A System Dynamics Approach on Quality Assurance System for Undergraduate Programs

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Abstract. The research is to identify important criteria of quality assurance system and their effects on Indonesia's higher education accreditation system award using system dynamics perspectives and a causal-loop analysis. First, we briefly investigate accreditation standards' framework. And then, based on the review, we have constructed a causal loop diagram explaining higher education accreditation system award process. We have found 7 important reinforcing loops in the causal loop diagram. Loop for (1) vision, mission, objectives and strategy, (2) governance, leadership, management and, quality assurance system, (3) students (including students affairs) and graduates, (4) human resources management (faculty and staff members), (5) curriculum, learning approach and processes, and academic atmosphere, (6) finance, facilities & infrastructures, and information management, (7) research, community services and collaborations. Through a deliberate analysis on the 7 causal loops, we have found meaningful results. First, our results indicate that each loop has a relation with all the other loops. Second, Vision, mission, strategy, lecturer, student, academic staff, curriculum, facility, and governance is the most important variable that contributes to all the criteria. Based on these findings, several meaningful implications are suggested for the higher education institutions related to internal quality assurance system.

Keywords: system dynamics approach, quality assurance system, causal loop diagram

1. INTRODUCTION

The Indonesian National Accreditation Agency for Higher Education (NAA-HE), or in Indonesia known as Badan Akreditasi Nasional Perguruan Tinggi (BAN-PT) is an independent body responsible to the Minister of National Education. The development of quality assurance system has long been initiated in Indonesia since 1996. Long before, in the year 1981, various model of quality management system were introduced in majority of Indonesian HEIs. These include introduction of quality circles, Quality control, and Total Quality controls system. However, the formal document of quality assurance for HEIs has just been issued in June 2009 and disseminated intensively by the DGHE since July 2009. Along with the formulation of the QA-system for HEIs, a document of Indonesian Qualification Framework has also long been formulated and is now still under progress of serial revisions.

In spite of the quality assurance system is under a massive improvement in BAN- PT, the orientation principally remains the same, i.e., implementation of the continuous quality improvement. The QA–system development is carried out to accommodate some progresses of QA best practices, either as consequences of BAN-PT's involvement in the ASEAN Quality Assurance Network (AQAN), Asia Pacific Quality Network (APQN), or International Network for Quality Assurance Agencies in Higher Education (INQAAHE).

Quality has been an issue for many organizations attempting to improve organizational performance. The main fundamental problem in achieving quality in higher education institutions is in deriving effective methods of measuring the qualitative aspects of activities (Kennedy, 1997). It is relatively easy to develop quantitative measures in areas such as student performance, resources, income and funding but it is difficult to quantify issues such as motivation and perceptions. Systems dynamics has contributed in a great way to understand the organization management considering organization as a system (Bishwas, 2013). System dynamics concept was evolved to understand the behavior in the organization.

The research is to identify important criteria of quality assurance system and their effects on Indonesia's higher education accreditation system award using system dynamics perspectives and a causal-loop analysis.

2. LITERATURE REVIEW

2.1 QA-system Standards

BAN-PT has introduced a new QA-system, a modification of the old system with 14 (fourteen) criteria into only 7 (seven) criteria/standards. The old 14 (fourteen) criteria/standards have been consolidated nowadays into a more systematic model adapting and combining the QA model of European Foundation of Quality Management (EFQM) and Malcolm Baldrige's model. The seven new criteria/standards are (1) Vision, Mission, Objectives and Strategy, (2) Governance, Leadership, Management and, Quality Assurance System, (3) Students (including student affairs) and Graduates, (4) Human Resources Management (Faculty and staff members), (5) Curriculum, Learning Approach and processes, and Academic Atmosphere, (6) Finance, Facilities & Infrastructures, and Information/ICT Management, (7) Research, Community services and Collaborations. This new set of accreditation standards' framework has been introduced to the stakeholders through a massive dissemination program in 14 capital cities of Indonesia form July to November 2008, and has been implemented for Undergraduate study program accreditation since April 2009. Similar approach also has been used to develop and improve the instruments for Diploma, Graduate and Professional Study programs accreditation.

2.2 System Thinking and Casual loop

Systems Thinking is the art and science of making reliable inferences about behavior by developing an increasingly deep understanding of underlying structure (Berry, 1993). Systems thinking can help us solve everyday and wicked problems, increase our personal effectiveness as human beings, and transform our organizations (Cabrera & Cabrera, 2015). Organizations are constantly in search for ways to achieve better business performance and sustain competitive advantages through effective deployment of resources and business processes. To improve business performance, organizations require an efficient planning and control system that synchronizes planning of all processes across the organization (Khaji, Shafaei, Mohebbi, & Aghaie, 2009).

Feedback loops are useful in understanding the dynamic behavior of a system. Interpretation of the feedback loops e xplains the dynamism in the systems like Positive feedba ck loops reinforces about the happening in the system, a nd negative feedback loops self-correcting suggests the a ctions for corrections (Bishwas, 2013).

3. RESEARCH METHOD

This study has been done in two phases. The first phase of the study focuses on the review of literature on some of the critical issues like higher education, QA–system development, criteria/standards, systems thinking, system dynamics and casual loop diagrams. In the second phase, Indonesian QA-system for HEIs has been used. The criteria/standards are discussed using casual loop diagrams. Total seven feedback loop diagrams using generic structures.

System dynamics gives an idea to learn and understand the influence of different factors or variables on a system (Lê & Law, 2009). The interaction between the objects/people in the system can be represented via feedback loops. The thinking is that any kind of changes in one variable of the system will affect other variables also. System dynamics emphasizes feedback loops (reinforcing and counter-balancing), the non-linearity of relationships, and an operational understanding of cause and effect, rather than an associative (statistical) understanding of the organization as a system (Sterman, 1994).

Causal loop diagrams have been considered as a part of system thinking concept. A casual loop is "a diagram that aids in visualizing how interrelated variables affect one another" (Lê & Law, 2009). The causal loop diagram clearly reflects the interrelations between the variables. The polarity on the arrow decides the kind of relationship. A positive (+) sign shows that one variable is having a positive effect on the other while a negative (-) sign reflects the inverse relationships between the variables.

4. RESULTS

4.1 1st Standard

By reffering to the literature review, a causal loop diagram was developed (Fig.1). The causal loop diagram demonstrates the infuences of first standards for undergraduate program excellence and inter-relationships between these standards are all positively linked (arrow with "+") representing that the stronger these standards are the more progressively the quality of undergraduate study program.
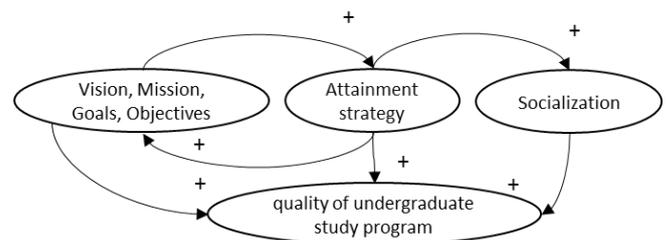

Figure 1: 1st Standard Causal Loop Diagram.

Vision, mission, goal, and objectives affect attainment strategy which in turn influences socialization. The links between these variables are all positively linked (arrow with "+") representing that the stronger these variables are the more progressively make vision, mission, goal, objectives and hence a good attainment strategy. The primary objective was to meet

the vision, mission, goal, objectives with attainment strategy.

4.2 2nd Standard

This standard is the benchmark of excellence the quality of governance, leadership, management systems and quality assurance system program of undergraduate studies as an integrated whole that becomes an important key to the success of the program of undergraduate studies in realizing the vision, organizing the mission and achieve the goals.
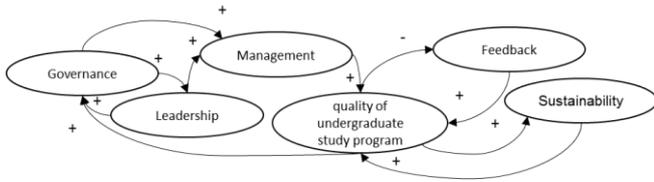
Figure 2: 2nd Standard Causal Loop Diagram.

The governance would not only lead to increase in leadership, it could also increase management which in turn influences quality of undergraduate study program. This together with leadership can stimulate governance. Quality assurance would not only lead to increase sustainability, it could alaso decrease feedback.

4.3 3rd Standard

This standard is a reference for quality excellence and graduate students are closely associated with the quality of prospective students. Undergraduate study programs should have a selection system that is reliable, accountable, transparent and accountable to all stakeholders (stakeholders). Within this standard undergraduate study programs should have a focus and commitment to the quality of the organization of the academic process (education, research, and service / community service) in order to give students the competencies required to be graduates who can compete. This standard also covers how to treat undergraduate study program and provide excellent service to students and graduates. Including all matters relating to attempts program of undergraduate study to gain a student of high quality through the system and a program of recruitment, selection, provision of academic services / physical / social-personal, monitoring and evaluation of the success of students (outcome) in studying in the study program scholars, study the needs and satisfaction of students and stakeholders, so as to produce high-quality graduates, and have competence in accordance with the needs and demands of stakeholders.
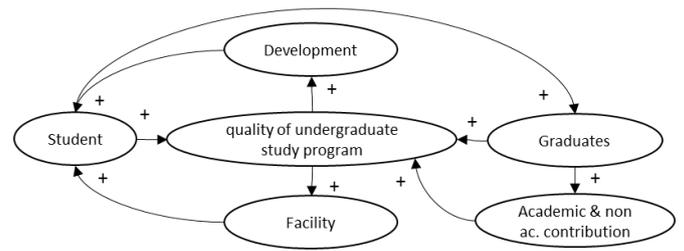

Figure 3: 3rd Standard Causal Loop Diagram.

4.4 4th Standard

This standard is a benchmark of excellence the quality of human resources, and how the program should graduate studies to obtain and utilize the human resources of high quality and provide excellent service to its human resources to realize the vision, implement and carry out the mission, and achieve their dreams. Human resources are the undergraduate study program lecturers and academic staff that includes librarians, laboratory technicians, and other education personnel who are responsible for the overall achievement of quality objectives college program.
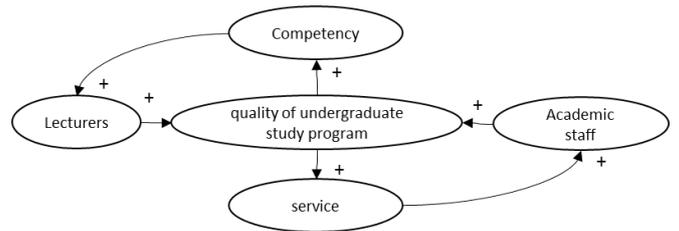
Figure 4: 7th Standard Causal Loop Diagram.

4.5 5th Standard

This standard is the benchmark of excellence in the quality of learning systems undergraduate study program. The curriculum is the design of all the learning activities of students as a reference in the undergraduate studies program plan, implement, monitor and evaluate all activities to achieve the objectives of undergraduate study program. Curriculum based on in-depth study of the nature of the scientific field of study and the needs of stakeholders towards science and guarantee the achievement of competencies of graduates covered by a program of undergraduate study with attention to quality standards, and the vision, the mission program of undergraduate study. In accordance with the needs of each program of undergraduate studies, graduate studies program and a set curriculum guidelines that covers the structure, sequence, depth, breadth, and inclusion of certain components.
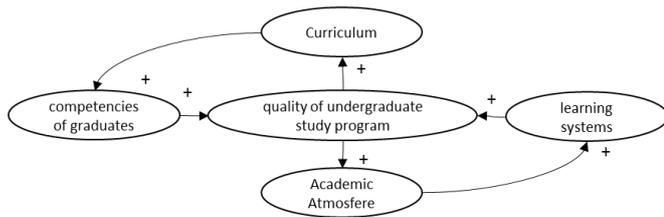
Figure 5: 7th Standard Causal Loop Diagram.

4.6 6th Standard

This standard is a reference resource quality excellence supporting the implementation of the academic process quality includes the procurement and management of funds, facilities, and information systems needed to realize the vision, implementing / organizing the mission, and to achieve the goal of undergraduate study program.
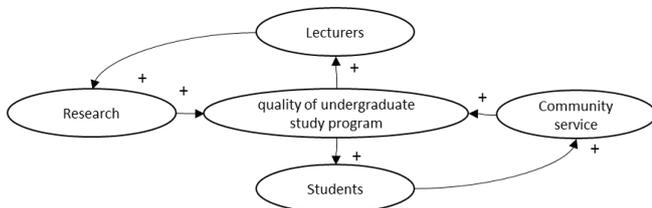

Figure 6: 7th Standard Causal Loop Diagram.

4.7 7th Standard

This standard is a reference to the quality of research excellence, dedication to community service, and cooperative organized for and associated with the development of the quality of undergraduate study program.
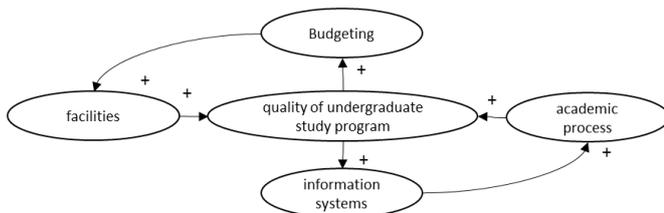
Figure 7: 7th Standard Causal Loop Diagram.

5. CONCLUSION AND FUTURE RESEARCH

This study suggests that system thinking can be applied for analyzing the organizational strategy and success issues in an implementation of the continuous quality improvement. System view can help in better integration and understanding of the key processes for organizational strategy. The environmental uncertainty can be managed in a smooth way by incorporating all the sub-systems of the organization. Like the performance of a system depends on efficient working of its sub-systems and the integration of all its parts, similarly the processes in organizations are not independent and can be considered as part of large systems i.e. organization. The strategy of organization can be improved by way of improving the performance of these sub-systems/ processes.

Vision, mission, strategy, lecturer, student, academic staff, curriculum, facility, and governance have been identified as critical processes for implementation of the continuous quality improvement. The final feedback loop has shown how these processes can be related with each other in the organization. The final loop shows that the processes may be interrelated either directly or indirectly.

This study has been done selecting seven standarts and literature review. The study can be used for financial management purpose. Taking this study as a base, detail organizational study can be done for developing an integrated feedback loop for that particular organization which will help to understand the interrelationship among the processes and show a path for success planning in the form of strategy development.

ACKNOWLEDGMENTS

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