MERAPI ANALYSIS FRAMEWORK : IDEAS VALIDATION OF APPLICATION DEVELOPMENT IN THE INDUSTRIAL AGE 5.0

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A. Introduction

Industry 5.0

The industrial revolution was started in connection with systems that developed from controlled computers to systems that could perform mass data processing. From this condition, it can be seen that the industrial revolution provides smart decisions by using an automated approach to improve the industrial sector to the way of life of the people [1]. Industry 5.0 is one development in the industrial world. In its development the industrial revolution moved in 1780 as industry 1.0, where the industrial revolution was marked by the use of water and steam [2], the second industrial revolution (2.0) in 1870 was marked by mass production using assembly lines, the third industrial revolution (3.0) in 1970 was marked With automation using electronics and computers, the fourth industrial revolution (3.5) in 1980 was known as the era of globalization where production to the economy was cheap. Here between countries can make sales marked by the sale of goods from one country to another. The fifth Industrial Revolution (4.0) in 2018 () is known as the Industrial Revolution 4.0, which is marked by data analysis (data analytics) and artificial intelligence technology in automating further processes by utilizing Information and Communication Technology [3] and the sixth industrial revolution (5.0) known as the industrial revolution 5.0 is characterized by personalization where humans and machines work together. Humans are placed in the industrial world by collaboration with robots [4].

Skobelev and Borovik, in 2017 in their research criticized the industrial revolution 4.0 development towards Industry 5.0 which was marked by digital manufacturing towards a digital society. In this study, researchers explain things starting from Industry 4.0 where the use of computers and robots, the relationship between the Internet of Things (IoT) and humans, multi-agent-based systems and technology, to evergetics (utilization and collaboration of humans with robots) [5]. Kadir Alpaslan E, et al in 2019 conducted research on the relationship between Industry 5.0 and Robots with Humans. From the data got by researchers that in the future the use of robots will replace human labor, both from the company side to the world of education [6]. Nagy K, et al in 2020 in their research focused on community support 5.0 related to audit and control aspects. Researchers developed a new model to ensure the use of public (public) money in supporting social economic development [7]. Kayano Fukuda in his research in 2019 focused on science, technology, and ecosystem innovation that occurred in welcoming society 5.0. In his research, researchers focused on Japan, Germany, and the United States. From this research, data shows that science, technology, and innovation experience short-term and long-term problems. The short term can be seen in the economy and technological breakthroughs, while in the long term it can be seen in demographic changes and the era of globalization. From this study it can also be seen that the influence of science, technology and innovation carried out by a country will have a good impact with good system management [8].

Idea or brainchild

Writing is an activity carried out by humans in expressing ideas or ideas into written form [9]. Ideas or ideas themselves are everything either as thoughts, desires, proposals, or hopes from a writer that is conveyed to readers or listeners where in expressing the idea it is integrated with facts, data, information, and other forms of media [10]. In expressing ideas or ideas required a process. The process itself is an activity that consists of investigating, compiling, and testing ideas in obtaining concrete, and correct data [11].

Sukardi, et al in 2018 used memes as an idea to build humor through sound games. According to researchers, memes are ideas, habits, ideas, or styles that spread in society within a culture. Memes combine creativity, message, art, and humor in digital communication [12]. Sopha D, in 2018 in his research, stated that it is difficult to write an essay when it is used for speech. The writing made must contain many ideas and can be understood by others and in the end this other person agrees and accepts the ideas conveyed by the speaker or writer. Organizing words must have a pattern as a strategy for arranging ideas in the right order. The technique of arranging ideas from one paragraph to another will help the success of conveying ideas and influencing listeners or readers [13].

Application or Software

Software Engineering is making software or applications based on the software development process model [14]. An application or software is the key to the success of a computer system. Applications can do a job and solve a particular problem [15]. When developing a software, the quality of a software developed is the major part or the most important part which includes the application development process and the product developed. To ensure the quality of the software, a software must be measured [16].

Various software bases include desktop, web, mobile. Shinta Esabella, et al, in 2021 in their research developed a desktop-based application to handle data management of basic food sales in Sumbawa Besar [17]. Jamhur A.Z, et al in 2020 developed a desktop-based application that focuses on sales and inventory control. Researchers use Visual Basic.Net and use MySQL database management system system [18]. Andreansyah A, et al in 2020 in their research developed a web-based savings and loan cooperative application using an incremental model. The developed application received 85.98% research results, which means the application is very useful for companies [19]. Arief R, et al, in 2019 developed a web-based ICT learning application for vocational students using the ADDIE model. The developed application received from media experts by 89.7%, from material experts by 88.1%, and from students by 88.9% [20]. Pinto, et al in 2020 in their research developed an Android-based clean water ordering application. Researchers use a prototype model to develop applications. The assessment from an application gets clean water providers and customers of 93.20%, which means the application is suitable for use for clean water customers in the South Central Timor area [21].

Technique, Method, Algorithm, Approach

Ardhian T, et al, in 2020 in their research entitled "Reading and Critical Thinking Techniques on Understanding Reading Skills for Early Grade Students in Elementary School" focused on reading and critical thinking techniques for elementary school students in their ability to understand reading. The researchers found that the CIRC (Cooperative Integrated Reading and Composition) method was better than the PWIM (Picture-World Inductive Model) method in improving students' writing skills [22]. Defiyanti S, et al, in 2019 focused on predicting rice productivity in the Karawang area. Researchers to predict using the C4.5 method. In its implementation, the researcher uses the CRISP-DM (Cross Industry Standard Process for Data Mining) method and the C4.5 Algorithm. Researchers get the results that the method used has an accuracy value of 66.1% [23]. Prihanditya H.A, and Alamsyah, in 2020 focused on diagnosing chronic kidney disease. Researchers used the Z-Score Normalization and Boosting Technique. The researcher uses the Z-Score Boosting Algorithm to increase the accuracy of the C4.5 Algorithm. In the results of the study, it was found that the algorithm used could penetrate the 97.25% accuracy rate [24].

El Brahmi A, et al, in 2021 focused on Sulfide Production in the Moroccan Sewerage Network. Sulfide is a waste that smells, interferes with breathing, and threatens health. Researchers try to prevent the emission process by evaluating the sulfide concentration present in the wastewater. The researcher uses the Artificial Terms Network method to overcome these problems. From the results of the study, it was found that the Artificial Terms Network could predict the sulfide concentration in water by 89% [25]. Husin M.R., et al, in 2020 focused on the use of an inductive instructional approach to career aspirations and noble values in history. By using an inductive instruction-based approach, it can help teachers in the teaching and learning process to reduce the level of boredom of students in learning [26]. Hadi R.A., et al in 2021, focused on automatic detection of the human ear using a changed adaptive search window method. This research is used to assist the ear forensics process which is done or so that the results are still less efficient and not optimal. By using combining several techniques, ranging from image contrast, laplace filters, and gaussian blurring techniques, as well as Adaptive Search Window, the average detection results are 96%.[27].

From some of the research above, it can be found out that the need for a method using techniques, methods, algorithms, or approaches that have been standardized and tested in helping to solve problems better when compared to using conventional or manual methods.

Merapi Analysis Framework

The researcher introduced the Merapi Analysis Framework for the first time in 2017 to be precise in the 2016 Even School year. This technique was introduced by the researcher to students who schedule thesis proposals from the 2016 to even 2019 academic year. New researchers provided the Merapi Analysis Framework in the Odd 2018 academic year. The Analysis Framework has four major activities, Idea Generation, Idea Validation, Study Literature, and Survei.

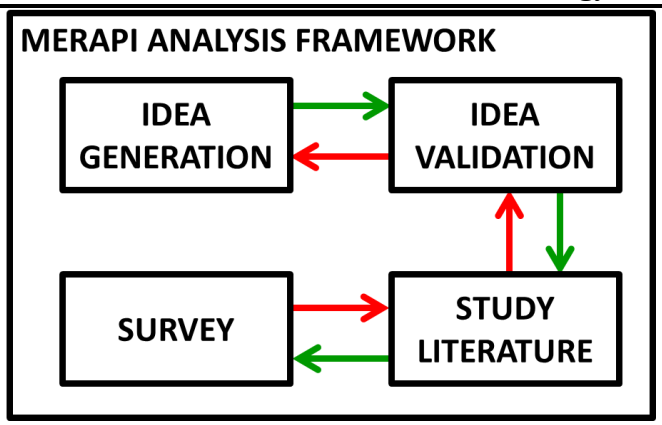

Figure 1. Merapi Analysis Framework

In Figure 1 it can be seen that the first process of the Merapi Analysis Framework (MAF) is ***Idea Generation***. This stage is marked by the statement "*What problem will be solving*" or "*What problem will be solved*" or if the application is made "*What application will be made*". This first stage will be the major key to the program / application that will be made. The second step is ***Idea Validation***. This stage is marked by the statement "*Who will use this application*" or "*Target User (Who) will use the application*.". These goals should be specific items. This is because it will affect the user interface (User Interface Application). The second statement from the second stage is "*What is the conditions/situations of application user/consumer*" or "*What are the conditions/situation of the users who will use the application*". The third process of MAF is ***Study Literature***. At this stage, students carry out the reading process regarding models, methods, algorithms, techniques, which can build applications. The fourth process in this MAF is ***Survey***. In this section, students should know the place that will be used for the survey or who the person will go to for the application test site. The processes that occur in MAF are interconnected, meaning that when the first process enters the second process and an error occurs, students can make corrections and improvements to ideas and this applies to all stages of MAF.

B. Problems

Department of Informatics Engineering – Institut Teknologi Adhi Tama Surabaya is one of the largest departement. The Department of Informatics has problems with graduates every semester where many students cannot graduate on time (12 semesters - 14 semesters)

C. Discussion

Respondent

Respondents who contributed to this research were 100 students out of 557 students who had graduated. Of the 100 students who will become respondents, 78 of them are male and 22 are female respondents.

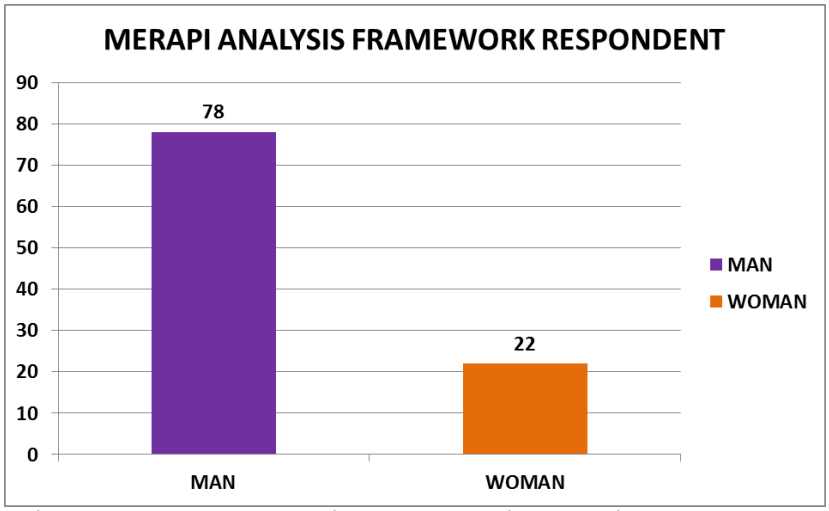

Figure 2. Respondents in the Merapi Analysis Framework.

College Student Difficulties in Thesis

Students who will become respondents, at the beginning, are given by the survey researcher about the things that hinder the difficulties in the thesis. From the survey results, it was found that the most difficult thing was to ***determine the idea***. The second difficulty is that many students work while studying, and the third difficulty is laziness.

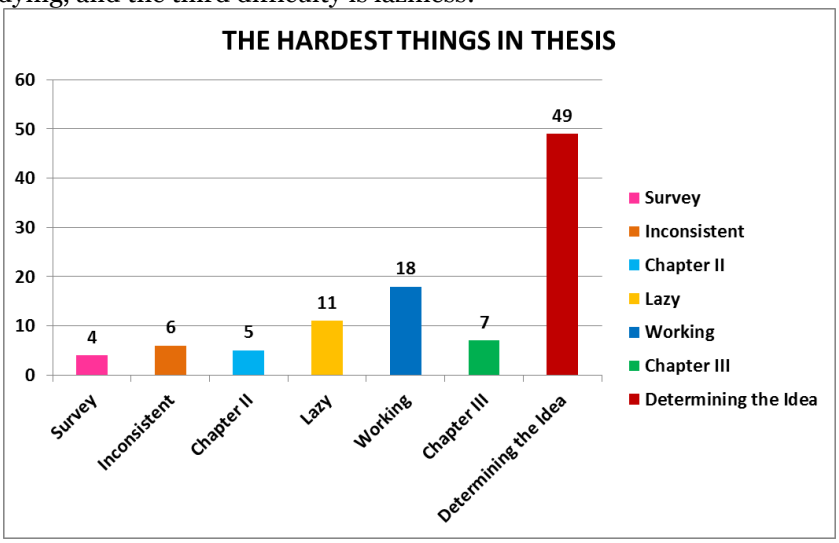

Figure 3. College Student Difficulties in Thesis.

From 49 students who stated that determining an idea was the most difficult thing in making a thesis, after a survey was conducted again by the researcher, it turned out that the idea in question was an idea in making an application by 71.43% and the idea of determining a thesis idea by 28.57%.

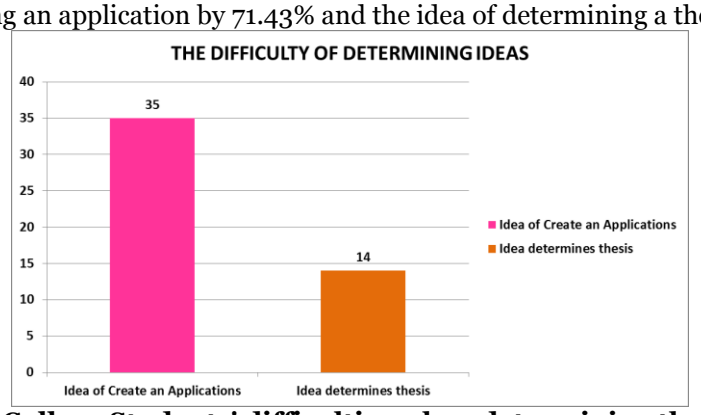

Figure 4. College Students' difficulties when determining thesis ideas.

Implementing the Merapi Analyst Framework

From 100 students who became respondents, they were given a template about determining the idea of making an application in a thesis. Researchers try to explore students' abilities in determining application ideas that will be planned at the time of thesis using MAF. Students are given the opportunity 3 times. Each opportunity is given 1.5 hours. From the results of the Pre-Test, most of the students could only finish up to the ***Idea Generation*** stage.

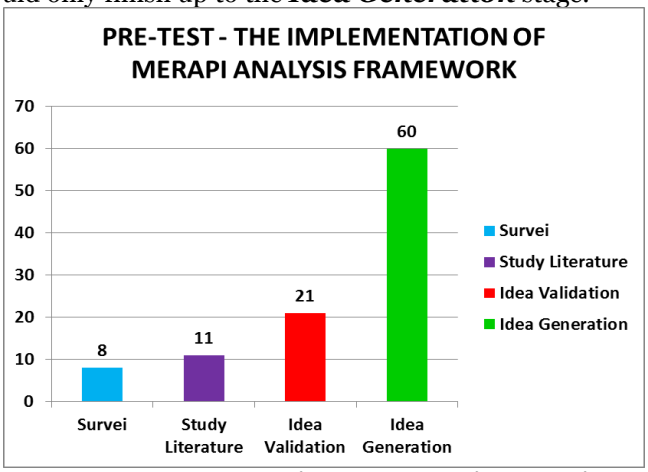

Figure 5. Pre-Test Implementation of Merapi Analysis Framework.

After carrying out the Pre-Test, the researcher conducted a workshop for one month. Every week, the researcher conducts workshops 3 times where each is 2 hours, so that the total in one month is 24 hours. After conducting the workshop, the researcher conducted Post-Test activities. The Post-Test was carried out by giving students assignments as in the pre-test, after that the researcher conducted the Post-Test. From the Post-Test results, it was found that there were 78 students who could complete the Post-Test to the Survey and 22 students to the Literature Study. This is quite good because by using the Merapi Analysis Framework students have been able to increase their abilities between 21% to 70% as shown in Figure 6.

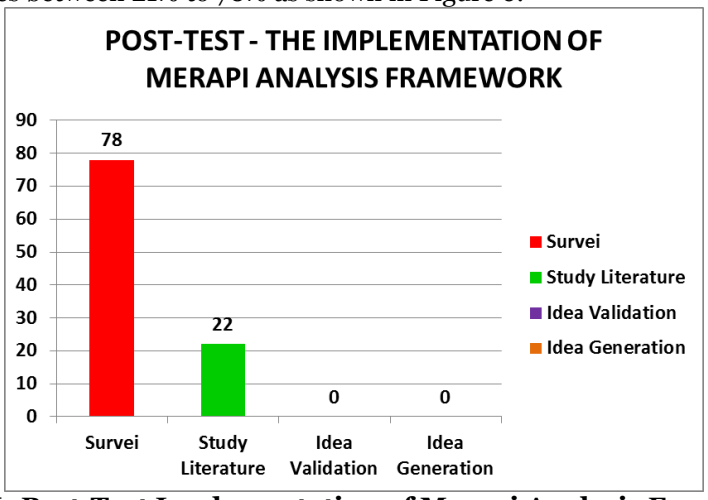

Figure 6. Post-Test Implementation of Merapi Analysis Framework.

D.Result

From the research that has been done by the researcher, several results are got:

1. Researchers have implemented the Merapi Analysis Framework (MAF) to 100 students.
2. MAF has improved students' abilities between 21% to 70%.
3. This success depends on the willingness of students to take part in the training conducted by researchers.
4. To ensure the success of MAF, it is necessary to involve lecturers in monitoring the condition of students at the Department of Informatics – Institut Teknologi Adhi Tama Surabaya, this is because most of the students on the ITATS Campus work while studying, this also affects the success rate of the Merapi Analysis Framework Model.

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E. Curriculum Vitae

	Andy Rachman is a lecturer in the Department of Informatics at Institut Teknologi Adhi Tama Surabaya (ITATS). He served for 20 years as a lecturer at ITATS. the author taking part in a research collaboration program in making books with lecturers inside the ITATS campus and outside the campus. The author is an International Journal Reviewer (Springer, Journal of Computer Science) and a Reviewer at the ELTIKOM National Journal, and KERNEL National Journal. the author has ten ISBN books. He also BNSP Competency Assessor for ICT at LSPTIK Surabaya. The author active as a driving force for student activities in the Department of Informatics - ITATS.
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