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DESIGNING A MODEL TO ENSURE QUALITY MANAGEMENT OF SCIENCE AND TECHNOLOGY FOR AUTONOMOUS INSTITUTIONS IN VIETNAM BASED ON THE IMPACT OF QUALITY ASSURANCE IN EDUCATION

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Abstract

Alongside internal quality assurance measures, external quality assessment serves as a mechanism to ensure the quality of education in Vietnam, proven to offer various opportunities (enrollment, research collaboration, technology transfer, etc.) as relevant parties become aware of and trust in the educational institution's quality. Consequently, the impact of educational quality assessment prompts systematic quality assurance activities within the university, yielding high results based on post-assessment expert recommendations. However, among the university activities in Vietnam, scientific and technological management has been identified as one of the few standards with a

relatively low average score [1], [2]. Proposing a suitable research model to assess the influence of educational quality assessment on the scientific and technological management of autonomous universities in Vietnam will assist these institutions in identifying crucial elements of scientific and technological management. This will facilitate the implementation of more feasible activities to ensure the quality of these operations, contributing significantly to the overall educational quality of the institution.

Keywords

Educational Quality Assessment, Science and Technology, Impact, Model, Educational Quality Assurance

Introduction

Thanks to quality assessment, evidence of a shift in the culture of higher education evaluation, known as the "assessment culture," has been identified (Silva et al., 1997; Vincenzi et al., 2018). Several studies conducted in countries without a tradition of higher education assessment, such as those in Latin America, have also shown positive evidence of the impact of external quality assurance [3]. Educational quality assessment brings about positive effects, including: (1) Creating conditions for cultural changes in management and evaluation. (2) Improvement through external recommendations (Dattey et al., 2017). (3) Increasing the involvement of various stakeholders in the quality discourse, as certain assessment standards require the participation of different stakeholders in the decision-making process. This is believed to help organizations enhance their quality [3].

Despite the positive impact of quality assessment, some negative points have been identified, including: (1) Resistance, costliness (Godwin, 2011), and time-consuming nature (Cheng, 2009; Godwin, 2011), causing stress as individuals feel their professionalism is being questioned (Cheng, 2009). (2) Some scholars view it as a control measure, although they still agree that quality assessment contributes to raising awareness of weaknesses in the system (Seema et al., 2016). Cardoso et al.'s (2018) study indicates that scholars may be unwilling to participate in external evaluation programs but do not necessarily criticize them. However, the research found that scholars believe quality assurance is their responsibility in any quality assurance mechanism.

Preceding the aforementioned debates, this study recognizes the necessity to investigate the impact of quality assessment on university operations. Consequently, there arises a crucial need

for a comprehensive understanding of the impact of quality assurance. Newton (2013, pp. 9, 11, 13) contends that there is still a significant gap in comprehensive and reliable knowledge regarding the methods and empirical evidence concerning the impact and mechanisms of action of quality assurance measures in higher education [3]. The reasons include: first, the field of measuring the impact of QA in higher education remains 'undertheorized and underresearched' (Newton, 2013, p. 8); second, the potential for impact analysis methods in higher education has not been fully explored to date—prior impact analyses have been limited to subsequent scenarios (Stensaker et al., 2011; Suchanek et al., 2012), primarily relying on judgments provided by selected information providers and quality assurance participants; third, the experiences of various stakeholders in higher education institutions, including students and faculty, have not been adequately captured in impact studies conducted thus far (Volkwein et al., 2007, p. 253; Westerheijden et al., 2007, pp. 305, 309).

By reviewing studies from Vietnam and worldwide related to the practicalities of educational quality assessment and the management of science and technology, along with examining systems theory, sociological theories of education, and impact research theories, this paper proposes the design of a research study to assess the impact of quality assessment on the management of science and technology in autonomous universities in Vietnam.

1. General View on University Autonomy and University Autonomy in Vietnam

From a research perspective, according to Anderson and Johnson (1998), university autonomy is defined as the independence of an educational institution in managing its affairs without direction or influence from any governmental authority [4]. The concept of 'university autonomy' globally refers to changing relationships between states and universities (N.V. Varghese, Michaela Martin, Thomas Estermann) [5]. The fundamental trend is to uphold academic freedom traditions and gradually reduce direct control of higher education institutions by governmental bodies. From this standpoint, 'university autonomy' represents the institutional freedom of universities to make and implement decisions regarding internal activities without state control or intervention. Any influence from the state must be based on legal grounds. University autonomy is the autonomy of the higher education institution itself, meaning, the autonomy of the university, and this autonomy is institutionalized by the state's system of policies and laws [5].

In Vietnam, the concept of 'autonomy' has emerged and developed during the state management reform of higher education institutions in line with the principles of socialization, ensuring both centralized and decentralized management, enhancing autonomy and responsibility of universities, and attracting the participation of relevant stakeholders. 'University autonomy' in Vietnam is defined by legal regulations, linked with self-accountability and partially institutionalized in various fields of university activities [5]. 'University autonomy' can be defined as the degree of independence necessary for universities to manage internal affairs, allocate financial resources within the institution, create and utilize non-budgetary financial sources, recruit personnel, establish standards for teaching and research, and ultimately, exercise the freedom to organize and implement. Another definition states that 'university autonomy' is upholding academic freedom traditions and reducing direct control of management bodies over universities based on the state's system of policies and laws, without state interference [6]. Within the legal framework of Vietnam, the autonomy rights of higher education institutions include: (i) Academic and professional autonomy; (ii) Organizational and personnel autonomy; (iii) Financial and asset autonomy; and (iv) Accountability.

2. Research Theory

2.1. Systems Theory

Initiated by Austrian biologist Ludwig von Bertalanffy in 1950, one of the fundamental concepts of systems theory is the identification and clarification of characteristics and properties of closed and open systems. Bertalanffy defines: "A closed system is when no matter enters or leaves the system. An open system is when there is a flow in and out, allowing the transformation of substances" [7]. With such a definition, closed systems are primarily studied in physics and inorganic chemistry. Open systems, on the other hand, are the primary focus of life sciences, social sciences, and humanities. Open systems adhere to the following principles:

- *Equifinality:* This means that the final state can be reached from different initial conditions and through various pathways. In open systems, the exchange of matter occurs continuously with the environment until a stable state is achieved. Therefore, this stable state depends not on the initial state but on the process leading to the outcome [8].
- *Anamorphosis*: This refers to the transition to higher-order states and greater differentiation. It is considered a characteristic of open systems, whereas in closed systems, transitions to states of disorder, chaos, and decay, blurring differences, always occur [8].

Additionally, systems theory views self-regulation and self-multiplication as vital attributes of living systems [8].

2.2. Sociological Theory of Education

According to the perspective of the sociology of education, schools are considered social systems. The educational system at the school level is a social system composed of various components that form a cohesive whole. The parts of the school-level education system exist relatively independently, while simultaneously being intricately connected, forming an organic network of relationships with the surrounding environment. Concerning environmental factors, the educational system continually exchanges inputs and outputs with individuals, families, and social organizations [9].

2.3. Impact Evaluation Theory

There are various impact evaluation theories used to assess the effects of projects, policies, and programs: Project Impact Theory, Social Impact Theory, Environmental Impact Theory, Economic Impact Theory, Comprehensive Impact Theory, etc. Impact evaluation is related to assessing long-term and/or significant changes brought about by a development intervention or a series of interventions. It can be implemented through various tools, methods, and different approaches. Impact evaluation always focuses on change and the path towards change, rather than relying on activities or products (White, 2009) [10].

According to the International Association for Impact Assessment (IAIA) [11], impact assessment is defined as the process of determining the actual or potential outcomes of a program that has been, is being, or is planned to be implemented. "Impact" is the difference between what issues occur if the activity is carried out or not carried out.

O'Flynn (2010) provides a comprehensive view of impact evaluation, seeing it as an effort to answer some fundamental questions. These questions offer a framework that can be applied in most situations, regardless of the definition of impact [12]:

- What has changed due to the development intervention (or interventions)?
- Which groups are affected (or unaffected) by these changes?
- How have the changes been implemented?
- How significant are they?
- Can they be sustained (or have they been sustained)?

According to Dina Pomeranz and Deborah, impact evaluation is evidence of causal effects, aiming to measure the impact of a program/policy on observed variables. However, the challenge of measuring impact is that it can only observe what has happened in reality, not what would have happened without the intervention. Therefore, to assess the impact of the intervention, it is necessary to identify the hypothetical situation if there were no intervention, known as the counterfactual scenario. This involves identifying two groups: the control group (those not involved in the intervention) and the treatment group (those participating in the program). The measurement of the impact of the intervention involves comparing the treatment group with the control group [13].

According to the World Bank report (2016), impact evaluation is a specific evaluation series that answers cause-and-effect questions: what is the causal impact (or effect) of an intervention on the desired outcome? To accurately assess this causal relationship, it is necessary to establish "causal inference and the counterfactual scenario" [14] to clarify: What would happen to the beneficiaries if the program did not exist?

In general, these studies all indicate that evaluating the impact of a program is the process of determining the causal relationship after the program intervention. To accurately evaluate this causal relationship, it is necessary to establish a counterfactual scenario. Understanding the counterfactual scenario is the key to understanding the program's impact. Building a counterfactual scenario involves identifying two groups: the control group (those not involved in the program) and the treatment group (those participating in the program). To measure the impact of the program, a comparison is made between the treatment group of the program and the control group. This aims to clarify "what would happen to the beneficiaries of the program if there were no program intervention.

3. Fundamental Designs of Impact Evaluation Studies

According to researchers, there are generally four designs used to evaluate impacts and applicable in Quality Assurance (QA) in higher education: Experimental research; Controlled group research; Longitudinal research; Existing-reality-based design.

Experimental research design: Researchers believe that the initial state of the system under experimentation can be restored or reconstructed, or that there are equivalent systems available, thus, applying intervention measures can be repeated under similar conditions. Clearly, based on practical experience and considering theoretical models of diversity, layers, and

complexity in the structure and processes of an educational institution, applying experimental design methods in practice is impractical when evaluating the impact of QA in higher education. In other words, the overall activities of higher education institutions and the subsystems within them, such as departments and training programs, appear to be a synthesis of complex and constantly changing social processes, meaning they are so different that they cannot be compared using any measure.

Controlled group research design (with or without comparison): This approach is implemented by comparing groups with an impact (undergoing intervention) to control groups (not undergoing intervention), where the selection of experimental and control groups can be done randomly to avoid sampling bias. The challenge with this type of study is that, in reality, activities related to quality assurance in education are based on general and vague legal regulations, making the design of experimental studies almost illegal and ethically problematic or even unacceptable. In other words, stemming from practical experience and considerations of theoretical models, it is believed that for cases of intervention related to quality assurance in higher education institutions, designing a study with a control group is impossible. This is because educational institutions are highly complex, and they encompass many individuals and diverse characteristics, such as cultural, values, and beliefs differences among schools or training programs.

Comparison Before-After Research Design (Longitudinal Research Design): This approach is implemented by comparing the status of the system process after certain interventions and the potential impacts that have occurred with the status before the intervention. The main challenge of this method is to analyze the extent to which the impact is generated by these interventions rather than other interventions. Therefore, it is necessary to design an initial study (baseline study) (establishing a basis for before-after comparison studies). In this regard, the best way to assess the impact using this approach is to conduct the study before the first interventions related to the quality assurance process in education, because if not, the pre-impact baseline study is considered ex-post data, leading to both data obsolescence and corresponding accuracy issues. Additionally, the before-after comparison requires at least one endline study (and ideally also a mid-line study), as well as comprehensive knowledge of contexts and causal relationships.

Existing-Reality-Based Design: This approach is implemented by attempting to assign assumed impacts to interventions after they have been completed. Typically, stored data and estimates and evaluations from experts and stakeholders are the sources of information used in this

research design. Analysis based on existing reality is the most widely used design to analyze the impacts of Quality Assurance in higher education organizations to date. Currently, it can be observed that the majority of impact studies on the mechanisms of Quality Assurance in education worldwide only apply an existing-reality-based research design (ex-post facto study), where impact studies are conducted after activities related to Quality Assurance in education, after being assessed and validated, using survey measures, interviewing relevant parties, and researching documents [15].

4. Proposed Model: Impact of Quality Assurance on the Management of Science and Technology at Autonomous Universities in Vietnam

The elements of the research model are based on two main pillars: State management regulations and insights drawn from research. The elements of science and technology management at the university include:

1. Independent Variables (Education Quality Assurance):

- Strategy: Establishing a system to develop research policies; Concretizing the process of monitoring compliance with research policies through documentation, dissemination, and implementation; Regularly reviewing research policies; Improving research policies to increase the effectiveness of educational institutions, meeting the needs and satisfaction of stakeholders [16].

- Functions: Establishing a system for directing, operating, implementing, monitoring, and reviewing research activities, the quality of research personnel, research resources, and related research activities; Implementing strategies to seek funding for research, promoting research, scientific innovation, collaboration, and advanced research to achieve the vision and mission of the educational institution; Using performance indicators commonly used to evaluate the quantity and quality of research; Improving research management practices to enhance the quality of research and scientific innovation; Establishing a system to manage and protect inventions, patents, copyrights, and research results; Implementing a system for recording, storing, and exploiting intellectual property assets; Implementing a review system for the management of intellectual property assets; Improving the management of intellectual property assets to protect educational institutions, research personnel, and community benefits; Building a system to establish collaborative relationships and partnerships in research to meet research

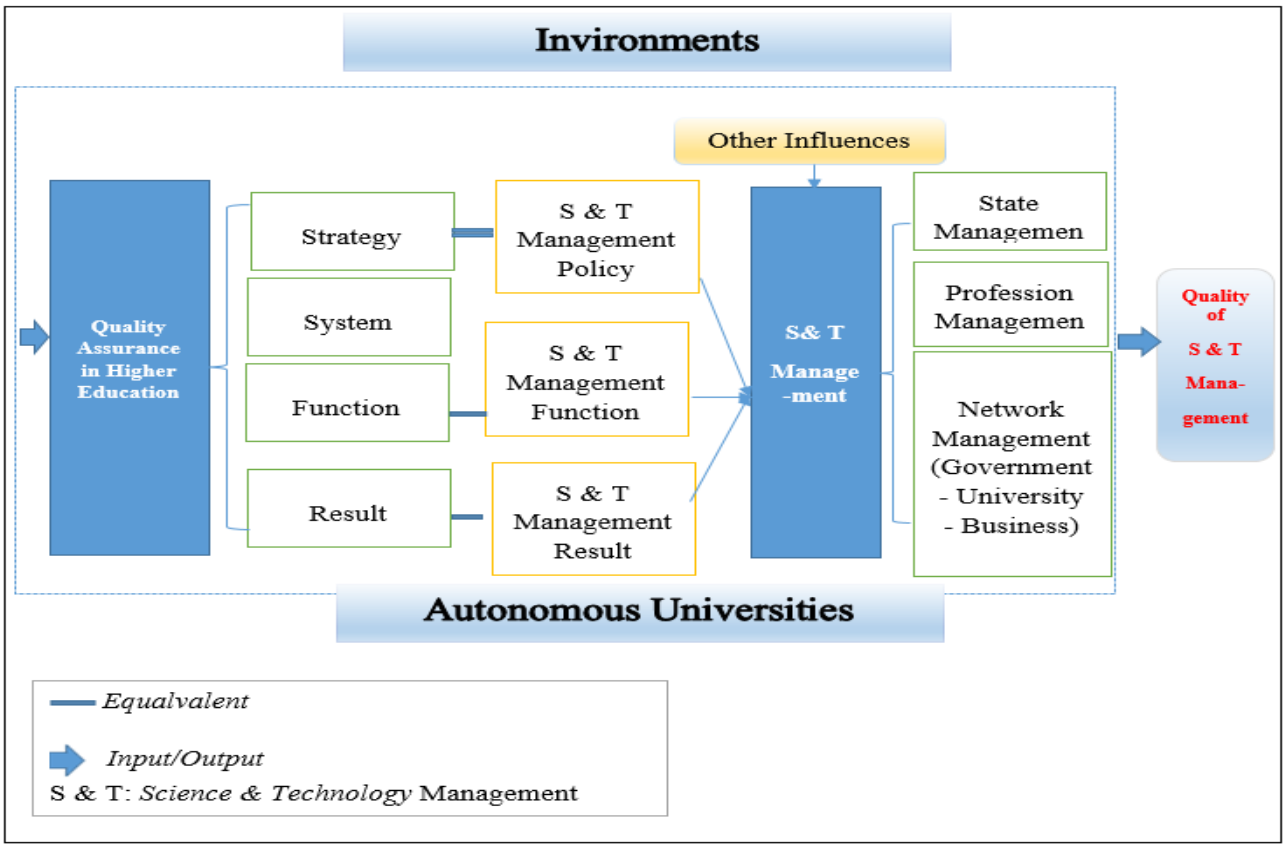
objectives; Implementing policies and procedures to promote research collaboration and partnerships; Implementing a system to review the effectiveness of research collaboration and partnerships; Improving collaborative and partnership research activities to achieve research objectives [16].

- Results of Activities: Establishing, monitoring, and comparing the types and quantities of research conducted by faculty and research staff to improve; Establishing, monitoring, and comparing the types and quantities of research conducted by students to improve; Establishing, monitoring, and comparing the types and quantities of scientific publications, including citations, to improve; Establishing, monitoring, and comparing the types and quantities of research results, including intellectual property assets, to improve; Establishing, monitoring, and comparing funds for each type of research activity to improve.

2. Dependent Variables (Science and Technology Management):

- State Management (Administrative): Achieving gender equality in scientific research at autonomous universities [17]; Policies for researchers' incentives in educational institutions [18]. The level of academic autonomy of educational institutions. The academic autonomy of educational institutions needs to be policy-oriented, defining the role of faculty in academic administration [19], [5], [20]. Quality of administrative support for scientific research [21], [22].
- Professional Management (Science & Technology): Results of scientific activities of faculty/researchers and students [23], [24], [25]; Results of technology transfer/commercialization of products [26], [27], [28].
- Connection Management (Science & Technology): Results of funding for scientific research [29], [27], [30], [28]; Results of establishing a startup ecosystem and linking research results to real-life applications [31], [25], [27], [30]; Results of connecting research with teaching [32].

The research results from the model for ensuring the quality of science and technology management at universities in Vietnam are proposed in the following figure.



5. Conclusion

From practical and theoretical research, in this study, ensuring the quality of scientific research management at the university is approached as a subsystem within a "living" system. For the development contribution of science and technology management activities to be integrated into the overall development of the university, it is crucial for the university to recognize and ensure the conditions for these activities to meet the requirements of system theory (equifinality, anamorphosis, etc.). In other words, the university must practice appropriate management activities to ensure that these activities develop to a higher level after completing a process, avoiding falling into a "closed" state. The proposed quality assurance framework for research management provides a tool to actualize the quality of science and technology management at autonomous universities in Vietnam. Specifically, universities need to consider the university as a living system composed of many subsystems, and these subsystems continuously interact with each other and exchange with external systems (society). Therefore, the university needs to integrate real-life practices into the educational environment by understanding and effectively

implementing state policies on science and technology management, as well as education quality assurance policies.

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