

Application of EKD-CM Method for Quality Assurance Information System Modeling

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Abstract - The purpose of this research is to develop a model of quality assurance information system based on integration of BAN-PT accreditation and ISO 9001: 2008 for ISO certified university, using the approach of "Knowledge Development-Change Management (EKD-CM) method. The EKD-CM method is a method in developing information system model based on the business goal model, business process model up to model information system. The use of this method will improve the knowledge of academic resources on the quality of the study program, provide reasons for alternative solutions from different perspectives, and develop knowledge in support of organizational learning. This study is the next stage of previous research showing a framework of accreditation results of BANT-PT and ISO 9001: 2008. This Research is a type of applied research that uses a qualitative approach.. The result of this research is a model of Quality Assurance Information System (QAIS) based on integration of BAN-PT and ISO 0001: 2008 for ISO certified higher education. By using EKD-CM method approach, this modeling will present business purpose model, business process model, and information system modeling (process modeling, data modeling, and Information System architecture modeling). This quality nassurance information system model will be able to support the change of study program management to improve the accreditation standard of study program significantly.

Keywords - EKD-CM Method, Information System, Quality Assurance, Modeling.

I. INTRODUCTION

National Accreditation Board of Higher Education (Badan Akreditasi Nasional - Perguruan Tinggi / BAN-PT, in Indonesia), in its guidance states that Law of the Republic of Indonesia Number 20 of 2003, Government Regulation No. 19 of 2005 and other legislation and the tendency of policy development on higher education which emphasizes on the quality and accountability of public institutions of higher education and study program is required accreditation of study program [1]. This accreditation encompasses all material aspects including best practices in the accreditation process especially in the course of study according to national standards of education applicable internationally (international best practices). In addition, BAN-PT Accreditation is the External Quality Assurance System [2]. SPME is a systemic activity of the feasibility assessment of study programs and / or universities by BAN-PT or independent institutions outside

government-recognized universities, to oversee the implementation of higher education for and on behalf of the community as a form of public accountability. SPME is a systemic activity of the feasibility assessment of study programs and / or universities by BAN-PT or independent institutions outside government-recognized universities, to oversee the implementation of higher education for and on behalf of the community as a form of public accountability. According to Tricia [3], in his study stated that quality assurance through Quality Management System ISO 9001: 2008 has been growing rapidly and touches on almost all types of production and service activities including educational institutions.

Problems that arise when the higher education has been certified ISO 9001: 2008 and will carry out accreditation of study program based on BAN-PT. This problem is also due to not have a model of quality assurance information system

based on the integration of BAN-PT Accreditation and ISO 9001: 2008. ISO 9001:2008 is a quality management standard for organizations [4]. Accreditation of BAN-PT is quality standard of education implementation in study program for higher education [2]. Consequently, the main problem in integrating is due to differences in language, structure, and details of both sets of documents. Furthermore, there is a problem in integration that requires the methods to integrate the two documents related to the quality assurance of the college, such as comparison method [5], mapping method [6], and model harmonization [7]. Modeling of information system is an effective way in developing information system. In this modeling, later represented by modeling process [8], data modeling [9], as well as modeling of information system architecture [10] to modeling of information system application. Research related to Quality Assurance System of Higher Education has been done by several previous researchers. Research conducted by Asy'ari [11] compare SMM ISO 9001: 2008 with Standard BAN-PT and Total Quality Management in UIN Malang. There are also studies that make software application design related to Standard BAN-PT [12]. Research in the integration, that is the study of integration of software development process quality model CMMI with ISO 9001: 2008 ever done for thesis purpose [13]. In this research is the next stage of previous research, which has obtained the result of integration of both quality models [14].

While the study of information system modeling has also been done by Legowo [15] that is by making monitoring and evaluation information system modeling for banking credit, where in modeling information system used Enterprise Knowledge Development-Change Management Method [16]. In this research, conducted to develop a model of quality assurance information system based on integration between BAN-PT accreditation with ISO 9001: 2008. This research is an applied product research that aims to develop a Quality Assurance Information System (QAIS) Modeling for ISO-certified higher education. Hopefully, this information system modeling will have a very significant contribution for ISO-certified higher education, especially useful for the study program it has.

II. MATERIAL AND METHODS

2.1 Quality Assurance System

In Indonesia, the accreditation of study programs for universities is a comprehensive evaluation and evaluation process of the study program's commitment to the quality and capacity of the Tri-Dharma Perguruan Tinggi program to determine the feasibility of the academic program [2].

BAN-PT is an institution that has the authority to evaluate and appraise, and establish status and quality rating of study program based on predetermined quality standard. The undergraduate accreditation standard standards include standards on the commitment of undergraduate courses to institutional capacity and commitment to the effectiveness of educational effectiveness, which is packaged into seven accreditation standards of accreditation (SA) and elaborated in several elements of the assessment (EA).

ISO 9001: 2008 [4] is an international standard for quality management systems (quality). The ISO 9001: 2008 system focuses on the effectiveness of the continual improvement process with the main pillar with the main P-D-C-A (Plan-Do-Check-Action) mindset [17], which can be explained as in Figure 1

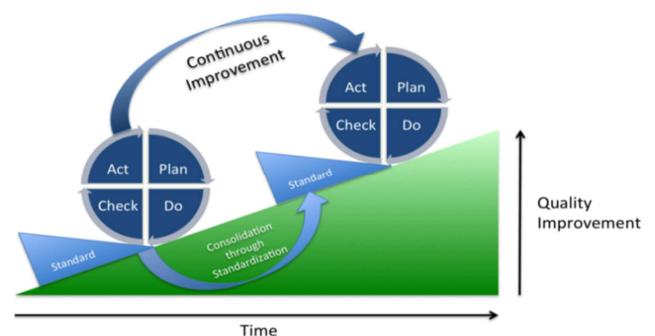


Figure. 1 ISO 9001:2008 Continuous Improvement [17].

Methods to make the integration model of Quality Assurance System between BAN-PT Accreditation standard and ISO 9001: 2008 standard, among others: Comparative method, Mapping Method, and Model Harmonization. This Integration Method is also done for previous studies when performing the integration of CMMI standards as a software development maturity standard with ISO 9001: 2008 quality standard [18].

In the case of integration, a framework has been developed that links the two sets of quality documents to the approach of integration methods, in order to produce an effective and efficient quality assurance system model [14], as in Figure 2

2.2 Information System Modeling

According O'Brien[19], stated that Information System is a combination of each unit run by (people), hardware (hardware), software (software), computer networks and data communication networks (communication), and databases (database) that collect, transform, and distribute information about that form of organization. Modeling Information Systems typically use process modeling and data modeling[9]. System models have effective place in

any system development. In order to illustrate a process model, data flow diagram (DFD) is needed[8]. In process modeling, the highest-level of data flow diagram is known as the context diagram. Process model is very important in defining the requirements in a graphical view. Yakubu et al [8] stated that data modeling is a technique for organizing and documenting a system data. Sometimes it is called database modeling because a data model is eventually implemented as a database. Entity relationship diagram (ERD) is the actual model that is frequently used. More clear and complete description of the modeling of information systems, it is usually also illustrated with Information Systems Architecture.

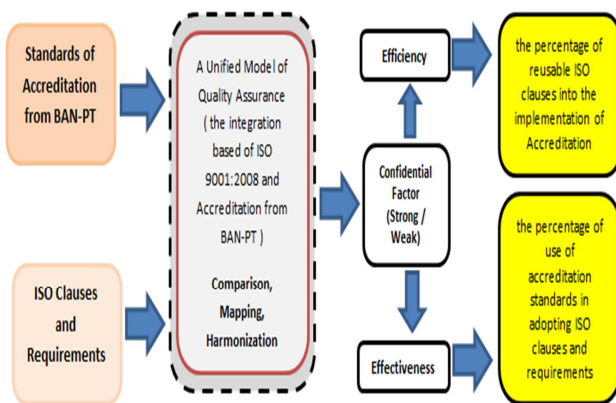


Figure 2 Integration Framework ISO 9001: 2008 and BAN-PT

2.3 Enterprise Knowledge Development-Change Management Method

Nurcan and Barrios[16] in their research have developed a model of information system called as Enterprise Knowledge Management Development- Change Method (EKD-CMM).

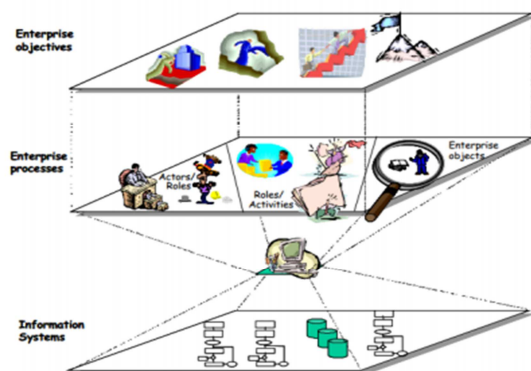


Figure.3 Development of IS Model with EKD-CMM [15]

Nurcan and Barrios[16] in their research have developed a model of information system called as Enterprise Knowledge Management Development- Change Method (EKD-CMM). In this information system modeling begins with determining the enterprise business goal (Business Goal Model), and then make the details of enterprise processes (Business Process Model), which finally creates a model information system (Information System model), as can be seen in Figure 3. EKD-CMM is a method to documenting an enterprise, its objectives, business processes and support systems, helping enterprises to consciously develop schemes for implementing changes.

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2.4 Quality Assurance System Framework

The result of integration of BAN-PT and ISO 9001: 2008 accreditation in the previous subsequent research (Legowo and Indiarito, 2017) was developed for Quality Assurance Information System Modeling for Study Program for ISO certified university. In developing the Modeling of Accreditation Based Quality Information System of BAN-PT Accreditation and ISO 9001: 2008, it is based on the principle of the corresponding Plan-Do-Check-Action process.

The Quality Assurance Information System Framework, as shown in Figure 4.

		SA-1	SA-2	SA-3	SA-4	SA-5	SA-6	SA-7
		Standard of Accreditation BAN-PT						
Plan	Resources Management			√	√		√	
	Management Responsibility	√	√			√		√
	Do	√	√	√	√	√	√	√
	Check	√	√	√	√	√	√	√
Action	Measurement Analysis							
	Improvement	√	√	√	√	√	√	√

Figure. 4 Quality Assurance Information System Framework

The Quality Management System Framework will have the main processes of Planning (PLAN), Implementation (DO), Evaluation and Audit (CHECK) and Repair and Upgrades (ACTION). For each process will be applied for each Quality Standard in BAN-PT Accreditation which amounts to 7 accreditation standards.

2.5 Research Framework

Based on Quality Assurance Information System Framework, then we will develop the framework for this research., as shown in Figure 5.

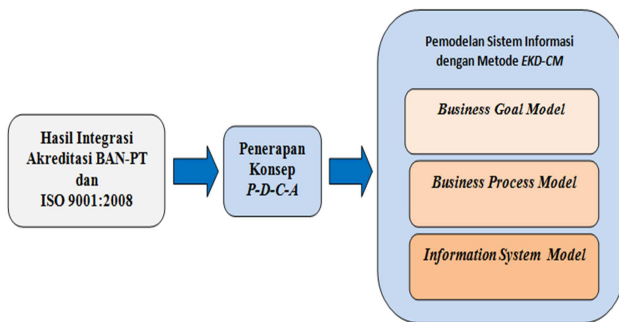


Figure. 5 Research Framework

The concept of Plan-Do-Check-Action is used as the basis for information system modeling using the EKD-CM method approach (Nurcan and Barrios, 2003). System modeling Information with the same method approach in Legowo research, MB (2017) will produce modeling business objectives, business process modeling and finally information system modeling, which includes process modeling with Data Flow Diagrams, data modeling with Entity Relationship Diagrams, information architecture modeling and system application modeling

2.6 Research Methodology

The research was conducted in Indonesia by taking one of ISO-Certified Higher Education, namely the XYZ Institute, as a case study. In relation to this, the study utilized the applied research with qualitative approach as its main methodology. In particular, model of information system is developed using the Enterprises Knowledge Development-Change Management Method / EKD-CMM as it was introduced by Nurcan and Barrios in 2003 [15].

In this study, primary data is collected directly from the respondents. Consequently, the collected data is constructed from the collection of interviews' responses or results from the assessment process to identify the importance of Quality Assurance Information System. Later,

to complete the test we invited the Information System practitioners and the experts in quality assurance system, which addresses the problems of higher education quality assurance and have comprehensive understanding of information system modeling.

III. RESULT AND DISCUSSION

Based on the result of an integration of BAN-PT and ISO 9001: 2008 accreditation in the previous subsequent research [13] was developed for Quality Assurance Information System Modeling for Study Program for ISO certified higher education institution. Modeling of quality assurance information system developed by EKD-CM method [15], including Business Goal Modeling, Business Process Modeling, and Information System Modeling, which is the result of this research.

4.1 QAIS Modeling Results and Analysis

Modeling of Quality Assurance Information System (QAIS) developed, including: Process Modeling, Data Modeling, Modeling of Information System Architecture and modeling of information system application which is the result of this research.

A. Business Goal Modeling

In this information system modeling begins with determining the enterprise business goal (Business Goal Model). Based on Quality Assurance Information System Framework, we create the Business Goal Model using Activity Diagram [20]. For example, shown by activity diagram[20], where Business Goal in this research is the better achievement for Accreditation from BAN-PT (See Fig. 6). Later, this business goal breakdown within PDCA concepts for each standards accreditation from BAN-PT.

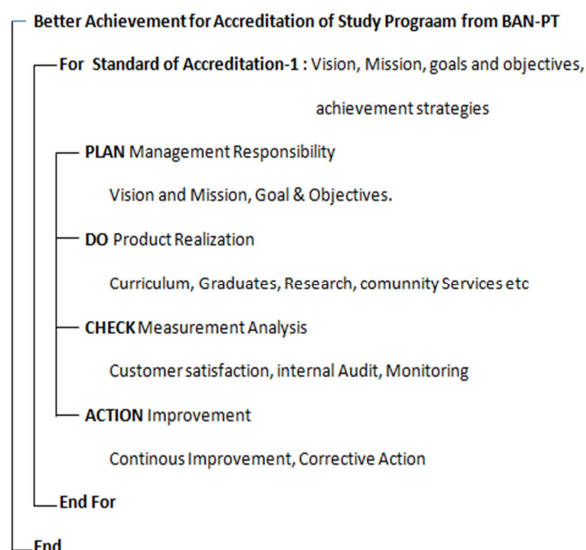


Figure. 6 Activity Diagram for SA-1 in QAIS

B. Business Process Modeling

The second step, in this model, makes the details of enterprise processes as a Business Process Model.

BUSINESS PROCESS MODEL QUALITY ASSURANCE SYSTEM FOR ISO-CERTIFIED HIGHER EDUCATION

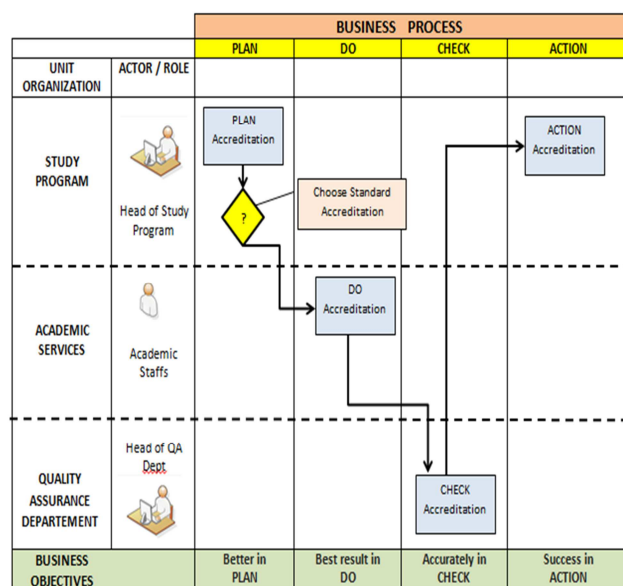


Figure. 7 Business Process Model of QAIS

C. Information System Modeling

Modeling of information system developed, including: Process Modeling, Data Modeling, Modeling of Information System Architecture and Modeling of information system

[1] Process Modeling

Modeling the process by using Data Flow Diagram to show the flow of data in the system. Diagram The data flow shown in this system modeling is Context Diagram and Overview Diagram. Overview This diagram illustrates the entire process generated in the Quality Assurance Information System.

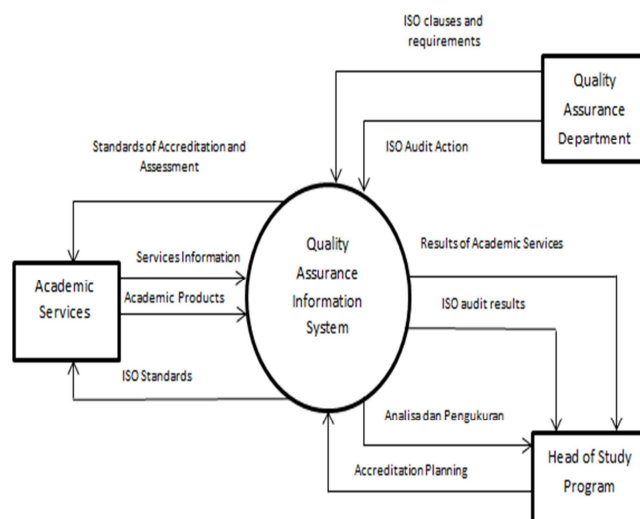


Figure. 8 Context Diagram of QAIS

Figure 8 shows the Context Diagram of Quality Assurance Information System. (as a process), where the entities involved in the system are the Academic Service Section, Study Program as well as the Quality Assurance Department within the institutions.

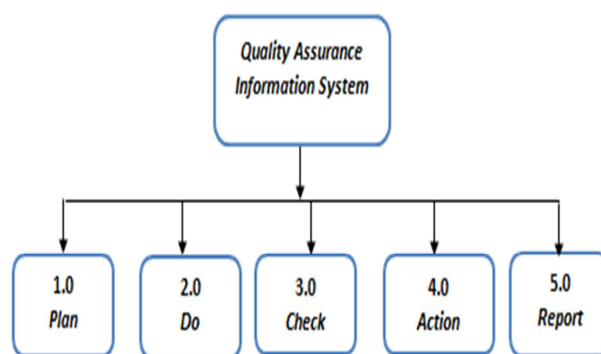


Figure. 9 Decomposition Diagram Level 1 of QAIS

Figure 8 shows the first level functional decomposition chart of the Quality Assurance process modeling. Each process in the decomposition is a parent process.

[2] Data Modeling

In general, data requirements for systems development and maintenance must be modeled using Entity Relationship Diagrams, as can be seen in Figure 10.

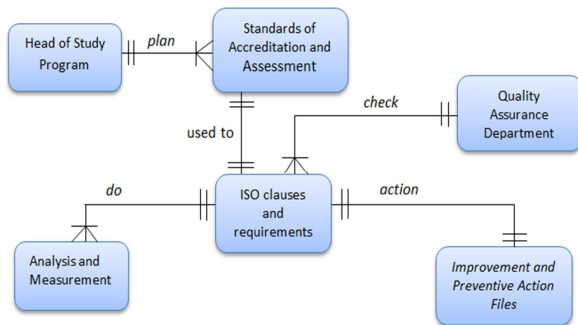


Figure. 10 Entity Relationship Diagram of QAIS

[3] Information System Architecture Modeling

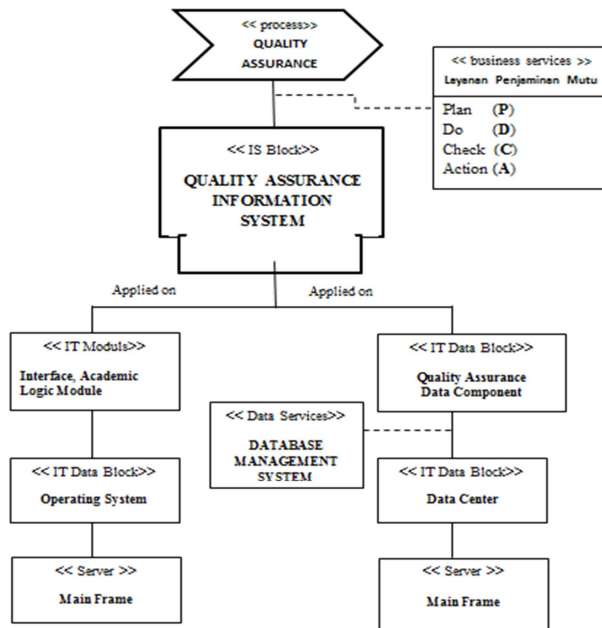


Figure. 11 Information System Architecture of QAIS

Information System Architecture is typically used to complement the results of an Information Modeling System. In Figure 11, it is the described the operations provided by the QA Information System (and which IT components implemented it). As described the Information System Architecture in Figure 11, the MEIS «IS Block» is implemented through two «IT Blocks» (one for data and another for logic and user interface), supported in «IT Platforms» and a mainframe computer.

D. QAIS Application Development

System application development is a further stage after developing this Integration-Based Quality Assurance Information System Model BAN-PT and ISO 9001:2008. To develop the application of quality assurance information systems, the Agile Software Development method is very appropriate in the present era. The development of this method is an iterative and gradual software development, where the requirements can be changed according to user needs [21].

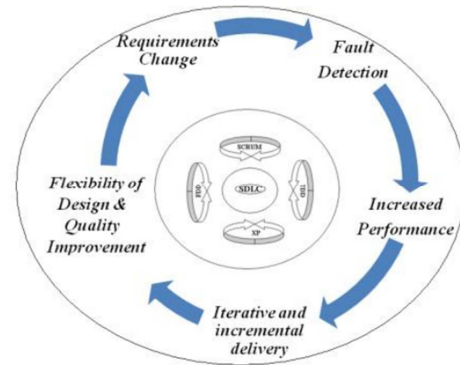


Figure. 12 Information System Architecture of QAIS

Figure 12 shows the process of developing the software. The stages are: Handling Change of Requirements, Fault Detection, Increased Performance, Iterative and incremental delivery, Flexibility of Design and Improvement in Quality [21]. The Scrum approach was carried out in this study. Scrum is one of the popular methods of Agile Software Development where in this way productivity becomes very high [21]. Several studies of Agile Software Development in Indonesia have used Scrum a lot [22][23].

E. Evaluation and Implication

The model evaluation confirm-ability test, where the test is used to test the reliability and validity of the model. Researchers invited ISO practitioners and experts who know the problem of quality assurance system in a higher education. The qualitative experiment showed that three persons as ISO Auditor, BAN-Assessor, and the experts Information System. They stated that 80% of auditor or assessor information system of quality assurance for ISO-certified higher education and 20% confirmed but with some notes. The theoretical implication of this study has an of related concepts of the information system should be translated into the process of quality assurance. As a managerial implication, higher education institutions resources should adopt quality assurance & accreditation as an instrument to achieve goals to reach standards at the higher level.

IV. CONCLUSION

The purpose of this research is to develop a model of the quality assurance information system for ISO-Certified higher education by integrating Accreditation of BAN-PT and ISO 9001: 2008.

The research contribution is applying the PDCA concepts in QAIS modeling. Furthermore, in presenting the information system model used in this research is the Enterprise Knowledge Development-Change Management Method.

Finally, the further of this research can be developed further by applying the computer-based system application as well as integrating with other systems owned by ISO-certified higher education. To develop the application of quality assurance information systems, the Agile Software Development method is very appropriate in the present era.

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