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Management Information System for Achieving Main Performance Indicators for Higher Education

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ABSTRACT

This research aims to develop a management information system for the achievement of Main Performance Indicators (MPI) for universities in Indonesia, especially the achievement of indicators for Students Gaining Experience Outside the University Campus and to be able to monitor the performance achievements of each study program following performance targets, especially at Universitas Negeri Manado (Unima). The development of this management information system uses the Extreme Programming Method which consists of Planning, Design, Coding, and Testing. The result of this research is the Unima MPI Achievement Management Information System, which can be used by universities to input and report the performance achievements of each study program. From the research results, this Management Information System helps in 1) planning the achievement of MPI by providing the data and information needed to formulate appropriate goals, strategies, and action plans 2) organizing the process of achieving MPI by managing the flow of information, tasks and responsibilities responsibilities between main actors such as students, admin, study program and rector; 3) facilitate the implementation of the achievement of main performance indicators by providing appropriate access to each actor to enter, verify and view data on the achievement of main performance indicators and 4) Management information systems play an important role in controlling the achievement of MPI by providing appropriate access control and regulation and provide the information necessary to evaluate the successful implementation of educational policies and programs. With the Management Information System for Achieving Main Performance Indicators, educational institutions can plan, organize, implement, and control the achievement of main performance

indicators effectively and efficiently following the performance targets that have been set by the Indonesian Ministry of Education, Culture, Research and Technology.

Keywords: Management Information Systems, Main Performance Indicators, University Performance

INTRODUCTION

Higher education performance is significant in realizing the vision of superior and innovative higher education. Higher education is not only a place to provide higher education but also a center for developing science, technology, and culture (Rapanta et al., 2021). Good performance from higher education institutions will create a conducive learning environment (Anthonysamy et al., 2020), producing quality graduates who are ready to compete in an increasingly complex world of work (Balzer, 2020). Apart from that, universities also have an important role in creating innovation and research that can make a significant contribution to the development of society and industry (Tseng et al., 2020). Thus, the performance of higher education is crucial in achieving the vision of superior and innovative higher education.

In 2020, the Directorate General of Higher Education, Ministry of Education and Culture, developed policies related to the eight Main Performance Indicators (MPI) regulated in Minister of Education and Culture Regulation 03 of 2020 concerning National Standards for Higher Education and Decree of the Minister of Education and Culture of the Republic of Indonesia Number 754/P/020 concerning Performance Indicators Main State Universities (IKU-PTN). Higher Education MPI is used as a performance measurement tool for Higher Education, which is evaluated based on 8 (eight) Main Performance Indicators. These indicators include 1) graduates who get decent jobs; 2) students who gain experience outside campus; 3) lecturers who work outside campus, 4) practitioners who teach on campus, 5) lecturers' work results that are used by the community, 6) study programs that collaborate with world-class partners, 7) collaborative and participatory classes, and 8) international standard study program. In 2023, the MPI was reaffirmed through the Decree of the Minister of Education, Culture, Research and Technology of the Republic of Indonesia Number 210/M/2023 concerning Main Performance Indicators for Universities and Higher Education Service Institutions in the Ministry of Education, Culture, Research and Technology.

The main performance indicators of State Universities are used as measuring tools and accelerators for the development of the Independent Learning policy: Independent Campus which has been regulated through Minister of Education and Culture Regulations Number 3, 4, 5, 6, and 7 of 2020. Quality higher education institutions must be able to provide education that is relevant to the needs of the Business and Industrial World (Abbas, 2020). This means that universities need to have a curriculum that is in line with industrial and job market developments (Pereira et al., 2020), as well as providing opportunities for students to gain relevant practical experience (Alam, 2022).

The Independent Learning – Independent Campus (MBKM) program launched by the Minister of Education and Culture aims to encourage students to master various knowledge and skills needed in the world of work (Matondang et al., 2024). The activities of students participating in MBKM are counted in achieving Main Performance Indicator 2. Thus, MBKM can be a means for universities to

improve the quality of graduates and make them better prepared to face challenges in the world of work.

Unima is a higher education institution that has the vision of a "Superior And Innovative University Based On Mapalus (cooperation)". To achieve this vision, universities need to have a system that allows them to monitor and measure MPI achievements effectively. However, currently, the University is facing challenges in developing and implementing a management information system model that can support effective monitoring and evaluation of MPI achievements.

The first challenge faced by Unima is the limitations of the system it has. Universities have separate and poorly integrated information systems, making it difficult to monitor and manage the achievement of Main Performance Indicators (MPI) as a whole. For example, MPI 1 for graduates who got a decent job was collected via the Unima tracer study website, and MPI 2 for students who got experience outside campus via Google Form which was then input into the PDDIKTI Neo Feeder application. MPI 3 for lecturers who work outside campus, MPI 4 for practitioners who teach on campus, and MPI 5 for lecturers' work used by the community were collected from the SISTER application. In addition, MPI 6 for study programs in collaboration with world-class partners is collected through the SILEMKERMA application and collaborative and participatory MPI 7 for classes through the PDDIKTI application. Unima's MPI Achievement Management Information System is focused on the Main Performance Indicators of students who gain experience outside campus because the other indicators already have their systems. Apart from that, the MPI of students who gain experience outside campus has a very important value because it is related to student experience outside the study program in the form of MBKM activities and student achievements. Better system integration can help universities overcome these challenges (Mittal et al., 2023) and improve the overall effectiveness of MPI data management. This situation gives rise to problems in management's ineffectiveness in managing various performance indicators and the slowness in documenting performance data accurately, quickly, and easily, making it difficult for the University to obtain accurate data.

The second challenge is the absence of a management information system that can monitor the performance achievements of each study program by performance targets, especially the Main Performance Indicators for students who gain experience outside the campus at Unima. This creates difficulties in collecting, analyzing, and tracking performance achievement data from each study program effectively. Without an integrated system, data management becomes inefficient and time-consuming, making it difficult to make appropriate decisions based on accurate information. A system is needed that can overcome this challenge by providing an adequate platform to manage and monitor the performance achievements of each study program holistically.

The application of information technology must be an inseparable part of performance measurement activities at Unima. The absence of an effective management information system has resulted in the work system at the University not being optimal and continuing with the old pattern which is less effective in achieving goals because it is still done manually with paper-based recording and documentation and stored in stand-alone computer files and hard copy folder files. . This situation gives rise to problems in management's ineffectiveness in managing various performance indicators and the slowness in documenting performance data accurately, quickly, and easily, making it difficult for the University to obtain accurate data.

Educational management is a field of study related to planning, organizing, managing, and supervising educational processes in various educational institutions (Tanjung, 2020). The main goal is to improve the quality of education and achieve the educational goals that have been set (Odell et al., 2020). On the other hand, Management Information Systems (MIS) are systems designed to manage and process information required for the management of organizations, including educational institutions (Yaseen et al., 2023). Main Performance Indicators (MPI) are parameters used to measure the performance or achievement of certain goals (Aithal & Aithal, 2023). Achieving this MPI is very important because it helps educational institutions evaluate their effectiveness in achieving educational goals and provides a basis for informational and data-based decision-making.

University rankings have gradually become an issue of concern to the academic community throughout the world. Several mechanisms with different methodologies have been developed to determine University rankings precisely. However, some ranking tools have important problems, especially in the indicators used. Some are based solely on research performance, while others focus only on specific fields, such as science and technology – which may not apply to the arts and social sciences. Five main ranking tools commonly applied to world universities are reviewed, namely 'Quacquarelli Symonds' (QS), 'Times Higher Education' (THE), 'Academic Ranking of World Universities' (ARWU), 'Leiden University' ranking, and ' Webometrics' ranking (Fauzi et al., 2020). In Indonesia, university rankings are carried out by achieving the University MPI, competing for nominations and rewards and forms of University MPI incentives.

Based on previous research, several findings are relevant to the development of management information systems for achieving Main Performance Indicators (MPI) in higher education. Research on "Development of a Higher Education Performance Information System Model" at Respati University Yogyakarta was carried out to produce an information system for assessing higher education performance (Winardi et al., 2022). They use the UML approach in system design and produce applications that can manage and assess higher education performance. Apart from that, research on Main Performance Indicator (MPI)-based MIS for measuring teacher performance at SMAN 14 Bandar Lampung found that accuracy and automation in the data processing process are very important. This research produces a management information system for measuring teacher performance using the MPI method, which has features for managing teacher data, MPI assessment, and information on MPI results for each teacher (An'ars, 2022). Another relevant research is regarding the influence of management information systems on improving employee performance in the Iraqi Ministry of Education. The results show that modern information systems are very important in increasing the effectiveness of technology and programming in the ministry's programming (Yaseen et al., 2023). Apart from that, competition between universities in achieving performance targets is also the focus of recent research. Universities are now paying more attention to their reputation as an important competitive factor. This competition encourages universities to focus on productivity, accountability, and internal competition (Geschwind et al., 2019).

Several studies that have been carried out have not mentioned the existence of a management information system for achieving the main performance indicators of higher education after the publication of Ministerial Decree Number 754/P/020 and Number 210/M/2023 concerning Main Performance Indicators for State Universities (IKU-PTN). This research proposes the existence of a

management information system for achieving MPI, especially MPI 2 Unima, following the performance indicators set by the Ministry of Education and Culture, Research and Technology.

METHODS

Everything that will be developed must have a framework that is used, as well as the steps used to develop the system/software. This research uses extreme programming methods in system development. Applying the Extreme Programming approach to software development provides clear advantages over traditional software development methods. Extreme Programming offers higher levels of productivity and efficiency. Unlike traditional methods, which tend to produce application prototypes in the final stages of development (Kumar, 2015).

One of the traditional system development methods is the Waterfall development model. According to Pressman, the Waterfall model is a sequential development model (Pressman, 2009). In the process of building software, the Waterfall model follows a systematic procedure. Analysis, design, code, test, and maintenance are the workflow. However, the waterfall model is not suitable for use in large-scale projects and is not flexible to change the system being created. Therefore, the information system that will be built will use the Extreme Programming method which is suitable for large scales and frequent system changes.

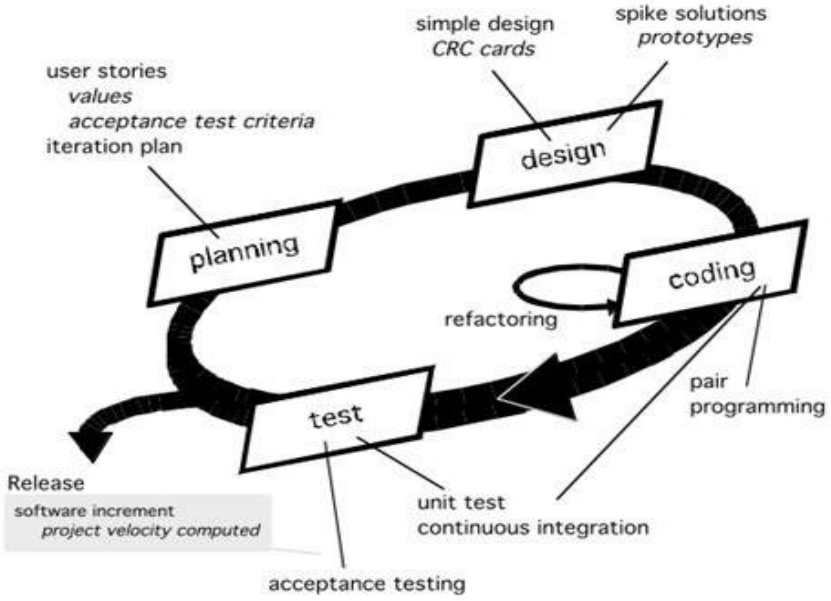

Figure 1. Extreme Programming Method (Pressman, 2012)

Figure 1 shows the 4 stages in Extreme Programming, as follows: The first stage is planning. This stage is the initial stage which involves researchers identifying problems, determining needs, determining features, and scheduling iterations or development cycles. The aim is to create an accurate and measurable work plan. The second stage is design. At this stage, the software architecture and structure are designed. At this stage where modeling is carried out starting from system modeling to database modeling using Unified Modeling Language (UML) diagrams and taking into account factors such as modularity, security, scalability, and flexibility. A good design must meet specifications and leave room for further improvement. The third stage is Implementation (Coding). This stage involves creating software code based on a design created in the form of an interface using a programming language. Where the software that will be used on the Front-End side is the React JS Library, while on the Back-End side, it is the Go language (Golang) with a database using MySQL. The last stage is testing. After the implementation stage is complete, then at this stage Extreme Programming emphasizes continuous and automatic testing at this time. To ensure proper functionality and avoid regression to find out what errors occur when the application is running and to find out whether the system being built meets the user's needs. At this stage, we will use the Black Box Testing method for testing.

RESULTS AND DISCUSSION

Planning

Planning is a very important management function in every organization, including in the management of information systems. Planning is the process of selecting organizational goals and determining the best steps to achieve those goals. In the context of developing an information system for managing Main Performance Indicator (MPI) data at Manado State University, planning is the key to ensuring that the system developed can run effectively and efficiently. The first step in planning the development of an information system for managing Main Performance Indicator (MPI) data at Manado State University is to identify the system that is currently running. This is done to understand existing processes, unmet needs, and potential improvements that can be made.

The collection of MPI data for students who have off-campus experience at Unima is following Minister of Education and Culture Regulation 03 of 2020 concerning National Higher Education Standards and Decree of the Minister of Education and Culture of the Republic of Indonesia Number 754/P/020 concerning Main Performance Indicators for State Universities (IKU-PTN) and is complemented by the Decree of the Minister of Education, Culture, Research and Technology of the Republic of Indonesia Number 210/M/2023 concerning Main Performance Indicators for Universities and Higher Education Service Institutions in the Ministry of Education, Culture, Research and Technology.

After identifying the system that is currently running, the next step is to explain the flow of the proposed system. This includes process stages starting from data input, and data processing, to decision-making based on the resulting data. In this case, the proposed system flow for managing MPI data at Manado State University could include the process of inputting data from students, verifying data by MPI staff, processing data, and presenting data via a website for access by the Rector and related parties.

Design

In the context of management information systems for achieving main performance indicators at Unima, system design plays an important role in determining how data is collected, stored, analyzed, and used to support better decision-making. With good design, the system can be integrated with various organizational units and ensure that the information produced can be accessed easily and on time, thereby helping to improve the overall performance and efficiency of the organization.

In this design, a Use Case Diagram is used to provide an overview of the activities of the system that will be created along with the actors involved in the system, as shown in Figure 2.

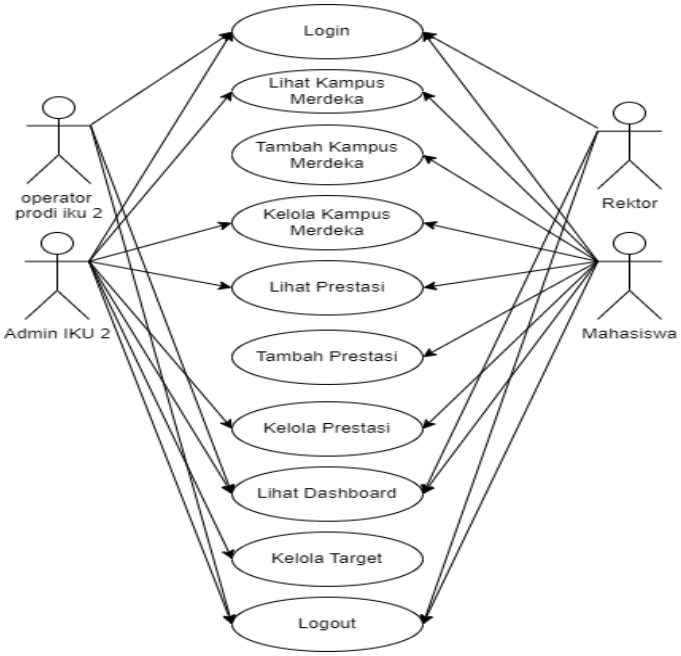

Figure 2. Usecase Diagram

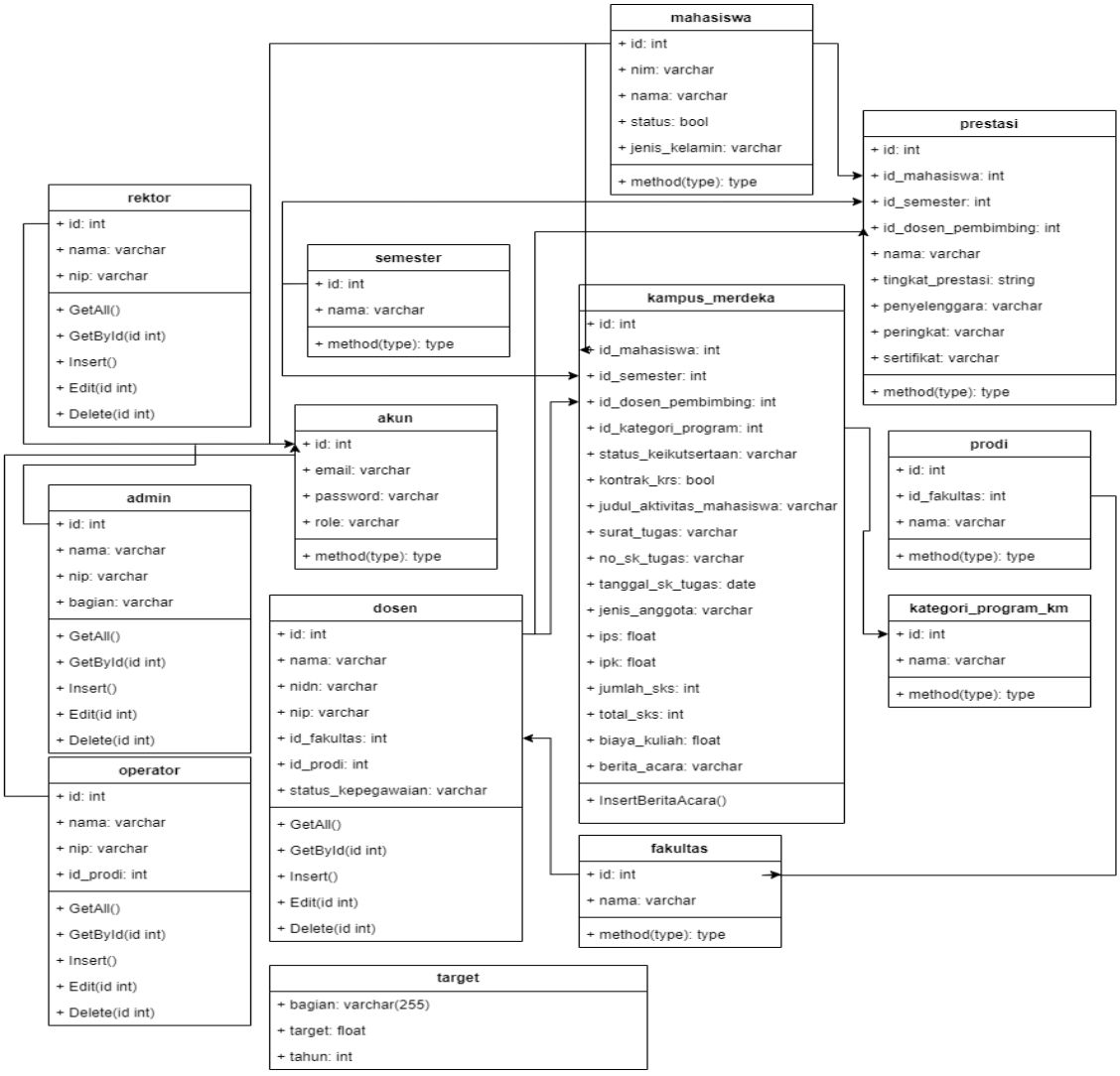

Figure 3. Class Diagram

Class Diagram of the Information System for Achieving Main Performance Indicators 2 at Manado State University is shown in Figure 3. Class Diagrams are used in designing databases.

Coding

Figure 4 depicts the login interface as follows:

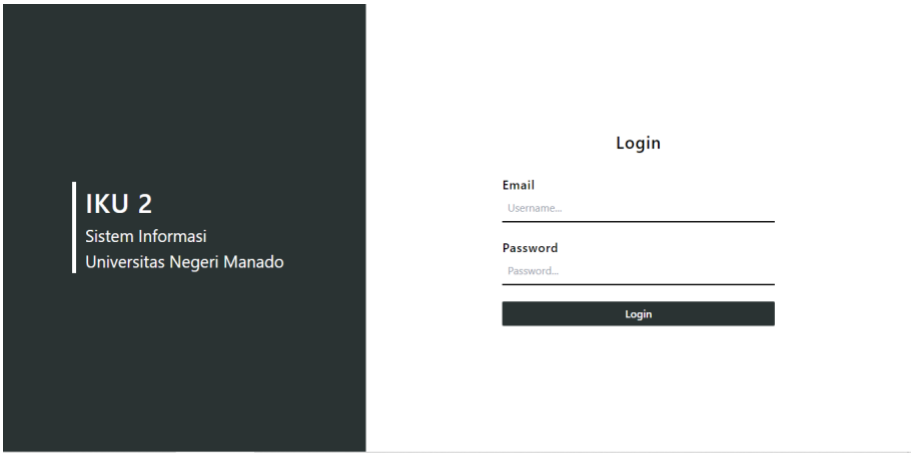

Figure 4. Login page

This management information system is specifically designed to assist organizations in monitoring, measuring, and analyzing the achievement of predetermined main performance indicators (MPI). This system helps organizations manage and improve their performance effectively by providing fast and timely access to relevant data and information about MPI achievements. The user must initially login to be able to enter the dashboard. This dashboard can be used by educational institutions to monitor, measure, and analyze MPI achievements.

The main actors in this system are Students, Admin, Study Program, and Chancellor. Students are responsible for entering data on the achievements of MPI. Admin is responsible for verifying data entered by students and managing golden targets (achievement targets). Study Programs have access to view MPI achievements. The rector has access to see MPI achievements.

The following are several aspects of the relationship between SIM and MPI achievement in educational management:

1. Data Collection:

These Management Information System allows educational institutions to collect data related to MPI in a structured and organized manner. This data can include student academic results, student attendance, teaching evaluations, and so on.

2. Real-Time Monitoring:

SIM enables real-time monitoring of MPI achievement, enabling management staff to track progress in MPI achievement directly. This allows them to immediately respond to changes or problems that may arise along the way.

3. Performance Analysis:

MIS provides powerful analytical tools to analyze performance data and create in-depth reports on MPI achievements. It helps educational management in identifying trends, patterns, and issues that may affect the performance of educational institutions.

4. Strategic Decision-Making:

Data from SIM is used as a basis for making strategic decisions related to the direction and development of educational institutions. This includes evaluating the effectiveness of educational programs, resource allocation, and long-term strategic planning.

5. Curriculum Development:

MIS provides valuable information for designing and developing more relevant and effective curricula. Analysis of data from MIS can help in evaluating the effectiveness of existing curricula and designing necessary changes.

6. Reporting and Communication:

SIM allows the creation of clear and structured performance reports regarding MPI achievements. This report is not only used for internal management but also for communicating with external stakeholders such as parents, government, and society.

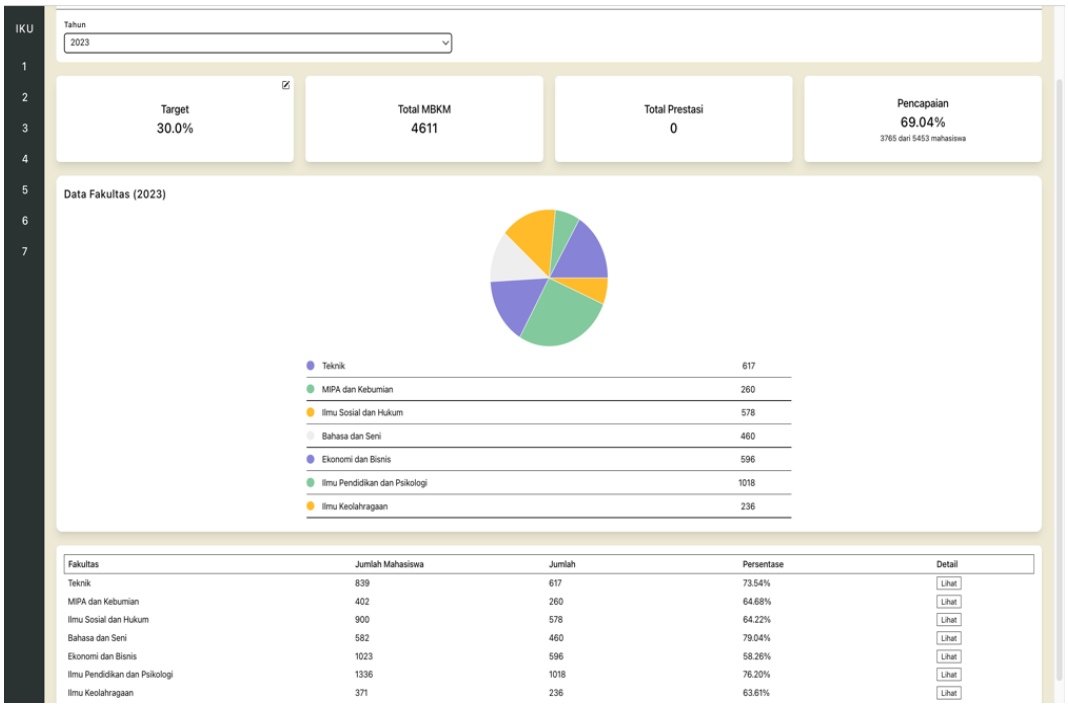

Figure 5. MPI Achievement Monitoring Page

Figure 5 shows the monitoring page for the achievement MPI for each study program carried out through the dashboard provided to Rector. On this dashboard, the Rector can see directly the achievement for each study program in higher education. These MPI includes several important metrics, including: a) Number of Students per Study Program: Information regarding the total number of students registered in each study program at the university. This data provides an overview of the scale and population of students in each study program. b) Number of Students Participating in MBKM: This is the number of students who are actively participating in the Independent Campus Learning Program (MBKM) or other non-curricular educational programs held at universities. This reflects student participation in extracurricular activities or increased competency outside the curriculum. c)

Number of Achieving Students: This is the number of students who have achieved academic or non-academic achievements recognized by the university, such as winning scholarships, winning competitions, or playing an active role in student activities. Rector's dashboard provides monitoring of the achievement of MPI for each study program in higher education. Through this dashboard, Rector can easily see various important information, including the number of students per study program, the number of students participating in MBKM, and the number of students who have achieved achievements. This data provides a comprehensive picture of the student population in each study program, their participation in non-curricular educational programs such as MBKM, and the achievements they have achieved. In addition, this dashboard also compares the number of students per study program with MBKM participants and high-achieving students, providing insight into the proportion of students involved in extracurricular activities and achievement achievements. With this dashboard, Rector can effectively monitor the performance of each study program in achieving a KPI of 2, and make the right decisions to improve the quality of education and student experience in higher education.

With this dashboard, Rector can monitor in real-time the performance of each study program in achieving a KPI of 2 and can identify areas that need improvement or improvements to improve the quality of education and student experience in higher education.

Testing

Testing carried out starting from the student flow, admin flow, and rector flow using Black-Box Testing produces 100% valid tests for each case tested, which means the system that has been built has been successfully implemented well.

CONCLUSION

Based on the results of the research conducted, as follows. First, The results of designing a management information system for achieving the main performance indicators, the system can be implemented by public universities in monitoring, measuring and analyzing the achievement of indicators for Students Gaining Experience Outside the University Campus with 4 actors, namely students, admin, study program and rector. This model shows the interaction between the system and its actors, shows the flow of data in the system, and models the system input, process, and output in calculating MPI achievements. Second, This management information system can monitor the performance achievements of each study program following performance targets, especially the Main Performance Indicators for students who have off-campus experience at Unima through the Rector's Dashboard. With this dashboard, Rector can effectively monitor the performance of each study program in achieving an MPI of 2, and make the right decisions to improve the quality of education and student experience in higher education. In developing a management information system for achieving the main performance indicators at Unima, there are several suggestions for further research, as follows: 1) Evaluate system performance during implementation to evaluate its effectiveness in meeting user needs; 2) Develop additional features such as integration with other systems at the

University to capture data automatically, more powerful reporting tools, or data analysis features to provide deeper insights; and 3) After the system is successfully implemented at Unima, this management information system can be applied at other universities. This can help expand understanding of how these systems can be implemented and adapted to the needs of various educational environments.

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