# Indicators for University Autonomy in the Context of University 4.0: A Case Study of Hanoi University of Civil Engineering from Vietnam

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**Abstract**

The pressure to adapt to the demands of the Industry 4.0 Revolution and to change to attract Generation Z to enroll in construction and civil engineering programs, among others, have emphasized the need for Industry 4.0-led autonomy in universities, including Hanoi University of Civil Engineering, Vietnam.

Generally, university autonomy has been regarded as an indispensable trend in Vietnam today. Legally, university autonomy is emphasized as a key issue in the Law on Higher Education amended in 2018. In fact, some universities in Hanoi and Ho Chi Minh City have already applied this new concept but they all encountered various difficulties in the implementation. Consequently, the results may not be as positive as anticipated. The main reason for such a limited outcome, as well as a critical question to explore, is that a system of criteria followed by a full set of indicators has not yet been comprehensively developed.

In reaction to the transformations initiated by Industry 4.0, the concept of University 4.0 emerged. University 4.0 requires careful considerations of the digital transformation when universities start implementing autonomy mechanism. From an overview of the current situation of university autonomy in Vietnam with analyses of pre-requisite conditions, international experiences, surveys and expert consultation, 20 criteria based on three categories of university autonomy, namely Autonomy in Organization and Staffing, Autonomy in Financing and Property and most importantly Autonomy in Academic Issues, are proposed, with a total of 77 indicators which should be nationwide used as an informative guideline for universities and an effective assessment/management tool for the Ministry of Education and Training, the state agencies and even the Government. Selected indicators have been designed to align with the demands of the Industry 4.0 Revolution. The authors discuss this new concept as a more powerful instrument and its application in reality at Hanoi University of Civil Engineering from 2022 to date, which will facilitate the data collection and processing, as well as accelerate the approach of any university to such an innovative model in response to the real demand.

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## 1. Introduction

Globally, university autonomy has been implemented for many years, especially in highly developed countries, because it allows higher education institutions to make timely decisions regarding their organizational structure, staffing, finances, curricula, and other academic activities [1]. In Vietnam, though starting much later for university autonomy, the Government created an enabling environment for university autonomy in 2014 with Resolution No. 77/NQ-CP on Piloting the Reform of Operational Mechanisms for Public Higher Education Institutions in the 2014-2017 Period, which legally paved the way for university autonomy to take root [2].

In the era of Industry 4.0, the concept of University 4.0 has evolved. "University 4.0" aptly characterizes the necessary adaptations of universities globally in response to the new economy, including phenomena like digital disruption and significantly evolving labor markets [3]. The workforce adaption, significantly impacted by the Industry 4.0 process, and its preparation for emerging competency requirements will predominantly be undertaken by universities [4]. The activities of Universities 4.0 were assessed based on six criteria: 1) educational function; 2) research endeavors; 3) socialization, indicating the university's engagement in the social domain; 4) internationalization or global practices; 5) branding; 6) digitalization, innovation, operational efficiency, and commercialization of university services [4]. University 4.0 enables students to actively select their learning content, customize their educational pathways, adapt their study schedules, integrate contemporary technological knowledge, and use it in professional practice, while swiftly addressing the demands of a tech-savvy environment [5]. Therefore, University 4.0 can help accelerate university autonomy by providing it with a more powerful instrument in the transformation of mechanism.

Currently, Vietnam is at a crossroad in educational reform, especially regarding higher education. The integration of ASEAN tertiary education to match global standards has emerged as a pressing issue and a crucial trend for a nation to supply high-quality human resources necessary for its socio-economic growth. The Resolution No. 29-NQ/TW of the Communist Party of Vietnam on "fundamentally and comprehensively renovating education and training, meeting the needs of the national industrialization and modernization in the conditions of a so-called socialism-oriented market economy and international integration" shows that the state leaders are aware of the importance of qualified human resources and the significance of an innovation in higher education in the context of on-going globalization and integration process [6]. In the current Industry 4.0 revolution, Vietnam has been facing a huge challenge due to the shortage of human resources in the labor market, especially in high-tech engineering. Therefore, a new strategy for sustainable development, such as university autonomy, must be regarded as an urgent task.

As a developing country, Vietnam tries to invest a large portion of the state budget in tertiary education, but the quality of education has not yet met the demand for a better socio-economic development. Today, university autonomy is an inevitable trend worldwide. In order to integrate successfully into the world's higher education panorama, Vietnam has to carry out a transformation of the model of the state management to university autonomy under the state supervision. Supplemented and revised in 2018, the Law on Higher Education paves the way for university autonomy. As of 2020, there were 240 universities in Vietnam, including 175 public universities, 60 private or non-public universities and five foreign universities [7], but only 23 universities had been reported to be applying the concept of university autonomy, either entirely or partially, such as Hanoi University of Science and Technology and the National University of Economics in Hanoi, as well as Ton Duc Thang University in Ho Chi Minh City [8]. That is to say, the autonomy rate among Vietnamese universities is currently less than 10%. For the majority of universities (217 out of 240, or over 90%), they still have a long way to go if they wish to reach the ASEAN university education quality standard. This question is particularly critical in terms of international publications and citations as two key factors that establish the prestige and solidify the caliber of a university today, as well as two out-standing indicators to be used for the measurement and assessment of a university on the way to achieve a high level of university autonomy.

In Vietnam, there have been numerous legal documents promulgated since 2010 that clearly define and analyze the concept of university autonomy. The amended Higher Education Law in 2018 confirmed that "Autonomy is the right of higher education institutions to define their own goals and choose how to implement them; to decide by themselves and take responsibility for making explanations of academic expertise, organization, personnel, finance, assets and other activities on the basis of the provisions of law and the capacity of the higher education institutions". University autonomy is considered important by the Government and based on three pillars: I. Autonomy in Organizations and Human Resources, II. Autonomy in Academia and Professional Activities and III. Autonomy in Finance and Property [9].

More recently, the Prime Minister adopted Decision No. 436/QD-TTg regarding the National Framework for University Degrees, giving universities more rights and opportunities to reform and update as well as upgrade their curricula for world recognition of qualifications, as the key point in Academic Autonomy [10]. At the same time, the Government issued Decree No. 106/ND-CP stipulating the number of staff to be recruited and positioned in state agencies, including universities, decided by employers themselves on the basis of annual demand, thus supporting Staffing and Organizational Autonomy to a certain extent [11]. Most notably, a long-awaited legal

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document - Decree No. 60/ND-CP - was officially promulgated, giving instructions on how to apply Financial Autonomy among state agencies. Once again universities are highly recommended for the implementation of financial autonomy [12].

The pressure to adapt to the demands of the Industry 4.0 Revolution and to change to attract Generation Z to enroll in construction and civil engineering programs, among others, have emphasized the need for university autonomy mechanism oriented University 4.0 in higher education institutions, including Hanoi University of Civil Engineering, Vietnam. University 4.0 requires careful considerations of the digital transformation when universities start implementing autonomy mechanism. For higher education institutions providing construction and civil engineering programs, the adoption of University 4.0 University 4.0 goes beyond integrating digital technologies into teaching and learning; it involves reshaping training programs to equip students with the knowledge and skills needed to apply digital technologies in construction investment projects and the management of the construction industry.

However, in Vietnam, no regulation or guidance has ever been issued to take a look into university autonomy and into University 4.0 as a crucial point as well. There is still a big gap in the assessment of university autonomy in general and university autonomy with the University 4.0 model in particular. Aiming to address and bridge this gap, this research study proposes an efficient instrument to be approved first by the Ministry of Education and Training and clear instruction to be applied by universities across the country with regard to assessing university autonomy and University 4.0. The findings are then discussed and illustrated with the case of Hanoi University of Civil Engineering in terms of digital transformation (or digitalization) to promote the approach of University Autonomy in the context of University 4.0 for an institution which provides undergraduate and postgraduate courses on civil engineering and architecture.

## 2. Literature Review

### 2.1 University Autonomy and University 4.0 Worldwide

Worldwide, higher education autonomy has been a topical issue in recent years, especially since 2015 in both developed and developing countries. These studies are constantly supplemented and improved, including some valuable research works for reference. Documents related to this question are quite diverse in both scope and intensity. Don Anderson and Richard Johnson from the Centre for Continuing Education published "University Autonomy in Twenty Countries" in 1998. This report was extracted from a research program conducted in 20 countries all over the world and led by the Australian National University. The authors compared the degree of autonomy and found a big difference as well as various levels of autonomy among universities in Europe, Australia and Asia [13]. In the book entitled "Governance reforms in higher education: A study of China" published by the International Institute for Educational Planning, Mei Li and Rui Yang presented all the issues related to higher education reform, specifically in scientific research and international publications as significant aspects of achieving university autonomy in China [14]. N. V. Varghese and Michaela Martin discussed the same problems on a much larger scale - not just focusing on China - in an academic paper entitled "Governance Reforms in Higher Education: A Study of Institutional Autonomy in Asian Countries" [15]. Sophie Bensmaine-Coeffier - in her PhD dissertation entitled "Le Principle d'Autonomie des Universités Françaises" and defended at the University of Grenoble in France - indicated two roadmaps for French universities: Either develop their own principles for university autonomy or follow the EU standards with a special focus on the freedom in teaching and research with the participation of public service agencies and state organizations as stakeholders which join the other parties in the decision making [16]. There are certainly many more research papers addressing university autonomy in Europe in all its key aspects from different perspectives with various approach methods, but the indicators as steppingstones towards the goal remain unexplored.

European University Association (EUA) issued "University Autonomy in Europe III, Country Profiles" in 2017. This is a guidebook putting together for the first time a broad spectrum of issues related to university autonomy in every EU member country (a total of 29 EU states). It covers all the four pillars of university autonomy (A: organizational autonomy, B: financial autonomy, C: staffing autonomy, D: academic autonomy). These four criteria/categories were further divided and elaborated into indicators as follows: A into eight sub-criteria (A1 to A8 with 33 indicators), B into seven sub-criteria (B1 to B7 with 36 indicators), C into eight sub-criteria (C1 to C8 with 24 indicators) and D into seven sub-criteria (D1 to D7 with 38 indicators). In total, there are 30 sub-criteria and 131 indicators developed by EUA experts in higher education development and management. All the indicators in each category are assessed in percentage, within the frame of 100 per cent each. That is to say the four categories are equally important. The difference between the highest and lowest in each category is not so large: six per cent in Category A, one per cent in Category C and four per cent in Category D. The largest difference is found in Category B - up to 15 per cent. The score in each category A, B, C or D, and the overall score are specified as follows [17]:

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• Level 1: 40% or under -"low cluster";
• Level 2: 41% to 60% - "medium low cluster"
• Level 3: 61 % to 80% - "medium high cluster"
• Level 4: 81% to 100% - "high cluster".

In Southeast Asia, the ASEAN University Network (AUN) is responsible for university autonomy in the region with some official documents including Guide to AUN-Quality of Autonomy Assessment at Program Level (version 3) and Guide to AUN-Quality of Autonomy Assessment at Institutional Level (version 2) published be-tween 2012 and 2016. In general, the categorization of university autonomy in the ASEAN is similar to that in the EU. These documents provided guidance on assessment of autonomy in programs offered by universities in the region [18].

The AUN established four categories of university autonomy, namely Strategy with eight criteria, System with four criteria, Function with nine criteria and Result with four criteria. There are 25 criteria as listed below, and in turn, these criteria are divided into sub-criteria, with a total of 111 sub-criteria. Together, they form a solid framework for university autonomy in the ASEAN broad context. The 25 criteria include: 1. Vision - Mission - Culture; 2. Governance; 3. Leadership and Management; 4. Strategic Management; 5. Policies for Education, Research and Services; 6. Human Resources Management; 7. Financial Resources Management; 8. External Relations and Networks; 9. Internal Quality Assurance System; 10. Internal and External Quality Assurance Assessment; 11. Internal Information Management; 12. Quality Enhancement; 13. Student Recruitment and Admissions; 14. Curriculum Design and Review; 15. Teaching and Learning; 16. Student Assessment; 17. Student Services and Support; 18. Research Management; 19. Intellectual Property Management; 20. Research collaboration and Partnership; 21. Community Engagement and Services; 22. Educational Results; 23. Research results; 24. Service Results; 25. Financial and Market Result [18]. However, the rating system for each sub-criterion has not yet been quantitatively assessed. Instead, only sources of evidence for each criterion have been given.

AUN also shared some success stories in university autonomy from ASEAN member states. The experience from Thailand, for example, shows that the Government gives full autonomy to public and private universities by reducing state regulation, focusing on policy formulation and post-audit, strengthening the Board Governance School and University Management, and most importantly, by promoting good university governance [19].

As a pioneering country in Southeast Asia in terms of university autonomy, Malaysia was consistently ranked among the Top 10 Asian nations in terms of research power and placed at No. 8 with the most Scopus papers within 20 years (1996 - 2015). The Government of Malaysia planned to develop five leading universities into national re-search-led centers, hereby maximizing Malaysia's competitiveness in providing higher education opportunities and improving the country's ranking in international league tables. Nooraini Mohamad Sheriff and Arshad Ayub proposed a set of seven indicators to measure the research performance of a university, from most to least important, in strengthening the research aspect in academic autonomy: Quantity and Quality of Re-search (35%) - Quantity and Quality of Researchers (15%) - Innovation of Research (15%) - Networking and Linkages (12%) - Professional Services (10%) - Quantity and Quality of Postgraduates (10%) and Support Facilities (3%). Some of these indicators can also be used to assess academic autonomy, particularly when it comes to research as the core of academic issues [20]. Basically, these indicators coincide with AUN's 25 criteria as above-listed.

Another neighboring country - Indonesia - is also a pioneer in striving for university autonomy. The Ministry of Research, Technology and Higher Education (MORTAHE) issued Ministerial Decree No. 88/2014 on the Transformation of Public Universities to Autonomous Public Universities. The decree specifically iterates the requirement for any public university to transform into autonomous university, so as to allow public universities in Indonesia to prepare themselves for the autonomous status. Autonomy is secured on the basis of several criteria of institutional performance, encompassing five key components: Quality, Governance, Financial Feasibility, Social Responsibility and Role in Economic Development of the Region and of the Country. Each of these components has been sub-divided into several aspects, with two of them notably quantified with percentage rates: Excellent accreditation for the institution shall be granted for at least 80% of the academic programs accredited and Percentage of students in hardship receiving scholarships should be no less than 20% [21].

In Southeast Asia, Singapore is known as a leader in terms of University 4.0 and university-based digitalization. The digitalization in higher education in Singapore began with transformation of undergraduate programs from traditional concept into e-concept to enable and ensure life-long learning of every Singaporean citizen. The significance of digital transformation in Singaporean higher education has been reflected in placing "building strong digital capabilities" at No. 3 in the Seven-Stragegy Plan initiated by the Ministry of Communications and Information for transformation, in which staff and students are required to equip themselves with a high-level knowledge of digitalization while the IT-system has been enormously upgraded. Digitalization also forms part of a national movement called "Skillful Future" initiated and supported by the Government to ensure the competitiveness of and maximize the opportunities for Singaporean graduates in the world labor market. Another program - Smart Nation Singapore - also focuses on digital transfer in the whole education system, not just at university level [22].

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Thailand is on the roadmap for University 4.0. In its development of the Third Framework of the 15-Year Long Range Plan (2017-2031), the Office of Higher Education Commission has suggested a number of key changes that are required in the program Thailand 4.0. Since the future of the nation rests on the quality of its people, "Thai people 4.0" are the prime focus of the blueprint of Thailand 4.0. Future generations should aspire to be knowledgeable, highly skilled, socially responsible, maintain their Thai identity, and be able to use technology. For research and innovation, a multidisciplinary infrastructure, hands-on learning and research, innovative projects, and demand-led research at universities remain in the focus. The blueprint for Thailand 4.0 also proposes new approaches to education, particularly university education. But the extent to which Thailand will be able to overhaul its higher education remains a challenge. Most of the lecturers currently teaching in higher education institutions have been trained in the use of traditional approaches, and can have difficulty adapting to the new approaches that will be required to educate new generations. A change of mindset and a revolution in teaching practices will be pivotal to the success of Higher Education 4.0 [23]. The biggest challenge for Thailand University 4.0 to overcome is found in the awareness of students as one of the two key groups, as demonstrated in a survey conducted at Nakorn Pathom Education Center as a case study with 185 students participated: only 2% have a good understanding of the University 4.0 concept, while 63% showed a moderate knowledge about it [24].

## 2.2 University Autonomy and University 4.0 in Vietnam

In Vietnam, over the past ten years, many research projects have been sponsored by the Ministry of Education and undertaken by some higher education institutions or groups of experts. They focused primarily on the definitions of university autonomy in general as well as specific context, sharing experience from both abroad and Vietnam, as well as finding out a number of solutions that may help universities strengthen their capacity and competence to apply successful the university autonomy concept.

A study undertaken by a research team led by Tran Quoc Toan divided university autonomy into two categories: unconditional content (fulfilling the university's missions and deciding between "research-led" and "practice-oriented") and conditional content (announcing annual student intake and offering new courses) [25].

Another group of researchers discussed five key solutions to university autonomy: 1) Reconsidering and restructuring the current university system (carried out by the state); 2) Re-classifying universities on the basis of four pillars of university autonomy (carried out by the Ministry of Education and Training); 3) Consolidating a university's status and adopting a new strategy as well as preparing future plans for post-autonomy development (carried out by the university), 4) Recruiting well-qualified new staff and enhancing the competence of current staff, especially academic staff (carried out by the university and its faculties/departments) and 5) Raising the awareness of university autonomy and accountability among university leaders, officers, academic and administrative staff (carried out by the university in top-down model [26].

Meanwhile, a research project conducted at Vietnam National University focused on the relationship between the University Council (new concept) and University Communist Party Committee (old concept), as well as between the Ministry of Education and Training and other ministries / state agencies involved in the management of university development, including university autonomy, which is regarded as a highly challenging process but a must as far as a true breakthrough in education reform is concerned and should therefore be made [27].

At the same time, Dao Trong Thi and his colleagues at Vietnam National University emphasized international cooperation as an external force for Vietnamese universities at the transitional stage - from 2018 until 2025 [28].

Two authors from the National University of Economics undertook a research which revealed that the current policies on university autonomy issued by the Government and the Ministry of Education and Training would enhance the development of higher education, particularly through the acquisition of "work-ready" skills by university graduates in accordance with new courses taught in English as part of the international curriculum, as well as the expansion of new enrolments, which can improve massification of higher education in Vietnam. However, some policies may deter universities from turning into a research university because tuition fees then become their main source of funding [29].

Two experts, Vo and Laking, investigated the autonomization of Vietnamese public universities through an institutional study of autonomy policies and empirical analysis of autonomy practices amongst selected public universities in Vietnam by paying particular attention to the evolution of the autonomy reforms and their implications for higher education governance in Vietnam. They argued that the autonomy of Vietnamese public universities would be apparently growing, but did not reflect a broad transfer of power from the central state to public universities. Instead, autonomization had a more limited objective of reducing public universities' claims on the central budget by presenting them with both the opportunity and the incentive to generate alternative sources of revenue to fund their teaching and research activities [30].

One more scholar, Dao Thanh Binh, pointed out and analyzed three major obstacles that prevent universities in Vietnam from applying university autonomy or slow down the progress of pioneering institutions, although they all understand the advantages of that concept: 1) Unclear understanding of university autonomy contents, especially key points, caused by the lack of guidance given by a state competent body, such as the Ministry of

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Education and Training; 2) Inconsistency of legal framework applicable to higher education reform, including university autonomy and internationalization of qualifications and degree programs, most notably related to investment capitals and financial mobilization, and 3) Delay in establishing international control systems, of which the formation and missions of the university council would play a decisive role [31].

Although University 4.0 is frequently mentioned in the state documents, this important issue has not yet been properly investigated in the country. The most outstanding research on this topical issue was published in 2022, consisting of 16 book chapters addressing a broad range of the Industrial Revolution 4.0 in education in general or at a lower level (high school) with 12 chapters. Only four chapters deal with University 4.0, focusing on four themes only: 1) improving the management at universities in view of job description requirements, 2) targeting at a specific group of universities (pedagogy), 3) discussing the competency rating framework for lecturers, 4) emphasizing the relationship between the university and the business in the context of University 4.0. These four chapters provide some facts through statistics about the preparation for University 4.0 at some higher institutions (most of them are regarded as "low"), SWOT-analyzed the current development and propose a number of solutions in general, mostly orientations, for the future. There is no concept for University 4.0 for Vietnam and no roadmap for a particular type of university to fulfill the goal University 4.0 either [32].

## 3. Research Questions

In Vietnam, there have been so far quite many research projects on university autonomy that deal with various aspects of this concept, but none has ever made any attempt to propose a full set of indicators for universities in Vietnam to start applying university autonomy. This is quite a new concept for most universities, so they have encountered several difficulties in one way or another while trying to apply this concept and striving for that goal.

In consideration of the implementation of university autonomy in the world and the application in Vietnam in the context of University 4.0, there are currently four outstanding research issues as follows:

1) How to establish clear and specific criteria to help evaluate the degree and the quality of a higher education institution after applying autonomy concept?
2) Which indicators should be elaborated to evaluate the level of university autonomy?
3) How to use this rating system to preliminary assess the preparation of a university for university autonomy and what is the significance of this assessment tool?
4) How to make this rating system more efficient in fact and commensurate with the digital transformation as the mainstream in higher education management?

## 4. Research Methods

Recently, Vietnam has joined the worldwide mainstream of university autonomy as a bold step to keep up with the regional and international development in higher education. University autonomy criteria and indicators in Vietnam have to comply with both the revised Law of Education and with the international standard. New criteria, subject to the context, can be added. The most important thing is that the supply-demand relation between the country's higher education and its socio-economic development must be taken into account and reflected in indicators.

In order to establish a complete set of indicators for universities to apply the long-awaited autonomy concept, the authors have collected a wide range of input data, including international theories, EUA and AUN frameworks (Source A), worldwide successful practice with a special focus on ASEAN countries (Source B), and Vietnamese context encompassing outcomes of application in reality and characteristics of universities (Source C), requirements of university autonomy and the capacity of universities to meet these requirements (Source D) and latest legal documents related to university education reform and autonomy (Source E). Source A and Source B were investigated by the group of authors while the group of 20 experts from the Ministry of Educations and Trainings and various non-governmental organizations analyzed data from Source D and Source E. As a common interest issue, Source C was examined by both groups. This work division and cooperation resulted in a comprehensive range of indicators for university autonomy in Vietnam, based on a number of criteria originally developed from three pillars of university autonomy (Organizational Autonomy, Academic Autonomy and Financial Autonomy) as determined in the revised Law on Education in 2018 and also highlighted by the EUA in 2017. The whole process can be illustrated in Figure 1.

In order to fulfill this objective, the five steps shall be applied:

Step No. 1: A literature review was conducted to draw out the international lessons as well as the characteristics of the specific educational context of Vietnam. As a result, the preliminary pool of indicators to assess the level of university autonomy was established.

Step No. 2: Case studies conducted on four Vietnamese universities, which have al-ready applied the concept of university autonomy at various levels, were carried out. There are two institutions from Hanoi and two others from Ho Chi Minh City involved in the survey. The case studies found out key challenges and difficulties that most

Vietnamese universities are facing in the transition towards university autonomy. Consequently, the pool of autonomy indicators would be refined. Some indicators were eliminated while new indicators were added.

Step No. 3: In-depth interviews with 15 experts, who are rectors, managers and re-searchers with so many years' experiences in education governance and management in Vietnam, were conducted to assess the initial set of university-autonomy indicators. A set of unstructured questionnaires was prepared for this purpose. The indicators in each criterion would be elaborated based on content and calibration. The more important one criterion is, the more components it should cover, and each component could be developed into one relevant indicator to be assessed on a one-to-five scale.

Step No. 4: Data collected was analyzed to establish a set of university-autonomy indicators that is suitable to the context of Vietnam's educational system.

Step No. 5: The set of indicators was applied to three universities, on the basis of university profiles, to assess how well they have prepared so far for university autonomy. Furthermore, the digital transformation in ensuring the quality of teaching, research and management activities at Hanoi University of Civil Engineering was evaluated by using the full range of indicators. The results may help those institutions change their plans and policies on the roadmap in time to achieve their own goals.
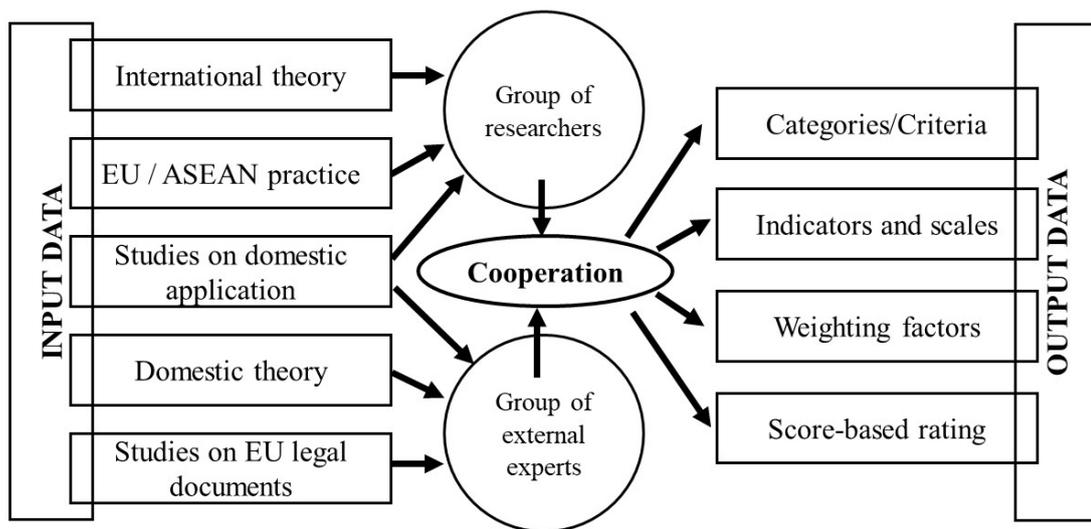


**Fig. 1** *Material flow from input to output for a full set of university autonomy level indicators in Vietnam*

The following methods/tools are used in the study:

Method/Tool No. 1 (Data collection): Data were collected from various reliable sources, such as the Ministry of Education and Training's website, Journal of Education, four national conference proceedings on higher education reform and university autonomy published in recent years, information provided by four universities (two from Hanoi and two from Ho Chi Minh City) that have applied university autonomy for over the past few years and research institutes that study university autonomy;

Method/Tool No. 2 (Data analyses): Data were first qualitatively and then quantitatively analyzed by means of statistical software programs, such as Microsoft Excel and SAS, and then used as supporting facts for arguments, wherever appropriate;

Method/Tool No. 3 (Expert consultation): A group of 20 experts in higher education governance and management was invited to give their opinions of the criteria and indicators initially established by the research team in form of a questionnaire: a. on the basis of learning from the experiences and successful implementations of the EU and ASEAN countries, b. in consideration of the current legal documents on university autonomy and c. with regard to the characteristics of Vietnamese higher education institutions. If approved by at least 15 out of 20 experts (75%), an indicator would remain in the relevant category. If selected by 10 to 14 experts only in Round One, this indicator should be re-considered and examined by five other specialists in Round Two. Based on the final total number of Yes, the indicator would be kept (if receiving 15 answers Yes or more) or otherwise excluded. In the case of less than 10 choices in Round One, that indicator would be eliminated.

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# 5. Results

## 5.1 Establishment of a Full Set of Indicators

The elaboration of a full set of indicators to help a university in Vietnam better prepare for and succeed in applying university autonomy is initially based on Article No. 32 in the amended Law on Higher Education in 2018 which provides the following three cornerstones of autonomy: I. Organization and Human Resources; II. Academic issues (including training, science and technology, international cooperation and quality assurance) and III. Finance and Property. More specifically:

- Autonomy in Organization and Human Resources is divided into four sub-contents: 1) University governance, 2) Leadership and management, 3) Recruitment and development of administrative staff, 4) Recruitment and development of academic staff, with reference to points No. 2 to No. 6 in the AUN framework, and Categories A and C in the EUA system;
- Autonomy in Academic Issues is divided into eight sub-contents: 1) Enrolment and admission of students; 2) Design, review, modification and/or upgrading of teaching programs; 3) Teaching and learning activities; 4) Scientific research; 5) Cooperation and partnership in scientific research; 6) Intellectual property management, 7) Transfer of knowledge and research outcomes and 8) Connection and community services, with reference to points No. 8 to No.10, No. 12 to No. 24 in the AUN framework, and Category D in the EUA system.
- Autonomy in Finance and Property is divided into five sub-contents: 1) Management of finance, 2) Management of property and equipment, 3) Securing financial sources for activities, 4) Allocation of secured funding for non-research activities and 5) Investment in research, especially ground-breaking research, with reference to points No. 7 and No. 25 in the AUN framework, and Category B in the EUA system;

At first hand, 17 sub-contents (i.e. criteria) can be put together. However, there are three more factors to be included, with regard to the current situation of university autonomy application at several pioneering universities in Hanoi and Ho Chi Minh City and in consideration of the future development towards autonomy and sustainability.

- A university, once established, should be first known for its raison d'être with strategies, orientations and policies, thus the number one criterion is the university's vision, missions and core values which in reality attract great attention from most prospective students, partners and employers today in Vietnam. This additional sub-content (No. 18) is in accordance with Point No. 1 in the AUN framework (Vision and Mission), and can be incorporated into Category I (Autonomy in Organization and Human Re-sources);
- Following and supporting leadership and management capacity, a culture of autonomy needs to become a daily action or behavior which can be reflected in various aspects (awareness, commitment, self-implementation and co-operation) and practiced by all the people involved (university and faculty leaders, heads of department, academic staff, administrative staff and even undergraduate/postgraduate students). This additional sub-content (No. 19) is in accordance with Point No. 1 in the AUN framework (another aspect of Culture), and can also be incorporated into Category I (Autonomy in Organization and Human Resources)
- A digitalized management system will help manage information and collect all the data required for both internal and external assessment as frequently, quickly, accurately and conveniently as possible. This is a university-wide data network divided into several tiers, from the top level (University Council and Board of Leaders) down to the department level. Affiliated agencies (research centers, consultant companies and offices) should be connected as well. This additional sub-content (No. 20) is in accordance with Point No. 11 in the AUN framework, and can also be incorporated into Category III (Autonomy in Finance and Property).

Identifying indicators within each criterion can be seen as the next phase and the most significant contribution to the preparatory process for university autonomy in Vietnam. In fact, many higher education institutions pay special attention to indicators. The lack of indicators, even when all the criteria are available, has been regarded as a real challenge for most on-the-road universities to cope with, particularly for those applying the brand-new development concept for the first time. But so far, a full set of university autonomy indicators has not yet been compiled, and thus it has become an urgent task to deal with.

An indicator, no matter which group it may belong to, is rated on a common 1-to-5 scale, with 1 being the lowest and 5 being the highest. The importance of a criterion will then be demonstrated with the number of indicators within its scope. In other words, the more important a criterion is, the more indicators it will cover. The most essential and critical issues in university autonomy need to be reflected in the way the relevant indicators are selected and organized. Furthermore, in order to optimize the rating system, weighting factors should be used, with 1 for being required, 1.5 for being important and 2 for being very important. With these in mind, a full set of

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indicators for the assessment of university autonomy level in Vietnam for the years 2025 - 2030 as a watershed period will be elaborated in Table 1 below. As a result, a total of 77 indicators have been elaborated for Vietnamese universities to apply, based on 20 criteria in three categories.

**Table 1** *Indicators for an annual evaluation of university autonomy level in Vietnam*

| No. | Criteria and indicators | Max. rating | Factor | Max. score |
|---|---|---|---|---|
| I | AUTONOMY IN ORGANIZATION AND HUMAN RESOURCES | | | 185 points |
| I.1 | University's vision, missions and core values | 15 points | 1 | 15 points |
| I.1.a | The university leaders themselves establish the university's vision and missions which are clear and comprehensive to highlight the roles of the university. | on 1 to 5 scale | | |
| I.1.b | The university leaders themselves review and modify the university's vision and missions, if necessary, to meet the needs of the society. | on 1 to 5 scale | | |
| I.1.c | The university leaders identify, emphasize and promote the university's core values. | on 1 to 5 scale | | |
| I.2 | University governance | 20 points | 2 | 40 points |
| I.2.a | The University Council works independently of the Board of Director. | on 1 to 5 scale | | |
| I.2.b | Party organizations, unions, associations, etc. work in support of the implementation of university autonomy. | on 1 to 5 scale | | |
| I.2.c | The university leaders set up and strengthen the university governance system to increase the university's performance. | on 1 to 5 scale | | |
| I.2.d | The university leaders establish and adopt strategic plans to fulfill the university's vision and missions as well as to ensure core values for every five or ten years. | on 1 to 5 scale | | |
| I.3 | Leadership and management | 25 points | 2 | 50 points |
| I.3.a | The University Council sets up, reviews and improves a management structure which clearly defines roles, responsibilities, decision-making processes, etc. in order to achieve the university's development goals. | on 1 to 5 scale | | |
| I.3.b | The University Council makes action plans for the implementation of the university's development goals. These action plans are officially announced, regularly reviewed and improved. | on 1 to 5 scale | | |
| I.3.c | The University Council makes policies in supporting action plans in order to best meet the requirements of the university's development. | on 1 to 5 scale | | |
| I.3.d | The University Council gives instructions in time and in detail for the fruitful application of policies. | on 1 to 5 scale | | |
| I.3.e | The University Council develops, reviews and modifies internal standards, criteria and rating systems to ensure the quality of the university's key activities. | on 1 to 5 scale | | |
| I.4 | Recruitment and development of administrative staff | 20 points | 1 | 20 points |
| I.4.a | The departments and faculties decide the number of new administrative staff to be recruited each year on demand. | on 1 to 5 scale | | |

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| No. | Criteria and indicators | Max. rating | Factor | Max. score |
|---|---|---|---|---|
| I.4.b | The university approves the annual proposals of the departments and faculties. | on 1 to 5 scale | | |
| I.4.c | The departments and faculties make plans for administrative staff training and promotion each year on demand. | on 1 to 5 scale | | |
| I.4.d | The university approves the annual administrative staff training and promotion plans. | on 1 to 5 scale | | |
| I.5 | Recruitment and development of academic staff | 20 points | 2 | 40 points |
| I.5.a | The academic departments decide the number of new academic staff to be recruited each year on demand. | on 1 to 5 scale | | |
| I.5.b | The university approves the annual proposals of the academic departments. | on 1 to 5 scale | | |
| 1.5.c | The departments make plans for academic staff training and promotion each year on demand. | on 1 to 5 scale | | |
| 1.5.d | The university approves the annual academic staff training and promotion plans. | on 1 to 5 scale | | |
| I.6 | Building of the daily culture of autonomy across the university | 20 points | 1 | 20 points |
| I.6.a | Awareness, commitment, support and implementation for the autonomy performance among the university leaders. | on 1 to 5 scale | | |
| I.6.b | Awareness, commitment, support and implementation for the autonomy performance among the heads of the faculties and departments. | on 1 to 5 scale | | |
| I.6.c | Awareness, commitment, support and implementation for the autonomy performance among the staff (both administrative and academic staff). | on 1 to 5 scale | | |
| I.6.d | Awareness, commitment, support and behavior for the implementation of autonomy among students (both undergraduate and postgraduate students). | on 1 to 5 scale | | |
| II | AUTONOMY IN ACADEMIC ISSUES | | | 330 points |
| II.1 | Enrolment and admission | 20 points | 1.5 | 30 points |
| II.1.a | The University makes a decision about an annual enrolment and admission policy on demand. | on 1 to 5 scale | | |
| II.1.b | The Department of Information and Communication makes an annual plan for enrolment. | on 1 to 5 scale | | |
| II.1.c | The Department of Training makes an annual plan for admission. | on 1 to 5 scale | | |
| II.1.d | The University develops a monitoring tool for both enrolment and admission | on 1 to 5 scale | | |
| II.2 | Design, review, modification and upgrading of teaching programs | 20 points | 2 | 40 points |
| II.2.a | The academic departments are able to design new teaching programs with relevant study subjects on demand. Academic staff within the departments are able to do this, and can invite external specialists to participate, if necessary. | on 1 to 5 scale | | |

| No. | Criteria and indicators | Max. rating | Factor | Max. score |
|---|---|---|---|---|
| II.2.b | The academic departments are able to review on-going teaching programs regularly as requested. Academic staff within the departments are able to do this, and can invite external specialists to participate, if necessary. | on 1 to 5 scale | | |
| II.2.c | The academic departments are able to modify and/or upgrade on-going teaching programs regularly to ensure that the study subjects are up-to-date. Academic staff within the departments are able to do this, and can invite external specialists to participate, if necessary. | on 1 to 5 scale | | |
| II.2.d | The key contents of the study subjects are determined by the experts, on the basis of the demand as well as the development in the professional areas, and can be changed from time to time | on 1 to 5 scale | | |
| II.3 | Teaching and learning activities | 20 points | 2 | 40 points |
| II.3.a | The university has a policy regularly updated to support its teaching and learning activities. | on 1 to 5 scale | | |
| II.3.b | The university has a system regularly improved to monitor its teaching and learning activities. | on 1 to 5 scale | | |
| II.3.c | The university has a variety of measures regularly strengthened to ensure the quality of teaching and learning. | on 1 to 5 scale | | |
| II.3.d | The university has a tool regularly reviewed to assess the quality of teaching and learning periodically (annually). | on 1 to 5 scale | | |
| II.4 | Scientific research | 50 points | 2 | 100 points |
| II.4.a | The university has a policy regularly updated to support its research activities. | on 1 to 5 scale | | |
| II.4.b | The university has a system regularly improved to monitor its research activities. | on 1 to 5 scale | | |
| II.4.c | The university has a variety of measures regularly strengthened to ensure the quality of research. | on 1 to 5 scale | | |
| II.4.d | The university has a tool regularly reviewed to assess the quality of research periodically (annually). | on 1 to 5 scale | | |
| II.4.e | The university allows researchers to choose research topics on demand. | on 1 to 5 scale | | |
| II.4.f | The university encourages researchers to apply for research funding or secures funding from different sources for researchers. | on 1 to 5 scale | | |
| II.4.g | The university supports researchers with modern facilities. | on 1 to 5 scale | | |
| II.4.h | The university supports researchers in publishing research outcomes nationally and internationally. | on 1 to 5 scale | | |
| II.4.i | The university has its own academic journal(s) to be recognized. | on 1 to 5 scale | | |
| II.4.j | The university grant awards to excellent researchers | on 1 to 5 scale | | |
| II.5 | Cooperation and partnership in scientific research | 20 points | 2 | 40 points |

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| No. | Criteria and indicators | Max. rating | Factor | Max. score |
|---|---|---|---|---|
| II.5.a | The university establishes cooperation and partnership in scientific research across the faculties (inter-faculty research) and enables key research teams/groups. | on 1 to 5 scale | | |
| II.5.b | The university establishes cooperation and partnership in scientific research with other domestic universities (inter-university research). | on 1 to 5 scale | | |
| II.5.c | The university establishes cooperation and partnership in scientific research with other universities in the ASEAN (regional research network). | on 1 to 5 scale | | |
| II.5.d | The university establishes cooperation and partnership in scientific research with other universities in the world (international research network). | on 1 to 5 scale | | |
| II.6 | Intellectual property management | 15 points | 2 | 30 points |
| II.6.a | The university has a policy regularly updated to encourage researchers to register for national intellectual property licences. | on 1 to 5 scale | | |
| II.6.b | The university has a policy regularly updated to encourage researchers to register for international intellectual property licences | on 1 to 5 scale | | |
| II.6.c | The university develops a management system regularly reviewed to monitor the registration for and recognition of intellectual property by its academic staff | on 1 to 5 scale | | |
| II.7 | Transfer of knowledge and research outcomes | 15 points | 2 | 30 points |
| II.7.a | The university has a policy regularly updated to support its transfer of knowledge and research outcomes to beneficiaries. | on 1 to 5 scale | | |
| II.7.b | The university has a system regularly improved to monitor its transfer of knowledge and research outcomes to beneficiaries. | on 1 to 5 scale | | |
| II.7.c | The university has a variety of measures regularly strengthened to ensure the efficiency of its transfer of knowledge and research outcomes to beneficiaries. | on 1 to 5 scale | | |
| II.8 | Connection and community services | 20 points | 1 | 20 points |
| II.8.a | The university has a policy regularly updated to support its connection with the communities and services for the community development. | on 1 to 5 scale | | |
| II.8.b | The university has a system regularly improved to monitor its connection with the communities and services for community development. | on 1 to 5 scale | | |
| II.8.c | The university has a variety of measures regularly strengthened to ensure the efficiency of its connection with the communities and services for community development. | on 1 to 5 scale | | |
| II.8.d | The university offers financial support to students from underdeveloped areas and underprivileged communities | on 1 to 5 scale | | |
| III | AUTONOMY IN FINANCE AND PROPERTY | | | 85 points |
| III.1 | Management of finance | 15 points | 1 | 15 points |

| No. | Criteria and indicators | Max. rating | Factor | Max. score |
|---|---|---|---|---|
| III.1.a | The university has a policy regularly updated to facilitate the management of finance. | on 1 to 5 scale | | |
| III.1.b | The university has a system regularly improved to monitor the management of finance. | on 1 to 5 scale | | |
| III.1.c | The university has a variety of measures regularly strengthened to ensure the efficiency of the management of finance. | on 1 to 5 scale | | |
| III.2 | Management of property and equipment | 15 points | 1 | 15 points |
| III.2.a | The university has a policy regularly updated to facilitate the management of property and equipment. | on 1 to 5 scale | | |
| III.2.b | The university has a regularly improved system to monitor the management of property and equipment. | on 1 to 5 scale | | |
| III.2.c | The university has a variety of measures regularly strengthened to ensure the efficiency of the management of property and equipment. | on 1 to 5 scale | | |
| III.3 | Management of securing financial sources for activities | 15 points | 1 | 15 points |
| III.3.a | The university is able, through its prestige and networking, to secure international funding for its activities | on 1 to 5 scale | | |
| III.3.b | The university is able, through its prestige and networking, to secure national funding (from the state-administered sources) for its activities | on 1 to 5 scale | | |
| III.3.c | The university is able, through its prestige and networking, to secure national funding (from the non-state sources) for its activities | on 1 to 5 scale | | |
| III.4 | Management of allocation of secured funding for non-research activities | 15 points | 1 | 15 points |
| III.4.a | The university is able to manage the allocation of secured funding for curricular activities | on 1 to 5 scale | | |
| III.4.b | The university is able to manage the allocation of secured funding for extra-curricular activities | on 1 to 5 scale | | |
| III.4.c | The university is able to manage the allocation of secured funding for administration in support of those activities | on 1 to 5 scale | | |
| III.5 | Management of investment in research, especially ground-breaking research | 10 points | 1 | 10 points |
| III.5.a | The university is able to manage investment in theoretical research (equipment and facilities) | on 1 to 5 scale | | |
| III.5.b | The university is able to manage the investment in application-oriented research (equipment and facilities) | on 1 to 5 scale | | |
| III.6 | Management of information systems and databases | 15 points | 1 | 15 points |
| III.6.a | The university is able to establish its information systems and databases at the department level with interlinks among departments within a faculty | on 1 to 5 scale | | |
| III.6.b | The university is able to establish its information systems and databases at the faculty level with interlinks among faculties within the university | on 1 to 5 scale | | |

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| No. | Criteria and indicators | Max. rating | Factor | Max. score |
|---|---|---|---|---|
| III.6.c | The university is able to establish its information systems and databases at the university level with interlink with the Ministry of Education and Training as well as with other professional associations | on 1 to 5 scale | | |
| | Total | | | 600 points |

It is advised that when a university accumulates 60% of the total points (360 out of 600 points), a standard level of autonomy can be awarded, a high level will be equal to 70% of the overall score or above (at least 420 out of 600 points), and a very high level will apply to 80% of the overall score or above (480 or more out of 600 points).

Category I (Autonomy in Organization and Human Resources) encompasses six criteria sub-divided into 24 indicators with 185 points (30.83% of the overall score). Category II (Autonomy in Academic Issues): eight criteria, 36 indicators, 330 points (55% of the overall score) and Category III (Autonomy in Finance and Property): 17 indicators, 85 points (14.17% of the overall score). The rationality and significance of each of the three pillars of university autonomy can be quite clearly reflected in the allocation of criteria, indicators, sub-total scores and their contributions to the total score. Furthermore, these indicators are elaborated with reference to the AUN framework and will therefore be recognized as "compatible".

Out of 77 indicators, 41 are regarded as "very important" and given a weighting factor of 2. They are put together from nine criteria: 1. university governance; 2. leadership and management; 3. recruitment and development of academic staff; 4. design, review, modification and upgrading of teaching programs; 5. teaching and learning activities; 6. scientific research; 7. cooperation and partnership in scientific research, 8. intellectual property management; and 9. transfer of knowledge and research outcomes. Most universities in Vietnam have encountered problems in these nine key areas when they decide to apply university autonomy. Actually, they are important enough, because they make up 68.33% of the total score (410 out of 600 points).

Out of 77 indicators, 22 are related to scientific research, and most of which are given 2 for their levels of importance. Research-related indicators account for 210 points (out of 600 in total, equal to 35%). This percentage can be accepted and in accordance with the intention of establishing research-intensive universities as a prioritized development trend in the new era proposed by the Ministry of Education and Training, as well as strongly supported by the Government. Criterion Scientific Research (II.4) alone covers the broadest range of indicators, sub-divided into 10 aspects with a total of 100 points, equaling 47.62% of the research-related score and 16.67% of the overall score, a contribution of three times higher than the average proportion (5% per criterion) to the final assessment outcome.

In the course of establishing criteria and elaborating indicators, the research team was fortunate to gain access to a complete profile of three universities (two in Hanoi and one in Ho Chi Minh City). These three universities represent three groups of universities in terms of applying autonomy in Vietnam as follows:

- Group No. 1: Universities that have implemented autonomy for over 10 years (pioneering) and already achieved a very high level of autonomy in most of the criteria, as demonstrated in various regional and international university rankings. The level of autonomy is expected to exceed 80% and the average score should surpass 4.0 on the 1-to-5 scale.
- Group No. 2: Universities that have implemented autonomy for approximately five years (new emerging) and already obtained a considerable status of autonomy in some key criteria, as demonstrated in some recent national rankings. The level of autonomy is supposed to vary between 70% and 79.99%, and the average score should surpass 3.5 on the 1-to-5 rating scale.
- Group No. 3: Universities that have not yet applied autonomy, but already prepared for it at least in key criteria, such as teaching and learning activities, research outputs and governance. The level of autonomy is anticipated to range between 60% and 69.99%, and the average score should surpass 3.0 on the 1-to-5 rating scale.

## 5.2 Assessment of University Autonomy Levels at Three Higher Institutions in Vietnam

If the indicators and their weighting factors meet these requirements, the full set can be considered "properly elaborated" and "appropriate for application" in Vietnamese context in the years 2025 - 2030. The research team chose three typical universities for three groups and was then provided with three full university profiles relevant to the indicators required for an assessment. The data from the two most recent academic years (2022-2023 and 2023-2024) were sufficient for the authors to conduct a testing assessment of each university's current level of autonomy by using the criteria and indicators proposed. However, the principle and agreement of anonymity upon receipt of data must be respected for the purpose of publication and the research team has to name the three participating institutions in this case study as follows: University X (from Group 1), University Y (from Group 2)

and University Z (from Group 3). To ensure the objectivity of assessment, each university profile was rated by five external experts in higher education management and development, based on the indicators proposed in Table 1.

University X, as a top-ranking higher education institution in Vietnam in terms of both extensive internationalization of qualifications and intensive application of autonomy for quality assurance, achieved 36 5-ratings, 38 4-ratings and three 3-ratings, therefore gaining a very high overall score of 89.3% and hereby fulfilling the requirement of surpassing 80%. The average rating was 4.43, higher than 4.0 as required.

University Y, as another well-established higher education institution in Vietnam specializing in economics and commerce, received eight 5-ratings, 48 4-ratings and 21 3-ratings, eventually gaining a good overall score of 77.2% and hereby fulfilling the requirement of notching up between 70% and 79.99%. The average rating was 3.83, exceeding 3.5 as a prerequisite condition.

University Z, as a pre-autonomous higher education in civil engineering in Vietnam, was given 31 4-ratings, 42 3-ratings and four 2-ratings, finally gaining a promising overall score of 67.5% and hereby fulfilling the requirement of securing an upper place between 60% and 69.99%. The average rating was 3.35, outperforming 3.0 as recommended by the experts.

The details can be seen in Figure 2, Figure 3 and Figure 4 below. That is to say, the indicators as a result of co-working between the research team and experts in Phase One prove to be properly developed and commensurate with the current grouping of universities, as far as the level of autonomy is concerned. In Phase Two, when more universities are involved in this assessment, the indicators shall be refined and optimized, if necessary, before the set can be officially accepted by the Ministry of Education and Training.
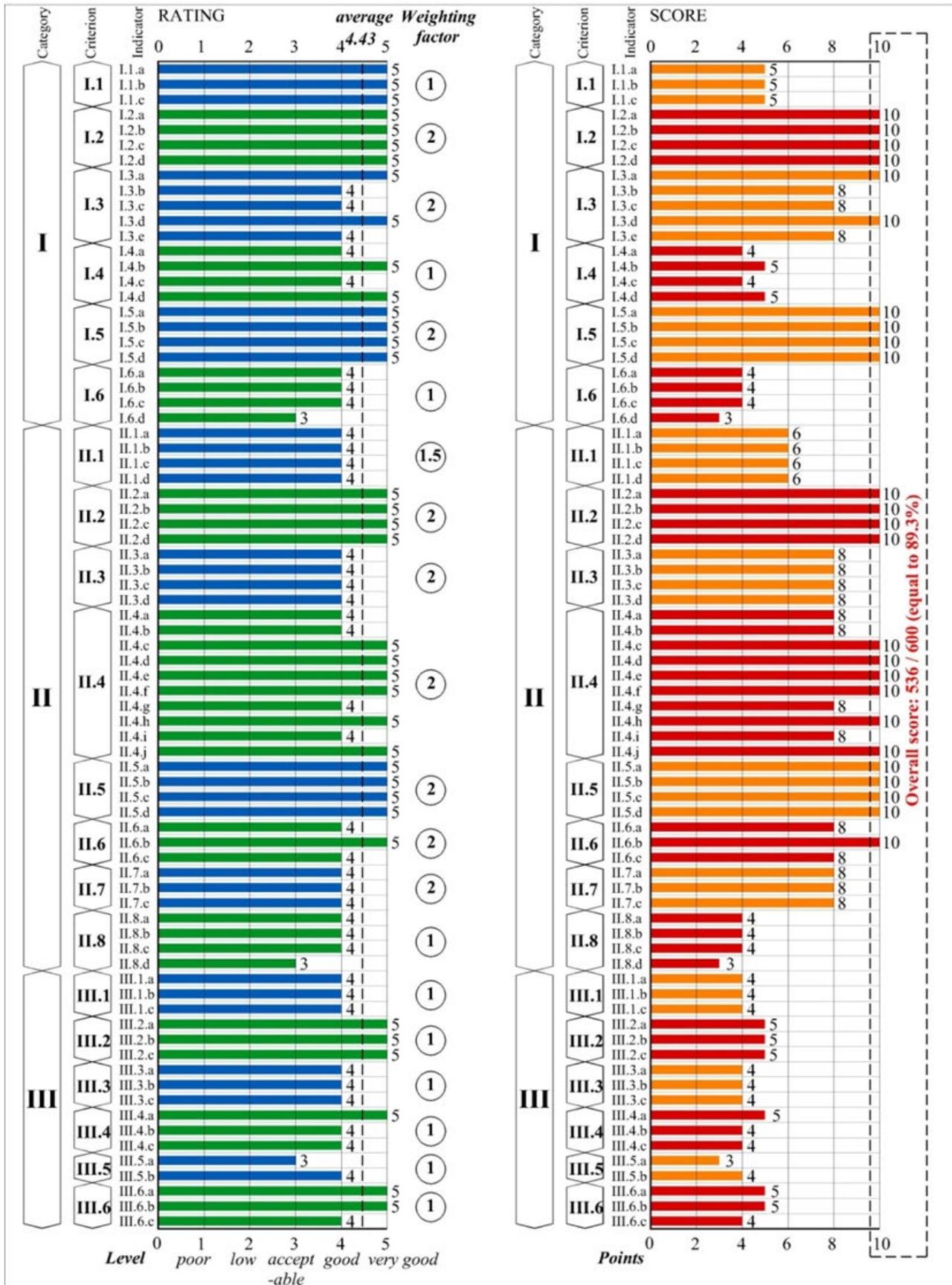
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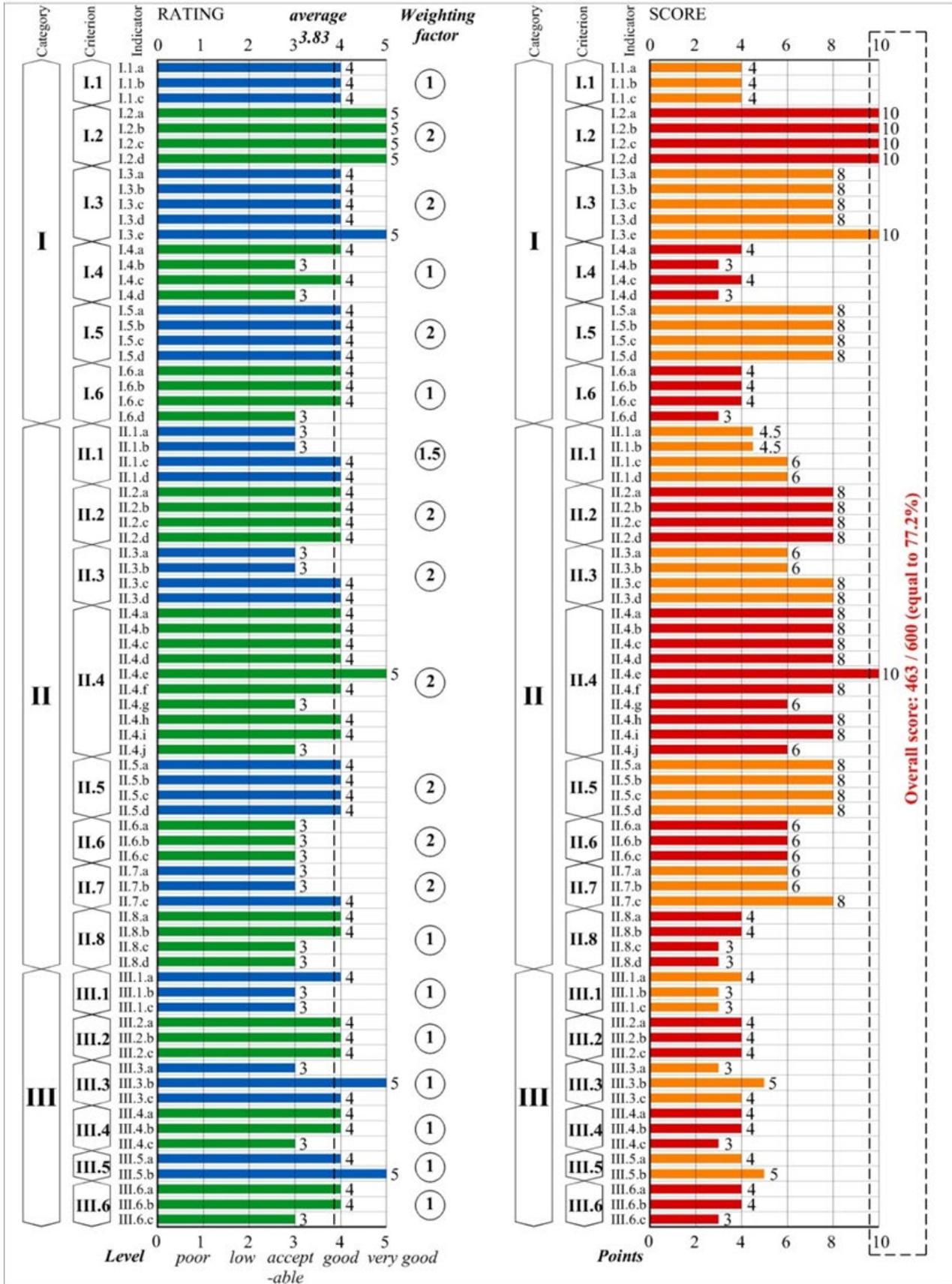**Fig. 2** *Evaluation of autonomy level of a Group One university (top level)*
(Data for expert assessment [33])

**Fig. 3** *Evaluation of autonomy level of a Group Two university (middle level)*
(Data for expert assessment [34])

Int. J. of Sustainable Construction Engineering and Tech. Vol. 15 No. 4 (2024) p. 100-122
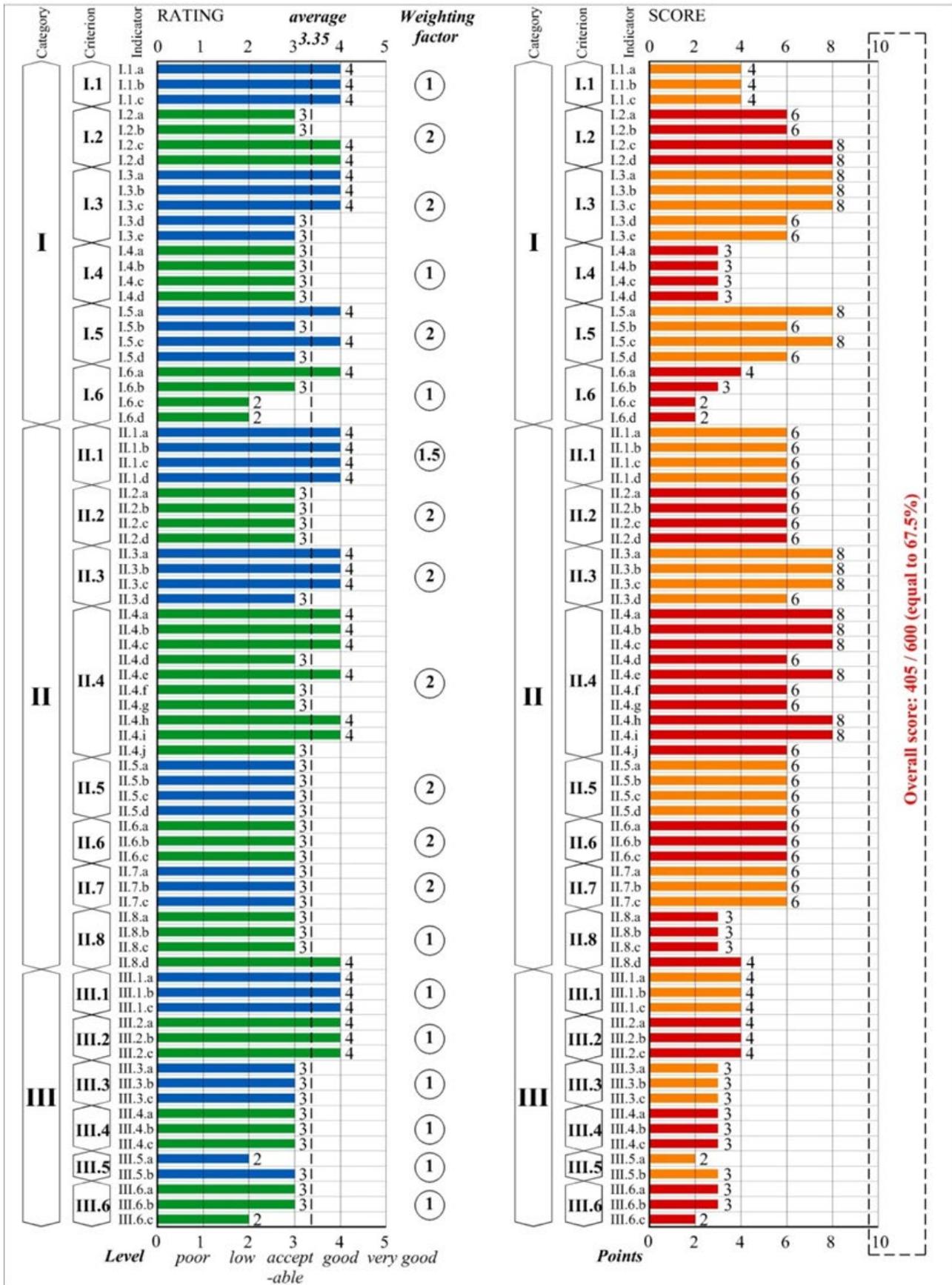
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**Fig. 4** *Evaluation of autonomy level of a Group Three university (pre-autonomy)*
(Data for expert assessment [35])

## 5.3  University 4.0 - Digitalization of University Autonomy Level Assessment

University autonomy assessment should be periodically, if not annually, undertaken, just like university ranking, which provides all the information for prospective students to decide where and what to study, and for employers as well, so that they understand the commitment and education quality of a higher education. Such an annual assessment needs a large amount of input data from all the universities and colleges involved, as clearly reflected in Table 1. It also requires accuracy of all the statistics and update of information. Without the support of information technology, this mission may never be so well fulfilled. The IT support in this case will take the form of a digital system interconnecting all the universities and colleges with the Ministry of Education and Training and an accredited organization or institute responsible for this nationwide assessment. Obviously, this system will save both time and cost. Moreover, the indicators can be quickly published and easily found. This digital transformation forms part of the University 4.0, which is an application of the Industry 4.0 to higher education in Vietnam.

As aforementioned, it is vital that input data for annual assessment of university autonomy should be digitally stored, collected, updated and submitted. These e-data are processed and analyzed from the first level (departments, centers and offices) to the second level (faculties for departments) and then to the third level (university). A complete university profiles will then be centrally submitted to an independently working committee or panel of experts accredited by the Ministry of Education and Training. By using the indicators and criteria proposed in Table 1, all the higher education institutions in the country will be evaluated and ranked in terms of university autonomy level, apart from other rankings, such as international publication, employability after graduation, students' satisfaction and so on. The most important indicators of the assessment that will attract the greatest attention from the public in general, and students as well as employers in particular, are quality of teaching, external funding gain, research power and citations, number of patents and job opportunities.

A few weeks before the start of a national university autonomy assessment (normally selected at the end of the year), a request from the Central Committee, on behalf of the Ministry of Education and Training and under the auspices of the Government, should be sent to all the participating universities and colleges via an inter-university network. Input data - within a university - can be collected by means of an intranet, stored in the server, automatically processed with a standard software program and accordingly put into relevant categories in a standard form provided by the Central Committee. Then they will be submitted to the Central Committee as a full university/college profile. The members of the Central Committee will check the data in each profile and make a ranking table. The outcomes of the annual university autonomy assessment should be announced at the beginning of the following year and electronically published. The whole process is presented in Figure 5.

Hanoi University of Civil Engineering has been prepared and started to strive for both digital transformation and innovative management based on university autonomy. Within two years of the post-Covid era (2022-2024). Among 77 indicators as proposed in the rating system of university autonomy level, 48 indicators have been noted for digital transformation, either as "new" (2) or "at a higher level" (3 and 4). Particular well rated (rated 4 out of 5) are the activities in sub-Category II.1 (Enrolment and Admission as administered and carried out by the Department of Training) and sub-Categories II.4, II.5 and II.6 (Research, Research Partnership and Intellectual Property Management as administered and carried out by the Department of Science and Technology). These are the Top 2 Departments across the University in terms of achieving University 4.0 and digital transformation. For the rest indicators, the University aims to accelerate this transformation and facilitate every effort to create a greater dynamo in the forthcoming years (2025-2030). This result is summarized and highlighted in Table 2.

**Table 2** *University 4.0 application at Hanoi University of Civil Engineering as of mid-2024*

| Category | Number of indicators | Number of indicators with University 4.0 | Note with level 2 (new), 3 and 4 (upgraded) out of 5 |
|---|---|---|---|
| I | 24 | 9 | I.1.a, I.1.b, I.1.c, I.2.d, I.3.a, I.3.b, I.3.c, I.3.d, I.3.e |
| II | 36 | 28 | II.1.a, II.1.b, II.1.c, II.1.d, II.3.a, II.3.b, II.3.c II.3.d, II.4.a, II.4.b, II.4.c, II.4.d, II.4.e, II.4.f, II.4.h, II.4.i, II.4.j, II.5.a, II.5.b, II.5.c, II.5.d, II.6.a, II.6.c, II.7.c, II.8.a, II.8.b, II.8.c, II.8.d |

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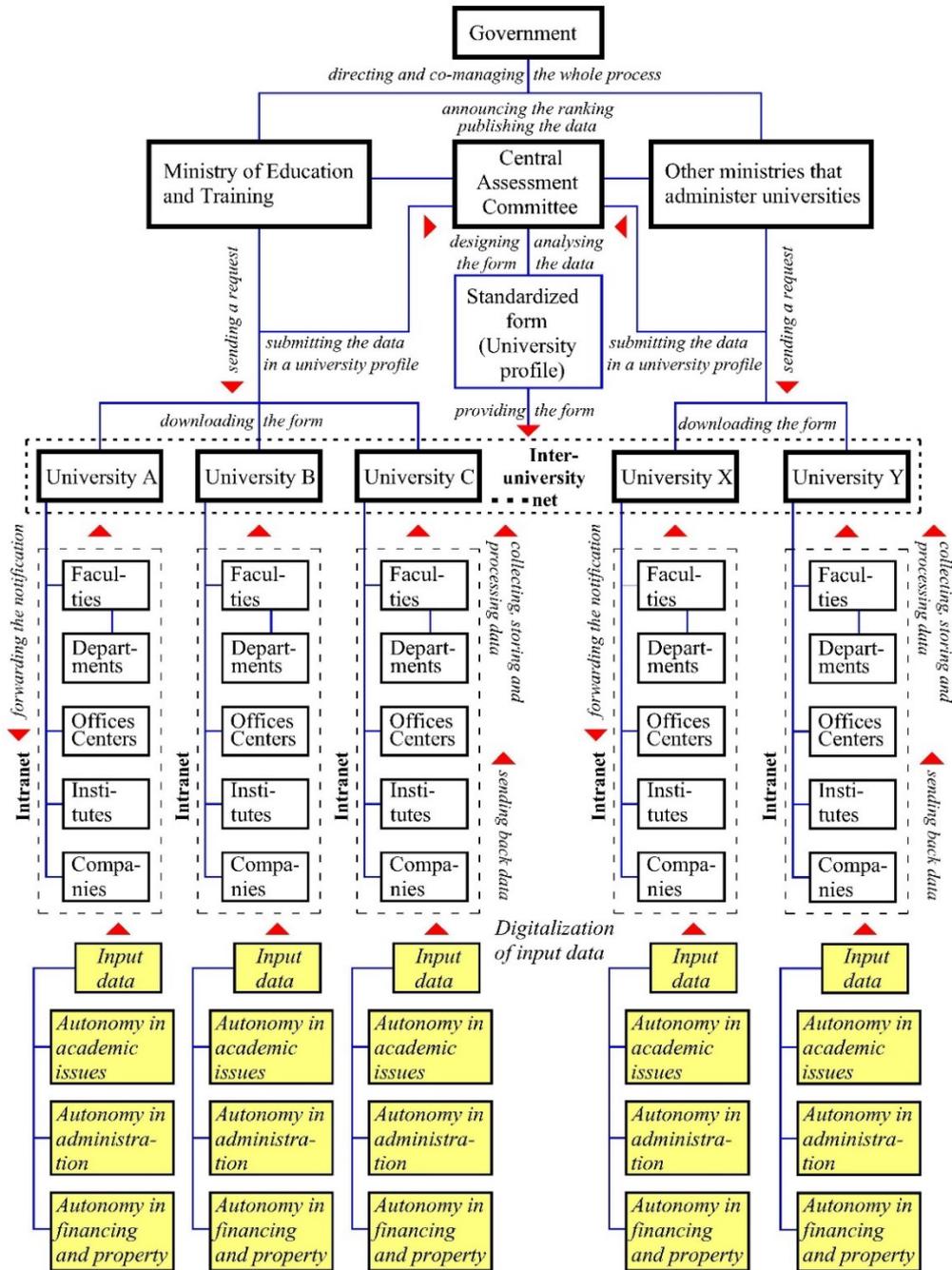| III | 17 | 11 | III.1.a, III.1.b, III.1.c, III.3.a, III.3.b, III.3.c, III.5.a, III.5.b, III.6.a, III.6.b, III.6.c |
|---|---|---|---|
| **Total** | **77** | **48** | (48/77 = 62.33% = intermediate level) |

**Fig. 5** *Digitalization concept for university autonomy assessment and University 4.0 development in Vietnam*

## 6. Conclusion

University autonomy is an indispensable trend in Vietnam today, when the Government regards education, particularly tertiary education, as a key to the success of the industrialization and modernization process of the country, and university autonomy can be considered greater opportunities (than challenges) for Vietnamese universities to grow more vigorously, not just to meet the higher requirement of the national socio-economic development in the 21st century, but also to keep up with the world education in a new technology 4.0 (or Internet of Things) era. Theoretically, Vietnamese universities seem to be well aware of (and prepared for) university

autonomy with a large number of research projects undertaken in recent years. However, in fact, a full set of indicators with a rating system as a lever, a guideline and a detailed instruction for universities to follow, has not yet been established. That is the reason why even the most successful universities in terms of applying university autonomy concept today have encountered some difficulties in implementation over the past ten years, and it took them a longer time to reach their goals. Therefore, it is imperative to develop such an effective instrument and assessment tool.

Encompassing 20 criteria and 77 indicators, a full set of assessment tool elaborated by an inter-university research group and standardized by experts is expected to help Vietnamese universities better prepare their own schedules and achieve university autonomy with concrete plans. This set of indicators has been used to examine the efforts for autonomy made by three universities in Vietnam at the first step, and by others as well later, provided that a full documentation is given. The preliminary testing shows that the indicators have been quite properly developed and can be officially adopted by the Ministry of Education and Training for a nationwide application.

University 4.0 or digital transformation has been regarded as an important goal to reach for the transitional years (2025-2030) at Hanoi University of Civil Engineering and for other leading institutions in Vietnam. The majority of activities have been, however, at an intermediate level of transformation (level 2 and 3) so far. Thus, it is imperative to upgrade this level to 4 and 5, not only with a greater investment in the IT-infrastructure, but also with a longer-term strategic development of human resources. International cooperation should play a decisive role in this process, especially in view of technology transfer, including education management technology.

## Acknowledgement

## Conflict of Interest

The authors declare that there is no conflict of interests regarding the publication of the paper.

## Author Contribution

*The authors confirm contribution to the paper as follows:* **Overview:** *Nguyen Quang Minh;* **Literature review:** *Nguyen Quang Minh, Nguyen Viet Phuong, Vu Tien Dzung and Vu Thi Hang;* **Data collection:** *Vu Tien Dzung, Vu Thi Hang and Hoang Thi Sinh Vien;* **Data analysis:** *Nguyen Quang Minh, Nguyen Viet Phuong, Vu Tien Dzung, Vu Thi Hang and Hoang Thi Sinh Vien;* **Graphics:** *Nguyen Quang Minh;* **Manuscript:** *Nguyen Quang Minh, Nguyen Viet Phuong and Vu Tien Dzung;* **Language editing:** *Nguyen Quang Minh.*

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