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Analysis of the Alignment of Bauran System Features Based on Outcome-based Education Rules Using Feature-oriented Domain Analysis

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***Abstract*—Implementing information systems in higher education curriculum design is a crucial tool for academics, enabling them to design, develop, and evaluate the curriculum more dynamically, responsively, and structurally. However, it is not just about having a tool. It is about ensuring that the tool aligns with curriculum design standards. This study, therefore, measures and analyses the conformity of the Bauran system as a curriculum management information system with the established stages and standards of curriculum design. The analysis is based on the Indonesia National Standards for Higher Education (*Standar Nasional Pendidikan Tinggi* (SN DIKTI)) by referring to the Guidebook for Higher Education Curriculum Development in Indonesia and best practices in the implementation of Outcome-Based Education (OBE) curriculum design. The method used in this research is feature-oriented domain analysis (FODA), which includes context analysis, domain modeling, and architecture modeling. Experts in the field of OBE curriculum then validate the results of feature measurement and mapping. The study compares 27 Bauran features to 10 stages in the curriculum design guidebook and nine stages in the OBE curriculum design flow. The analysis results show that the Bauran system has implemented 10 out of 10 stages (100%) of curriculum design according to the curriculum design guidebook. However, Bauran has only implemented 8 out of 9 stages (89%) in the OBE curriculum flow. These findings not only provide feature recommendations for future Bauran development and other higher education curriculum management systems but also highlight the potential of the Bauran system for future development.**

***Keywords*—Higher Education; curriculum; curriculum management system; outcome-based education.**

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I. INTRODUCTION

The impact of globalization in the 21st century has changed the paradigm of education in Indonesia. The purpose of education is not only to educate but also to emphasize the mastery of practical and material science, technology, and art. In the digital era, information technology is a part of the field of education because its use allows educators to be more interactive in delivering material and supports dynamic curriculum design and management. Curriculum management is essential in higher education to ensure the curriculum is aligned with the times and the industry. Along with these developments, higher education institutions must adapt to technology implementation to improve curriculum management.

In higher education curriculum management, the Bauran System is critical in helping study programs design, develop, and manage curriculum [1], as stated in the 2020 Ministry of Education and Culture guidebook [2]. Bauran supports the Outcome-Based Education (OBE) approach based on the National Higher Education Standards (SN DIKTI) as a product of collaboration between education science and information technology. With its adaptability and relevance to the changing educational paradigm, Bauran is a valuable tool for higher education institutions in Indonesia.

OBE is an educational theory that focuses every aspect of the education system on outcomes [3], [4]. Davis defines OBE as an approach in which decisions about curriculum are made before outcomes are determined [5]. This means that the OBE approach emphasizes that the final goals or learning outcomes must be determined first, and the entire learning process is designed to ensure these goals are achieved. Other research

explains that determining the desired outcome must be achievable, measurable, and in line with three main domains within Bloom's Taxonomy: Affective, Cognitive, and Psychomotor [6].

With the rapid development of technology and industry, personal abilities and competencies have become essential for graduates to compete in the field of work [7]. In his research, Yusof argues that an OBE-based curriculum effectively addresses this challenge [8]. Other related research shows that OBE enables a shift from a traditional curriculum to a modern curriculum that produces graduates who can adapt to the changing economy and demands of the times in a changing global market. Other research confirms that OBE aims to prepare graduates with relevant skills to compete worldwide [9].

Implementing OBE has been proven to positively impact the teaching and learning process with a focus on student readiness and overall program success [10]. Research in Hong Kong shows that implementing OBE can increase students' motivation and active learning and provide hope for educational success [11]. This educational model is also recommended for use in training prospective community leaders in the future. In Malaysia [12], implementing OBE helps active student learning and improves faculty teaching. The Ministry of Education in Malaysia decided to implement OBE to overcome unemployment among college graduates by preparing students according to the needs of the local job market. Students can gauge their understanding and get lecturers' feedback on their academic progress.

The development of information technology continuously facilitates the implementation of OBE in universities. However, it must be ensured that the application of this technology follows existing curriculum development guidelines to ensure compliance with the standards that have been set. The FODA method can ensure the software conforms to predetermined standards or procedures. FODA also supports reusing features from previous systems, improving software development efficiency [13]. Related research has conducted case studies in colleges to measure the suitability of features in the developed software. Research [13] shows that with FODA, they can measure the relevancy between Learning Management System (LMS) features such as Edmodo, Google Classroom, and Moodle to the SN DIKTI. Other research [14] on Canvas as an LMS found features for students and lecturers following the Learning and Assessment Standards.

This study uses the FODA method to analyze the features of the Bauran curriculum management system with SN DIKTI and OBE. The goal is to assess the suitability of features in the Bauran with SN DIKTI and OBE curriculum flows. The focus of this research is outlined through 3 research questions:

- How are the features in the Bauran system compatible with the SN DIKTI criteria and relevant to the 2020 Higher Education Curriculum Preparation Guidelines in Indonesia?
- How is the Bauran feature suitable for the curriculum design stages based on the Outcome-Based Education approach?
- What are the results of expert feedback on the conformity analysis of the Bauran system?

A. National Standards for Higher Education

The curriculum outlines what should be taught, how to teach, and how to perform an evaluation [15]. Thus, a structured curriculum is essential in shaping future generations to become a productive workforce and members of society skilled in information and technology. The study results show that a well-organized curriculum creates alums with extensive knowledge and the ability to serve the community effectively [16]. Curriculum management is one of the key aspects in educational institutions, emphasizing the effectiveness of the learning process and achieving goals, as well as setting competency standards that students must master.

In higher education regulations in Indonesia, SN DIKTI as a national standard plays a crucial role as a foundation for higher education quality assurance and a regulatory framework that sets standards that higher education institutions must meet in various aspects. Referring to the Regulation of the Minister of Education, Culture, Research, and Technology No. 53 of 2023 concerning Higher Education Quality Assurance, SN DIKTI consists of 3 standards: (1) National Education Standards, (2) National Research Standards, and (3) National Community Service Standards. In higher education curriculum design, the National Education Standard is the main foundation for preparing, teaching and learning methods, evaluating learning outcomes, etc.

As shown in Figure 1, the National Education Standard consists of 4 core curriculum design standards: *(1) Graduate Competency Standards; (2) Learning Process Standards; (3) Learning Content Standards;* and *(4) Assessment Standards*.

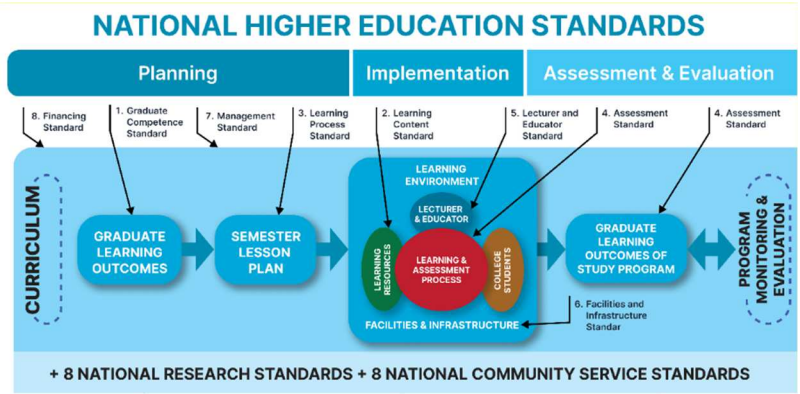

Fig. 1 Relationship between SN DIKTI and Curriculum Design [2]

The four standards have criteria, principles, and techniques that a program must implement in curriculum design to determine learning objectives, develop appropriate teaching strategies, and evaluate student achievement, namely:

1) Graduate Competency Standards:

- Attitudinal Competency Criteria
- Skill Competency Criteria
- Knowledge Competency Criteria
- Techniques for Preparing Graduate Learning Outcomes

2) Learning Process Standards

- Learning Process Planning
- Implementation of the Learning Process
- Learning Process Assessment

3) Assessment Standards

- Principles of Valid Assessment
- Principles of Reliable Assessment
- Principles of Transparent Assessment
- Principles of Accountable Assessment
- Principles of Fair Assessment
- Principles of Objective Assessment
- Principles of Educational Assessment
- Formative Assessment Techniques
- Summative Assessment Techniques

4) Learning Content Standards

- Principles of Curriculum Preparation
- Learning Material Scope Criteria
- Learning Material Delivery Techniques

The criteria, principles, and techniques in the four standards mentioned provide direction regarding comprehensive curriculum design in determining graduate learning outcomes, designing effective learning processes, conducting valid and accountable assessments, and ensuring relevant and up-to-date learning content or materials.

In addition, the implementation can also provide quality curriculum design and produce competent graduates according to industry needs and science for the future. A deep understanding of the meaning and process of curriculum design is critical in achieving this goal. Higher education institutions in Indonesia can use the curriculum design guidebook to develop curricula following SN DIKTI and the OBE approach [2].

According to research [17], planning and setting up the curriculum as part of the curriculum cycle includes various steps, starting from needs analysis, design, development, implementation, evaluation, and steps for future improvement. Figure 2 shows the six stages of designing and evaluating higher education curricula in Indonesia based on the curriculum design guidebook.

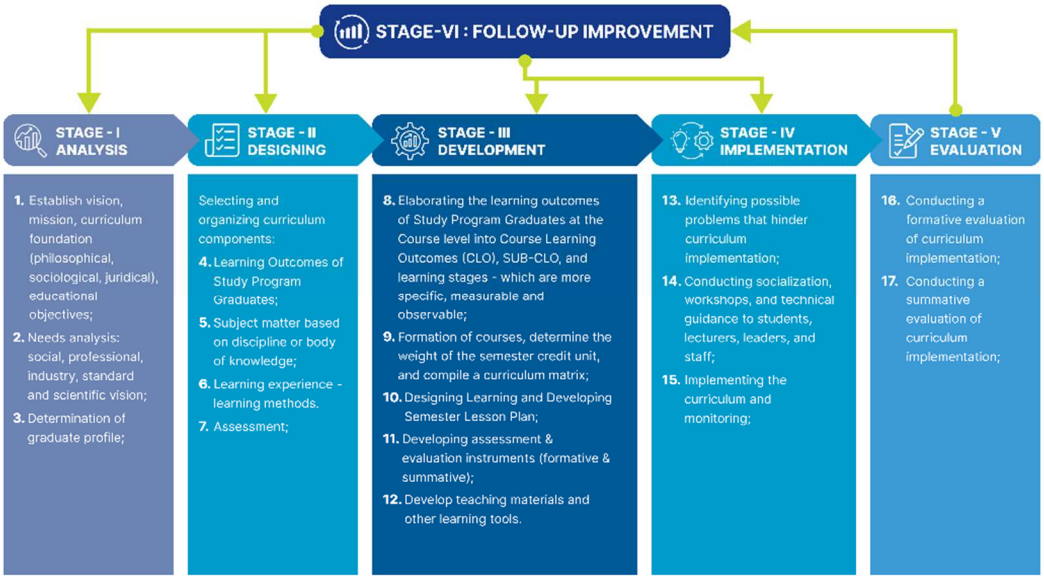

Fig. 2 Stages of higher education curriculum design and evaluation [2]

The stages include the following points:

- The Program must determine the vision, mission, curriculum foundation, and educational goals, set aspirations, and decide how to realize, base, and meet the program/college goals.
- The Program must determine the Graduate Profile/ Profil Lulusan (PL), which describes graduates' skills according to the labour market's needs.
- The Program must determine Graduate Learning Outcomes/ Capaian Pembelajaran Lulusan (CPL), which includes formulating graduate abilities, attitudes, knowledge, and general and special skills.
- The Program must define study materials, which determine the branch of science and its branches as a characteristic of the field of study program.
- The Program formulates the courses, credit units, and Satuan Kredit Semester (SKS) and compiles a curriculum matrix, which designs the courses based on CPL and structures them logically.
- The Program formulates Course Learning Outcomes/ Capaian Pembelajaran Lulusan (CPMK), detailing the final abilities expected at each stage of course learning.
- The Lecturer must design the Lesson Plan/ Rencana Pembelajaran Semester (RPS), which prepares student-centered learning program documents.

- The Program and Lecturer develop Assessment Instruments that develop valid measuring instruments to assess CPL achievement.
- The Lecturer develops Teaching Materials that compile learning materials according to the development of science and technology in various forms.
- The Program and Lecturer conduct Formative and Summative Evaluations, which evaluate the curriculum implementation for continuous improvement and decision-making.

All the stages of curriculum design mentioned are closely correlated with the four primary standards of Indonesian national education. The initial stage, which includes determining the vision, mission, and ELOs is related to the Graduate Competency Standards. The determination of teaching materials, the preparation of courses, and the preparation of learning plans are related to the content and learning process standards. Preparing assessment instruments and teaching materials is related to the Assessment Standards. Evaluation of curriculum implementation is associated with the assessment of the learning process. All these stages also use the OBE approach described in the Indonesian higher education curriculum design guidebook.

B. Outcome-Based Education

The OBE approach emphasizes the achievement of learning outcomes, where the students' primary focus is on the goals to be achieved. Spady first introduced this concept in 1981 [18]. Spady stipulated that the curriculum should be designed based on student achievement goals. Today, the implementation of OBE has become mainstream globally [19]. Because of its benefits, various countries have already implemented the approach, such as the United States, Malaysia, China, Australia, and other countries. Research at the Department of Accountancy, Sri Jayewardenepura University, Sri Lanka, shows that the OBE model has been successfully applied for more than 20 years, producing graduates ready for the world of work [20]. Another study at an Asian university also found that the OBE model was successfully applied in such environments [21]. Gurukkal, in his research, highlights the potential of OBE on a global scale to encourage the adaptation of OBE systems in higher education institutions to meet the evolving needs of the worldwide market [22].

Spady said several vital elements are interrelated to change how education is delivered and ensure student learning success. These elements work together systematically to transform education and guide students to achieve the expected learning outcomes more effectively. These elements are shown in the OBE pyramid in Figure 3.

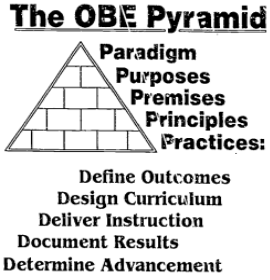

Fig. 3 The five key elements of OBE, *Source: OBE Spady Document* [18]

The OBE pyramid has five key elements: Paradigm, purposes, premises, principles, and practices. These elements are related to supporting the implementation of OBE in educational institutions. In its implementation, Spady describes five stages of practice to implement OBE: define outcomes, design curriculum, deliver instruction, document results, and determine advancement. By paying attention to the five key elements and their practical stages, this systematic approach aims to ensure that education is more effective in guiding students to achieve the expected learning outcomes.

Previous research studies on implementing the OBE curriculum have found best practices in implementing OBE in universities [23], [24]. The result is an expansion of 9 stages of the OBE curriculum design process by focusing on five core domains defined in the practice elements proposed by Spady:

1) Defining Vision and Mission Program: Defining the direction, goals of the Program, and how students should learn. Vision will describe the goal, and the mission shows how to achieve it [25].

2) Defining Program Educational Objectives/Profil Lulusan (PL): PL is a profile of graduates' careers and a collective vision of graduates' contributions after completing their education. The definition of PL should be able to describe the predictions that graduates will achieve in 3-5 years after graduation [24] and must also be evaluated continuously to ensure its relevance.

3) Determining Program Learning Outcomes/Capaian Pembelajaran Lulusan (CPL): CPL is a skill expected of graduates after completing their education [26] and is also the foundation for PL's success. To map and agree on PL, lecturers and related parties must cooperate.

4) Designing the Curriculum: The curriculum should have clear objectives to achieve a pre-set CPL. It involves presenting material that covers necessary and relevant areas for the development of graduates, both technically and ethically.

5) Defining Course Learning Outcomes/Capaian Pembelajaran Mata Kuliah (CPMK): CPMK should be explicitly defined for each course, considering its position and difficulty. This CPMK definition process involves participation from all stakeholders. It draws on Bloom's Taxonomy to detail the expected level of learning, and each CPMK must be explicitly associated with one or more CPL Fields [24].

6) Developing Teaching Content and Strategies: Teaching content and strategies include material and delivery methods that are interesting and relevant to students. Various approaches, such as problem-based learning, Massive Open Online Courses (MOOCs), and blended learning, can be applied to create interactive and practical learning experiences [27].

7) Determining Assessment Methods: Assessment should reflect the fundamental tasks that graduates will face in the world of work. It involves using various evaluation tools and sharing formative and summative assessments to provide a comprehensive profile of student progress [28].

8) Measuring Learning Outcomes: CPL and CPMK achievement are systematically evaluated using pre-compiled assessment rubrics. Data on these achievements is used to compile student transcripts and plan future course improvements [29].

9) Conducting Continuous Quality Improvement (CQI): Continuous quality improvement is based on internal and external evaluations involving lecturers, students, industry, and academics using various surveys and discussions [24].

All stages of curriculum design of the study program, which are explained based on the literature review results, correlate with the five generic domains proposed by Spady in the OBE practice element. We also expand with CQI as an additional stage beyond the Spady concept to continuously evaluate the educational curriculum in OBE objectives. In Figure 4, CQI works by assessing every aspect of the curriculum, including program objectives, program outcomes, and course learning outcomes, through feedback from internal and external parties. CQI ensures continuous education quality improvement and achieves better standards relevant to the times and industry [30].

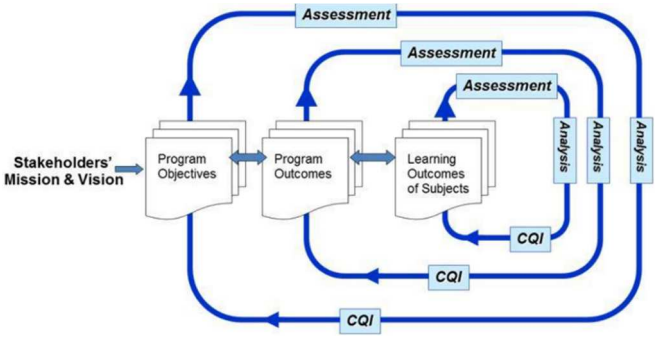

Fig. 4 The Flowchart of Continuous Quality Improvement Process [30]

C. Feature-Oriented Domain Analysis

FODA is one method to assess whether the features of a system have been developed under established standards and guidelines. This method can analyze the suitability of the Bauran system with the stages of curriculum design based on the curriculum design guidebook and OBE. Kang introduced the FODA method and the Software Engineering Institute in the 1990s to identify products, systems, or technology features in a defined domain [13].

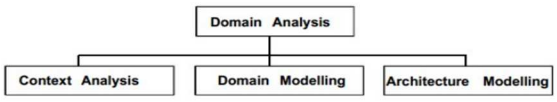

Fig. 5 All three stages in the domain analysis process using FODA. *Source: Kang's research document on FODA*

Kang explained that there are three stages in domain analysis using FODA:

1) Context Analysis:

Identify all external actors or entities involved in the system, understand how they interact, and identify the limitations that affect the system by creating context diagrams.

2) Domain Modelling:

The advanced context analysis stage describes the structure of features and helps understand the relationships, differences, and dependencies between various existing features. This stage consists of 3 parts:

- *Feature Analysis*: Identifying and understanding what features users need in the software through a visual representation of feature diagrams.
- *Entity Relationship Modeling*: Representing knowledge related to entities in a domain and the relationships between them using an Entity Relationship Diagram (ERD).
- *Functional Analysis*: This process identifies functional similarities and differences between applications or systems by creating use-case diagrams to illustrate the interaction of systems with actors.

3) Architecture Modelling

A description of the software structure is needed to develop the evaluation of features or the main menu. On the other hand, it's also necessary to analyze system support functional and non-functional requirements.

Through the three stages of domain analysis in FODA, this research can identify the context of using the Bauran system, model relationships between existing features, and organize software architecture hierarchically. This research also makes it possible to map the Bauran features with the requirements and standards based on the curriculum design guidebook and the OBE approach. By measuring the relevance of the Bauran Feature, this study can evaluate the level of suitability of the Bauran system in supporting the curriculum design process with national education standards in SN DIKTI. The FODA method also allows the identification of features that are still unavailable or not implemented in the Bauran system.

II. Material and Methods

This research applies a qualitative approach through a literature study and exploring the website sampled. It then uses the FODA method to analyze the suitability of features. Interview sessions involve OBE curriculum experts to validate the system's suitability under study with curriculum design guidelines, as shown in Figure 6. All stages in this research can be seen in Figure 7.

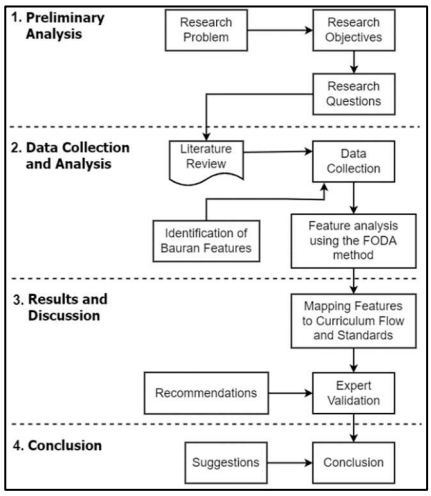

Fig. 6 Research Methodology

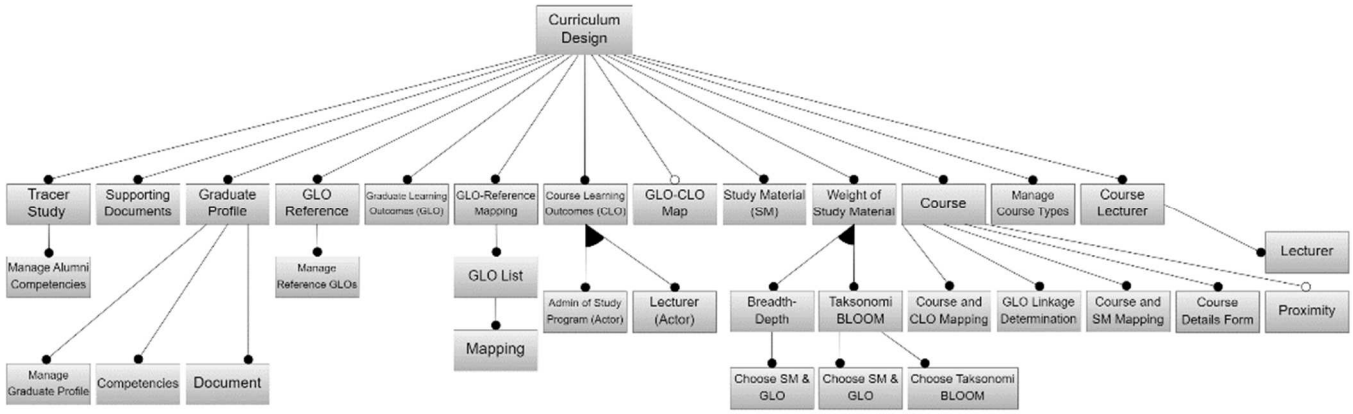

Fig. 7 Feature Diagram of Curriculum Design

A. Data Collection

The data collection process involves exploring the www.bauran.id website in depth. This includes studying the features available through the user interface, documentation, and user guides. Detailed documentation of each feature includes the name and description of each main feature and its derivative features. Interviews with system developers are also conducted to obtain complete information, and literature studies related to curriculum management systems, OBE, and higher education curriculum design in Indonesia are used as additional references.

B. Feature Analysis Using the FODA Method

The domain analysis will be carried out feature analysis using the FODA method. The result is a mapping of Bauran features, which refers to the function of each feature and the description with the curriculum design guidebook and OBE flows.

C. Expert Validation

The validation process was carried out through an interview method with an expert in the design of the OBE curriculum and the preparation of the higher education curriculum in Indonesia, Dr. Erwin Budi Setiawan, S.Si., M.T., as Head of Curriculum Central Executive Board of the Association of Informatics and Computer Higher Education/ Dewan *Pimpinan Pusat Asosiasi Pendidikan Tinggi Informatika dan Komputer (DPP APTIKOM)*. The expert validated the features to ensure the suitability of all features in the Bauran system, which was analyzed and mapped using the previous FODA method, along with the flow of designing the higher education curriculum in Indonesia and creating the OBE curriculum. This validation also aims to get expert feedback regarding the features developed to improve the system's quality and ensure that the system meets the applicable standards for use [31].

III. Results and Discussion

In these results, the researcher elaborated on the results of the FODA method, academic feedback, and expert validation.

A. FODA Analysis

The results of the analysis process using FODA will be explained in detail based on the three stages described by Kang, as shown in Figure 5:

1) *Context Analysis Result*:

The results obtained in this context analysis are visualized using context diagrams to determine how entities interact with the Bauran system. As shown in Figure 8, the Bauran curriculum management system has one external entity: the user. Users can perform various behaviors such as designing curriculum, managing lesson plans, managing program preferences, managing user accounts, using *SAM* Bauran, logging, viewing usage recapitulation in the dashboard, viewing and printing curriculum reports, and viewing the visualization of the distribution of courses.

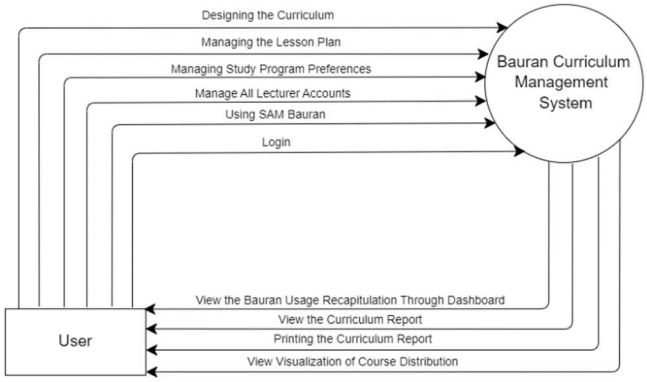

Fig. 8 Context Diagram of Bauran System

2) *Domain Modelling Result:*

The results of this stage highlight features relevant to the curriculum design process in Bauran, following the Curriculum Design Guidebook and OBE guidelines.

a. Feature Analysis

The feature analysis generates a feature diagram that connects the main features with their derivatives to identify the features developed in the Bauran system and evaluate their functions and suitability to the curriculum based on the curriculum design guidebook and OBE flow. As shown in Figure 7, which illustrates one of the feature diagrams of the Bauran system, specifically the curriculum design, there are several essential sub-features in developing, assessing, and evaluating the higher education curriculum on an ongoing basis. These sub-features are also closely related to Indonesia's higher education curriculum development cycle.

The list of features associated with the stages in the cycle is described in Table I.

TABLE I
LIST OF BAURAN FEATURES THAT ARE RELATED TO THE CURRICULUM DESIGN PROCESS

Bauran Features	Function Features
Settings	
Vision	Users input the vision of the Program.
Mision	Users input the mission of the Program.
Curriculum Design	
Manage Alumni Competencies	Users can manage tracer studies and graduate competencies based on selected tracer studies.
Supporting Documents	Users can manage supporting documents to form graduate profiles.
Graduate Profile	Users can manage graduate profiles based on the year of formation.
Competencies	Users can associate the graduate profile with the competencies of graduates from tracer study.
Document	Users can associate graduate supporting documents.
Manage Reference GLOs	Users can manage the reference of graduate learning outcomes.
Graduate Learning Outcomes (GLO)	Users can manage GLOs based on the list of formation years. GLOs are formed by connecting GLOs with graduate profiles.
GLO-Reference Mapping > GLO List > Mapping	Users can map GLOs with reference GLOs within the GLO reference group.
Study Material	Users can manage Study Materials based on the list of years of formation.
Weight of Study Material	Users can determine one or more GLOs related to the study material and map them to aspects of the Bloom Taxonomy (Cognitive, Affective, and Psychomotor).
Manage Course Types	Users can manage the type of course (core, elective, or other)
Course	Users can form courses based on study materials related to GLO.
Lesson Plans	
Manage Lesson Plan > CLO	Users can formulate CLO based on the GLO. Users can also use verbs based on aspects of Bloom's Taxonomy when formulating CLOs.
Manage Lesson Plan > Sub-CLO	Users can formulate the final ability expected for each Sub-CLO in topic/class meetings. Formulating Sub-CLO can also use verbs based on Bloom's Taxonomy.
Plan Tasks	Users can manage the assignment plan that will be implemented in the course, including the form of the assignment, its duration, the lecturer assignment, etc.
Manage Assessments > Questions	Users can add questions to the assignment plan.
Manage Lesson Plan > Assessments	Users can determine indicators, criteria, techniques, and the weight of the assessment used in the course.
Manage Lesson Plan > Learning Forms & Methods	Users can determine the form of learning: lectures, seminars, practicums, research, and others. This feature can also help you choose the learning methods: project-based learning, problem-based learning, small group discussion, etc.
Manage Lesson Plan > Material	Users can determine the material to be studied at each meeting. Users can also add learning references like books or articles from journals.
Manage Materials for Each Meeting	Users can add a description of the activity at each learning step (introduction, core activity, and closing) based on the learning form and method and specify the learning time for each step.
MOOC Course Link	Users can link to online courses that are already available and relevant to the selected learning category. They can also manually add online courses to course learning.
Student Grade > Add Students	Users can add a list of students for grading.
Student Grade > Assessment	Users can enter assessment results/scores based on the techniques and weight of the evaluations in the lesson plan.
Report Menu	
Student Transcript	Users can see transcripts of students' grades. The score is displayed using numerical and alphabetical values. This feature also shows the GPA (IPK).
GLO Transcript	Users can see the CLO achievement scores in each course and the cumulative CLO results as GLO achievement scores.

Table I shows 27 essential features in designing, developing, assessing, and evaluating the curriculum.

b. Entity Relationship Modeling

This stage creates an ERD that visually illustrates the relationship and data structure between entities in the Bauran system. This step aims to validate the entity's completeness to support the Program following the curriculum design guidelines. The ERD shown in Figure 9 identifies the 21 main entities in the Bauran system (excluding login), which are interconnected to support curriculum design processes, learning outcome monitoring, and linking study materials to courses. These entities have the same functionality as those in the previous feature diagram.

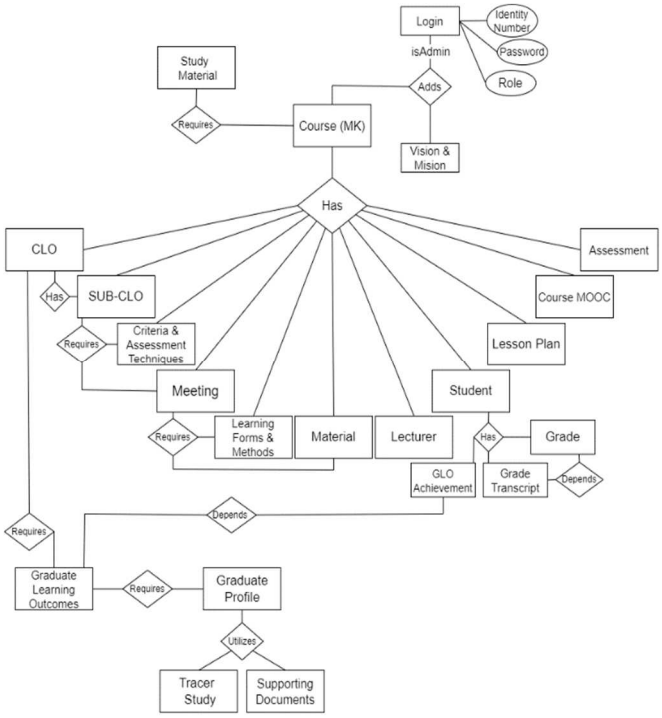

Fig. 9 Entity Relationship Diagram of Bauran System

c. Functional Analysis

This stage draws a use case diagram to illustrate the functionality of the Bauran system and the user's interaction with the system during the activity. As a result, in Figure 10, the User actor is connected to the six main menus of Bauran. The six main menus have sub-features connected through extended model relationships. The functions of each use case related to the curriculum design, development, assessment, and evaluation process are the same as shown in Table I.

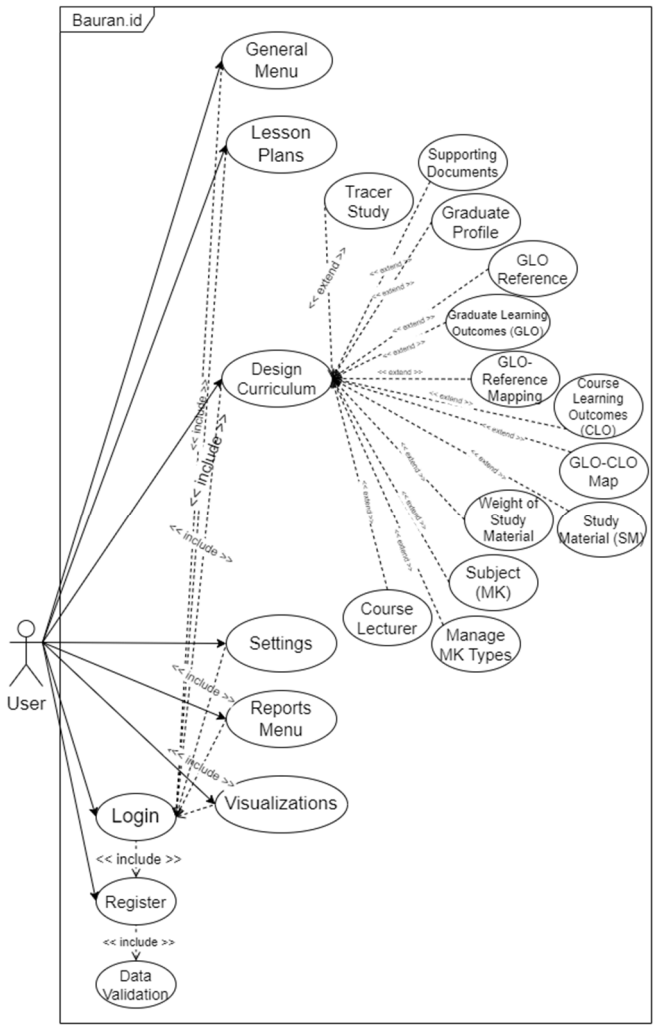

Fig. 10 Use Case Diagram of Bauran System

d. Architecture Modelling Result

The final stage of FODA outlines the organization of the previously developed Bauran software structure, evaluating whether the main features of Bauran support the identified functional and non-functional requirements. Figure 11 displays the Bauran domain application specifications with six integrated menus: General Menu, Learning Plans, Curriculum Design, Settings, Reports Menu, and Visualization, which are interconnected to manage, display, and evaluate reports to support curriculum development.

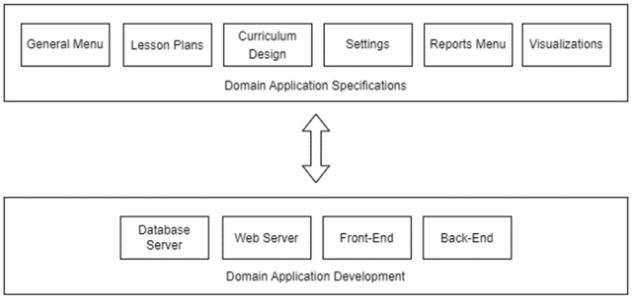

Fig. 11 Architecture Diagram of Bauran System

In developing the Bauran system domain application, the database server stores data, the web server manages the domain, the back-end handles curriculum design and evaluation interactions, and the front-end creates an attractive and easy-to-use interface.

B. Results of Mapping Bauran Features to Curriculum Flow and Standards along with Expert Validation

The outcome of the FODA analysis stages is a mapping of features based on their functions and the descriptions of the two curriculum design stages. Experts then validate this mapping to ensure that the mapped features are accurate. The results are presented in Table II.

TABLE II
FEATURE MAPPING AND EXPERT VALIDATION RESULTS

Curriculum Design Guidebook	OBE Flows	Bauran Features	Result	
			Yes	No
Defining the Vision and Mission of the Program	Defining the Vision and Mission of the Program	Vision	√	
		Mision	√	
Determining Graduate Profile/ *Profil Lulusan (PL)*	Defining Program Educational Objectives (PEO)/ PL	Manage Alumni Competencies	√	
		Supporting Documents	√	
		Graduate Profile	√	
Determining Graduate Learning Outcomes/ *Capaian Pembelajaran Lulusan (CPL)*	Defining Program Learning Outcomes (PLO)/ CPL	Manage Reference GLOs	√	
		Graduate Learning Outcomes (GLO)	√	
		GLO-Reference Mapping > GLO List > Mapping	√	
Defining Study Materials	-	Study Material	√	
		Weight of Study Material	√	
Forming Courses, Credit Units/ *Satuan Kredit Semester (SKS),* and Curriculum Matrix	-	Manage Course Types	√	
		Course	√	
-	Designing the Curriculum	Vision	√	
		Mision	√	
		Manage Alumni Competencies	√	
		Supporting Documents	√	
		Graduate Profile	√	
		Manage Reference GLOs	√	
		Graduate Learning Outcomes (GLO)	√	
		GLO-Reference Mapping > GLO List > Mapping	√	
		Study Material	√	
		Weight of Study Material	√	
		Manage Course Types	√	
		Course	√	

Curriculum Design Guidebook	OBE Flows	Bauran Features	Result	
			Yes	No
Formulating Course Learning Outcomes/ *Capaian Pembelajaran Mata Kuliah (CPMK)* Based on CPL	Defining Course Learning Outcomes (CLO)/CPMK	Manage Lesson Plan > CLO	√	
		Manage Lesson Plan > Sub-CLO	√	
Designing Lesson Plan (RPS)	-	Manage Lesson Plan	√	
Developing Assessment Instruments	Determining the Assessment Method	Plan Tasks	√	
		Manage Assessments > Questions	√	
		Manage Lesson Plan > Assessments	√	
Developing Teaching Materials	Developing Teaching Content and Strategies	Manage Lesson Plan > Learning Forms & Methods	√	
		Manage Lesson Plan > Material	√	
		Manage Materials for Each Meeting	√	
		MOOC Course Link	√	
Conducting Formative and Summative Evaluations of curriculum implementation	Measuring Learning Outcomes	Student Grade > Add Students	√	
		Student Grade > Assessment	√	
		Student Transcript	√	
		GLO Transcript	√	
-	Conducting Continuous Quality Improvement (CQI)	-		√

Based on the guidebook, as shown in Table II, the expert validation of each feature in the curriculum design flow indicates that all features meet the requirements (100%) and do not require adjustments. However, validating the curriculum design flow based on the OBE approach shows that the features have implemented 8 out of 9 compliance stages (89%), as the Bauran system has not yet implemented the CQI stage. Experts provide input related to feature recommendations for further future development of the Bauran system, along with other recommendations shown in Table III.

TABLE III
RECOMMENDED BAURAN SYSTEM FEATURES

Features	Sub Features	Description
Exit Survey/ Feedback	-	This feature helps create and manage exit surveys aimed at students and lecturers on curriculum implementation.
Performance Statistics	-	This feature helps conduct statistical analysis of the performance of lecturer and student learning activities.
External Partners	Industry Academic Advisory Board	This feature helps interact with external partners to get feedback and evaluation.
Improvement	Courses	This feature helps track course improvement and development based on feedback from alums, lecturers, students, industry, and accreditation boards.
	Learning Process	This feature helps track the improvement and development of the learning process.
Curriculum Flow	-	This feature helps provide users with an overview and direction regarding the flow of curriculum design using the Bauran system.

The list of expert recommendation features in Table III helps complete the stages that still need to be fully implemented in the Bauran system. The recommendation features are based on CQI's description and provide direction for designing higher education curricula using the Bauran system.

IV. CONCLUSIONS

This study aims to analyze the suitability of the Bauran system features with higher education curriculum design based on the OBE flow and guidelines that implement Indonesia's four national education standards in SN DIKTI. Using the FODA method, this research found that the Bauran system 100% meets the criteria of SN DIKTI and the 2020 Higher Education Curriculum Preparation Guidelines and has implemented 8 out of 9 stages (89%) in the OBE approach, with the CQI stage still needing improvement. These results were validated by an OBE curriculum expert, who also provided recommendations for further development to enhance the compliance of the higher education curriculum management system with all OBE stages. This research provides insight into integrating technology in higher education and encourages the adoption of appropriate technology in curriculum management systems based on OBE and SN DIKTI.

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