher education management.

The identification of information elements accompanying each KPI is adjusted to the instrument of BAN PT. Table 2 is some examples of indicators produced, the table is only taken 2 years from the time the target was set. The target results are obtained from the results in the field.

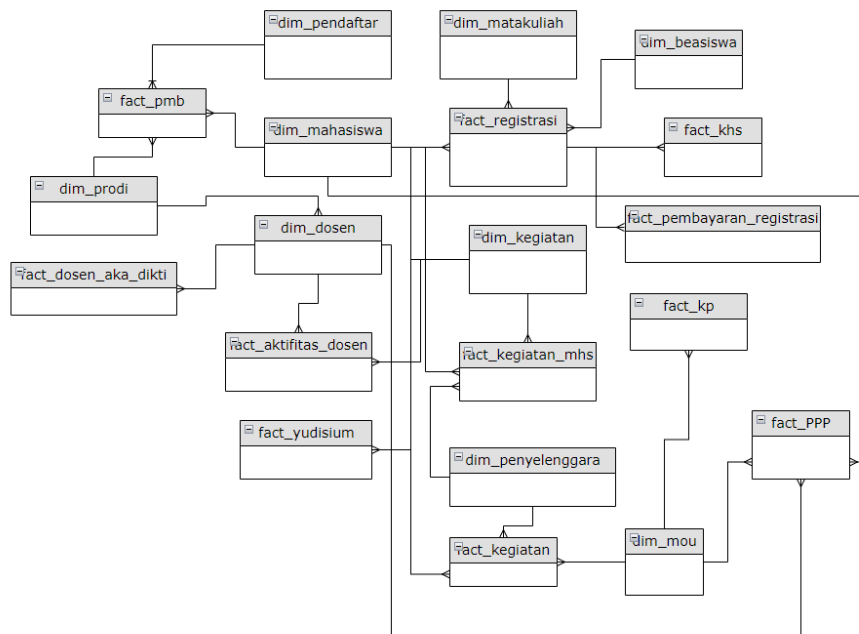
TABLE 2.  
EXAMPLES OF KPI INDICATORS

No	Indicator	Target					
		2015			2016		
		Min Limit	Middle Limit	Max Limit )	Min Limit	Middle Limit	Max Limit
1	The ratio of prospective students taking part in the selection: capacity	1:2	1:3	1:4	1:2	1:3	1:4
2	Lecturer: Student Ratio (RMD)	1:32	1:31	1:30	1:32	1:31	1:30
3	The Average number of students per Academic Supervisor (PA) per semester (= RMPA)	>=50	40-45	30-40	>=36	31-35	25 - 30
4	The Average teaching load per lecturer per semester	>20	16-19	12-15	>20	16-19	12-15
5	The Average students per supervisor I final project (= RMTA)	30	25	20	25	20	15
6	Number of final project students involved in lecturer research	0	3	5	<5	5	10
7	Percentage of timely graduation (KTW)	<25%	25%	30%	<25%	25%	30%
8	Average GPA of graduates of all Informatics Study Program students	<2.75	2.75	3	<2.75	2.75	3
9	Average graduate study period	>=7	6	5	>=7	6	4.5
10	The average waiting period for graduates to get the first job	> 18 month	7 - 18 month	<= 6 month	> 18 month	7 - 18 month	<= 6 month
11	The average amount of research funding per lecturer per year	0	<3	3	<3	3-4	5
12	The average amount of research funding per lecturer per year (= RDP)	<5	5-9	10	<7	7-14	15
13	Lecturer International Journal Publication Number	1	2-5	>6	3	6	>6
14	Percentage of lecturers who are editors or partners of national journal journals accredited in other fields of IT	0	0.1 - 0.4%	>0.5%	0	0.1 - 0.4%	>0.5%

No	Indicator	Target					
		2015			2016		
		Min Limit	Middle Limit	Max Limit )	Min Limit	Middle Limit	Max Limit
15	Qty. The title of service that is integrated with study program subjects	0	1	2	0	1	2
16	Average number of Research Publications in international journals accredited with students	0	<0.1	>0.1	0	<0.1	>0.1

*D. Implementation KPI on Schema Data Warehouse*

KPIs that have been built can be implemented in a data warehouse scheme. The data warehouse that will be built will later become a source of data and visualization of KPI development with a dashboard. There are 11 fact tables and 20 related dimension tables. The fact table is built based on the needs of the KPI to be visualized with the Academic Study Program Dashboard. Fig. 4 shows an outline of the data warehouse table scheme. The table shown in Fig. 4 is the main table that affects the relationships between other tables. In a data warehouse scheme, not all KPIs can be implemented in the scheme; this happens because there are several KPIs produced that can be retrieved information manually. For example, KPI "Lecturer publications cited by other researchers." To get a KPI can only be done by doing a manual recap on Google Scholar or at the research gate



**Figure 4.** Implementation KPI on Schema Data Warehouse

*E. Implementation KPI on Dashboard Academic*

KPIs that have been built can be applied to academic dashboards that have been tailored to the needs of the study program. KPIs are used to assess the results of data processed to have good or bad indicators



The KPI built can be evaluated by looking at the success of the Schema Data Warehouse and Visualization Dashboard implementation. In Schema, not all KPIs can be implemented into the KPI Data Warehouse can also be obtained through the operational data systems available at the University.

The implementation of KPI on the academic Dashboard is used as information that must be present on the Dashboard. The KPI Achievement Target is also used to see the limits for determining performance indicators in Study Programs. The visualization of the KPI Dashboard yields various outputs, including Tracer Study, Student Activity Points, Student Grade Evaluation, Lecture Activities, Student Scholarships and Loans, Internships and Theses, Faculty Support Activities, as well as Collaborations with Partners. The dashboard for evaluating student study outcomes, incorporating the KPIs developed by the researcher, has been published by another author [22].

## V. CONCLUSION

Research conducted aims to assist Informatics Study Program in analyzing the performance of Study Programs each year. The research that was built could also help Informatics Study Programs in filling out the BAN-PT accreditation forms, namely Study Program Performance Sheets and Study Evaluation Sheets. Based on the results obtained from the research conducted, the KPI development method that first needs to be done is knowing business processes and identifying strategies from every business. After that, Stakeholder identification is essential to know the subject of KPI. In addition to supporting documents such as regulations, standards of assessment within the company are also needed.

The KPI that has been built is proven to be implemented in two places, namely the Data Warehouse and Academic Dashboard scheme. Not all coverage areas can be implemented in the Data Warehouse scheme, and this happens because the basic concept of the Data Warehouse itself only stores history data that can be processed with various dimensions. KPIs that cannot be implemented in a Data Warehouse scheme, data can be retrieved from operational data. The built dashboard is beneficial for analysis and filling in the Study Program accreditation forms 4.0.

Future research from the development of this KPI is weighting each indicator, so that the weight of the indicator becomes input to the Informatics Study Program in implementing which targets should be done first

## ACKNOWLEDGMENT

The research Universitas Atma Jaya Yogyakarta postgraduate was supported by the Faculty of Information Technology, Duta Wacana Christian University, with contract number 009.2/J.05/FTI/2018

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