



## Article

# Autonomy Acquisition and Performance within Higher Education in Vietnam—A Road to a Sustainable Future?

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**Abstract:** The Vietnamese Government prioritizes education as a developmental investment within its socioeconomic development programs. Subsequently, Vietnam's higher education system (HE) is experiencing substantial transformation, emphasizing autonomy, because institutions endowed with self-governance capabilities may allocate societal resources more efficiently for developmental purposes. In this paper, we measured Vietnamese universities' total factor productivity change (TFPCH) in the autonomy context, using it as a proxy for the sustainable performance of HE institutions. We decomposed TFPCH into Technical Efficiency Change (EFFCH) and Technology Change (TECHCH) and regressed these indices with independent variables to derive their determining factors. Notably, we employed the derived intercept as a proxy for the autonomy context of Vietnam. The DEA found significant advancements in productivity and technology, indicating a positive paradigm shift within Vietnam's higher education system. The intercepts obtained from these regressions are positive and significant, implying that the autonomous environment supports the sustainable advancement of Vietnam's higher education system in both components of TFPCH: the catch-up ability (EFFCH) and technological improvement (TECHCH). In addition, we found that investment in vital resources (number of laboratories, research funding, or quality accreditation) improves productivity (TFPCH) via technological improvement. We also observed that private universities experienced higher performance progress than public ones. However, we did not find any significant relationships between the university scale or the location of the main campus and their performance. To further the growth of Vietnam's higher education system, we propose that the autonomy of institutions continues to be granted.

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**Keywords:** performance; autonomy; university; Vietnam

## 1. Introduction

In the current international context, issues of sustainable development for the future have assumed utmost importance. This concern is of utmost importance for developing nations across the globe, and it raises a critical inquiry: how can these countries proactively participate in and educate themselves on future sustainability? By showcasing their agility, these educational institutions significantly contribute to advancing innovations and technology, delivering vital training, and distributing crucial information relevant to sustainable futures [1]. The active participation of these institutions is essential in promoting a unified international endeavor to achieve sustainable development [2,3].

The integration of sustainable development (SD) has risen to prominence within higher education, prompting increased efforts by higher education institutions (HEIs) to actively assume the role of advocates for SD principles. HEIs, which generate knowledge and prepare students for their future societal roles, are crucial in propelling the transition towards a sustainable society [4–6]. This function underscores universities' complex yet essential role in shaping the next generation of responsible leaders in sustainable development.

Higher education institutions in developing countries encounter resource limitations because of many variables. Ziderman and Albrecht (2013), Abugre (2018), and Tilak (2003)

have demonstrated that a reduction in educational quality can be attributed to limited public funding, staffing shortages, and infrastructure constraints [7–9]. In developing countries, higher education institutions are granted different levels of autonomy [8,10–12]. For example, Jarernsiripornkul and Pandey (2018) and Lao (2015) showed that autonomous universities in Thailand have varying degrees of readiness and face challenges in leadership, resources, and international ranking. Similarly, in China, universities have limited autonomy due to external supervision, particularly in formulating and implementing regulations [10]. Several countries have adopted various financial strategies, multinational alliances, and regulatory and quality assurance to address these challenges [13–15]. Others undertake the renovation of their higher education systems and grant autonomy to higher education institutions as a means of optimizing the utilization of societal resources.

However, research on the relationship between university autonomy and performance reveals a complicated interplay of elements. According to Varghese and Martin (2014), significant endeavors are being undertaken by the central governments of China, Vietnam, Cambodia, and Indonesia. It has been noted that expanded autonomy in higher education primarily concerns procedural elements in less developed nations. The independence of this system is apparent in more developed countries, including Japan, where it operates both substantively and procedurally. A portion of the lack of success in Indonesia's transition to autonomy can be attributed to the perception of financial worries that emerged because of the state's retreat [16]. However, Agasisti and Shibanova (2020) and Aghion et al. (2010) discovered a positive relationship between autonomy and performance. They also emphasized the importance of competition. Kantabutra and Tang (2010) identified autonomous universities in Thailand as more effective regarding research efficiency [17–19]. Enders (2013), on the other hand, cautioned that the research was inconclusive and that various contextual circumstances influence the impact of autonomy on performance. Belgaroui and Hamad (2021) and Aithal and Aithal (2019) underline the importance of governance and the need for institutions to use their power to improve performance successfully. Clarice et al. (1984), Carvalho et al. (2023), and Ritzen (2016) emphasize the impact of political and external influences in determining the autonomy–performance relationship [20–25].

Significant improvements were realized in higher education in Vietnam because of the reforms that followed the *doi moi* (renovation) strategy. Despite the nation's shift towards a market economy, the higher education system was characterized by a centrally planned mechanism [16]. In 2013, Resolution No. 29-NQ/TW on fundamental and comprehensive innovation in Education and Training set an orientation for the Vietnamese higher education system, transitioning from centralization to autonomy [26]. Thus, the autonomy afforded to universities is regarded as the primary strategic measure to improve the higher education system, with the conviction that universities endowed with autonomy can actively capitalize on their strengths, leverage societal resources, and proactively pursue developmental orientation. Thus, universities in Vietnam are permitted an excessive amount of autonomy, mainly since Law 34 was drafted in 2018 and subsequently enacted in 2019 [27]. As a result, responsibilities for decision-making about universities, formerly done via the Ministry of Education and Training, have been decentralized. Universities have transformed into fully autonomous, self-responsible units.

In this paper, we measured the performance of universities in the autonomy context from 2018 to 2021. We regard this performance as a proxy for universities' sustainable development. The data were taken from the official websites of universities, as required by Circular 36/2017/TT-BGDT and other sources [28]. To evaluate the sustainable performance of universities, we analyzed multidimensional elements such as their efficiencies, the components of total factor productivity, and how it has evolved. Concurrently, we ascertained the variables that influence these measures, designating the intercept of regression models to represent the impact of the autonomy context.

The present study exemplified the correlation between autonomy at universities and their performance, a subject that has generated considerable debate in prior research. We also assessed Vietnam's autonomy strategy in light of the results to determine whether or

not the country's shift from a centralized to an autonomous higher education system was fruitful and sustainable.

## 2. Materials and Methods

This paper used a two-stage technique: the Data Envelopment Analysis (non-parametric benchmarking approaches) in the first stage and regression modeling in the second. First, we used panel data from 2018 to 2021 to develop Malmquist indices of total factor productivity change (TFPCH) using a CCR (Charnes, Cooper, and Rhodes) model [29]. Following Coelli et al. (1998) and Färe et al. (1994), we decomposed TFPCH into two categories: technological change (TECHCH) and technical efficiency change (EFFCH) for each university [30,31]. Second, these indices were regressed against a set of independent variables to determine the factors that influence them. This approach was undertaken to help understand the determinants of technology upgrades, technical efficiency, and productivity change in Vietnamese universities.

### 2.1. Data Envelopment Analysis (DEA)

Technical efficiency is frequently used in economics. It is the ability of a decision-making unit (DMU) to utilize inputs to generate outputs. Specifically, technical efficiency pertains to the capacity of a DMU to optimize its outputs, given a vector of inputs, or to reduce the magnitude of its inputs to obtain a given vector of outputs. Numerous methods for determining technical efficiency can be used, including parametric and non-parametric approaches [29,32]. DEA, one of the non-parametric approaches, is extensively implemented in empirical research [33].

DEA comprises several quantitative models that employ linear programming to assess the relative efficiency of DMUs to benchmark and undertake performance evaluation. Extensive research in management, economics, education, and health care has considerably used these models [34,35]. Because it makes no assumptions concerning the weights of the underlying production function, DEA is classified as a non-parametric approach. This technique is suitable for autonomous universities because they enjoy a high level of self-government and become actual DMUs. The DEA models, which were introduced by Banker, Charnes, and Cooper (1984) (or BCC) and Charnes, Cooper, and Rhodes (1978) (or CCR), are constructed in the following manner and are grounded in the linear programming problem [29,36].

We consider  $n$  decision-making units denoted by DMU $_j$  ( $j = 1, 2, \dots, n$ ). Each DMU $_j$  uses a vector of inputs  $x_{ij}$  ( $i = 1, 2, \dots, m$ ) to produce  $s$  outputs  $y_{rj}$  ( $r = 1, 2, \dots, s$ ). The primal linear programming for CCR and BCC models with input-oriented methods can be written as follows:

$$\begin{aligned} & \text{Min } \theta \\ \text{Subject to} & \sum_{j=1}^n \lambda_j x_{ij} \leq \theta x_{i0} \quad i = 1, 2, \dots, m; \\ & \sum_{j=1}^n \lambda_j y_{rj} \geq y_{r0} \quad r = 1, 2, \dots, s; \\ & L \leq \sum_{j=1}^n \lambda_j \leq U; \\ & \lambda_j > 0 \quad j = 1, 2, \dots, n. \end{aligned} \tag{1}$$

where  $x_{i0}$  and  $y_{r0}$  are respectively the  $i^{\text{th}}$  input and the  $r^{\text{th}}$  output of the DMU $_0$  under evaluation for its efficiency score calculation.

This DEA model will be the CCR model when  $L \geq 0$  and  $U < \infty$  are included as linear programming constraints. This model is sometimes called the CRS (Constant Returns to Scale) DEA model. The BCC model is obtained if  $L = 1$  and  $U = 1$ . This model is called the VRS (Variable Returns to Scale) DEA model.

## 2.2. Malmquist Productivity Change Measurement

Based on DEA models, Färe et al. (1994) measured the Malmquist Total Factor Productivity Change (TFPCH). The index is divisible into two components: the first index quantifies alterations in technical efficiency independent of the production possibility frontier (PPF) shift (called the Efficiency Change or EFFCH in abbreviation), while the second index tracks progressions in the PPF (called the Technology Change or TECHCH in abbreviation) [30,31].

$$TFPCH = EFFCH \times TECHCH \quad (2)$$

EFFCH quantifies the degree to which the DMU can catch up with the most advanced DMUs at the PPF [30]. TECHCH measures the change in the PPF between two periods. In other words, TECHCH evaluates the change in the technology of the whole industry. In contrast, EFFCH quantifies the individual improvement in technical efficiency under the condition that the frontier remains unchanged. A value greater than one for these indices indicates that the innovation's representative components are extant [30,31].

This study is not intended to cover the vast subject of DEA. Readers interested in a comprehensive explanation of the many aspects of DEA might consult the literature evaluations conducted by Cook and Seiford (2009) and Kuah et al. (2010) [37,38].

## 2.3. DEA Model for Vietnamese Universities

Kuah and Wong (2011) proposed two models to calculate universities' teaching and research efficiencies. In addition, they combined these models into a single model to measure the overall efficiency of the universities. In this paper, we benchmarked the inputs and outputs in their combined model, since these teaching and researching functions are stipulated together by the Higher Education Law of Vietnam [27,39]. Though the weights ascribed to each activity may vary, teaching and researching are two obligations of faculties and research staff in the Vietnamese higher education system. For this reason, our model aimed to deal with both educational and research inputs/outputs specifically.

We obtained data from 32 institutions (out of 236 HEIs), of which 9 were private and 23 were public, by utilizing information that was published on their official websites from 2018 to 2021. The number of universities included in the analysis was limited to 32 due to the requirement for balanced and panel data. Nevertheless, the research achievements of universities were obtained from the Google Scholar database. First, the details relating to students, academic staff, and funding were derived from the five reports (M17: quality commitment, M18: actual educational quality, M19: educational facilities, M20: academic staff, and M21: budgets) mandated to be released under Circular 36/2017/TT-BGD of the Ministry of Education and Training of Vietnam [28]. Real input and output data are fundamentally indispensable in DEA. However, some essential university inputs/outputs are qualitative; thus, we used a scoring system to convert qualitative variables into quantitative ones [33,40]. Second, we count the citations of each university's academic staff based on Google Profiles Databases. The number of citations is used as a measure of a university's research output. It is worth noting that Kua and Wong (2011) used the number of academic papers published. However, research papers are not comparable in quality. The number of citations of academic staff is a better proxy for a university's research output. Following the Webometrics Methodology, we excluded the 20 top researchers from the profile investigation [41]. The inputs and outputs of DEA model is presented in Table 1.

**Table 1.** Inputs and outputs of a mixed teaching and research efficiency.

Inputs	Outputs
X <sub>1</sub> : Number of academic staff	Y <sub>1</sub> : Number of graduates
X <sub>2</sub> : Number of students	Y <sub>2</sub> : Average graduates' results (scoring)
X <sub>3</sub> : Qualification of first-year students (minimum entrance score)	Y <sub>3</sub> : Graduates' employment (after one year)
X <sub>4</sub> : University's total budget	Y <sub>4</sub> : Number of citations (from academic staff profiles)

Source: Authors' model (as per [1]).

The number of academic staff,  $X_1$ , is calculated using a scoring system based on Kua and Wong (2011) (professors and above = 4, associate professors = 3, Ph. D holders = 2, master's degree holders = 1). We noted that Circular 03/2022/TT-BGDT regulates a similar scoring system [42]. The number of students,  $X_2$ , is estimated using a conversion system (undergraduates = 1, master students = 2, and doctoral students = 3). The minimum grades necessary for enrollment stipulate the qualification,  $X_3$ , of the first-year student. We noted that the average GPA of students was utilized for this input by Kua and Wong (2011). Because this information is unavailable, the minimum score necessary for university admission is used. The budget,  $X_4$ , is derived from the funding report the Ministry of Education and Training requires. The average graduation results,  $Y_2$ , are calculated using the graduation ratings (excellence = 4, very good = 3, good = 2, and fair = 1).  $Y_3$  is the percentage of graduates that have a job one year following graduation.

All data are panel from 2018 to 2021, as we sought to measure both efficiency and changes in the performance of Vietnamese universities.

#### 2.4. Econometric Model Specification

A qualitative model was used to analyze the interactions between independent and dependent variables to derive factors affecting technical efficiency, technology, and productivity improvements. As in Hoi et al. (2021), three indices (TFPCH, EFFCH, and TECHCH) were swapped to be utilized as a dependent variable in the regression model [43]. We should highlight that a higher value of a university's index indicates a greater ability to improve or maintain the performance aspect represented by this index. The regressions are as follows:

$$Y = \alpha_0 + \sum_{i=1}^8 \alpha_i X_i + \sum_{j=1}^3 D_j + e \quad (3)$$

where

$X_i$  and  $D_j$  are numeric and dummy variables, respectively.

We drew upon previous research and the availability of data to construct independent variables. The independent variables can be divided into three groups. The first group includes variables linked to the scale of universities, including the number of students (STUNUMBER), academic staff number (FANUMBER), and the number of highly qualified faculties (HQFNUMBER) [44–46]. The second group consists of variables related to vital resources of universities, namely land area per student (LANDPS), floor area of buildings per student (AREAPS), number of laboratories (LABNUMBER), research funding (RESEARCHFUND), and governmental subsidy amount (GOVTSUB) [44,45,47]. The last group includes dummy variables, which are accreditation strategy (QAMETHOD), ownership of universities (OWNERSHIP), and location (LOCATION) [48–50].

In particular, the context of university autonomy in Vietnam is quantified through the intercept value derived from regression models. Theoretically, the intercept is the expected value of the dependent variable when all independent variables are zero. It captures the changes in the response variable that are not accounted for in explanatory variables. It is generally interpreted as the overall impact of fixed factors on the dependent variable in the regression model. This interpretation was discussed and used in prior studies [51–54]. In this paper, we employed the intercept as a proxy for the impact of the autonomy context on the performance of universities. If the intercept value is greater than zero and is statistically significant, the context positively supports the performance of universities in general. In other words, we interpret a positive and statistically significant intercept to imply that the context of autonomy is pushing universities to improve performance.

### 3. Results

#### 3.1. Autonomy Context and Some Figures of Vietnam Universities

Although the beginnings of legislative codification of university autonomy were introduced relatively early in Vietnam, meaningful autonomy was only recently legalized. The Higher Education Law No. 08/2012/QH13, as amended in 2018 by No. 34/2018/QH14 (Law 34), has, as its primary concern, the expansion and improvement of university au-

tonomy [27,39]. Law 34 has cemented the conceptual meaning of university autonomy and established procedures for autonomous decisions in several areas. Law 34 governs professional and academic autonomy, organizational structure, human resource management, and finance. However, the law still compels higher education institutions to be accountable to the Ministry of Education and Training and its stakeholders. Notably, they are responsible to learners, society, and management agencies for quality commitments, disclosure of annual performance indicators, and financial statements. The university's board of trustees is a governing body supervising the organization and administration and making critical decisions to increase university autonomy and social responsibility. Thus, universities are transitioning to become highly autonomous entities. Table 2 summarizes significant points of the development of the Vietnamese Legal Framework.

**Table 2.** Changes in the legal framework for university autonomy in Vietnam.

No.	Document	Year	Content
1	Education Law No. 11/1998/QH10	1998	Course content, instructional materials, lesson plans, and teaching autonomy [55].
2	Education Law No. 38/2005/QH11	2005	Curriculum, material, and instructional and learning plan autonomy. Academic oversight of student enrollment, accreditation, and training. Human resources and recruitment via self-governance [56].
3	Higher Education Law No. 08/2012/QH13	2012	Quality assurance, training, international cooperation, and organizational autonomy. Accountable for overseeing the enrollment process, establishing enrollment quotas, disseminating public information regarding quotas, training quality, and fulfilling other obligations associated with ensuring the quality of instruction at higher education institutions. Because of the university council's restricted jurisdiction, autonomy in financial matters was curtailed [39].
4	Amended Law on Higher Education No. 34/2018/QH14.	2018	Academic institutions are endowed with autonomy regarding communicating and implementing their policy guidelines for student tuition and scholarships, academic staff, public employees, and other personnel, and the enrollment and initiation of new training programs. The function of university councils is expanded by law, and universities are granted greater financial autonomy. Universities that operate with autonomy must also answer to society, parents, and students, in addition to the responsibilities outlined previously. The Ministry of Education and Training retains jurisdiction over the complexities associated with the independence and accountability of higher education institutions [27].

Source: Ngo et al. (2023) [57].

Table 3 provides data for the numbers of institutions, types of students and faculty, and funding data for school years 2017–2018 and 2021–2022. Six universities were established from 2018 to 2021, contributing to Vietnam's overall count of 242 universities, comprising 175 public institutions and 67 private ones. Notably, undergraduate enrollment has shown a tendency to increase, while graduate enrollment has experienced a decline. As a result, the scale of undergraduate training expanded over the period, while postgraduate training has decreased. The number of highly qualified lecturers, including professors and associate professors, has decreased across public and private educational institutions. This decline can be primarily attributed to stricter regulations regarding the quality standards for recognizing professor and associate professor titles, including the requirement to have academic works published in accredited journals. Newly established universities entering the system during this period may have contributed to this decline. Since these universities primarily provide instruction for undergraduates, full-time faculty members with professor or associate professor titles are not mandatory.

Government subsidies to universities remained relatively modest, amounting to approximately VND 4 million per student annually. This funding was predominantly directed towards public institutions, with a particular emphasis on those specialized in pedagogy. A notable difference existed in tuition fees between public and private universities. Private university tuition was typically three times higher than that of public universities. This disparity in tuition fees constitutes a fundamental factor driving greater student competition for admission to public institutions.

**Table 3.** Some characteristics of the Vietnamese Higher Education System.

Criteria (Per University)	2017–2018			2021–2022		
	Total	Type		Total	Type	
		Public	Private		Public	Private
Number of institutions	236	171	65	242	175	67
Admitted undergraduate students	1852	2064	1295	2351	2533	1875
Admitted graduate students	203	245	95	132	165	45
The scale of undergraduate students	7233	8418	4116	8865	9879	6217
The scale of graduate students	514	626	220	502	620	196
- Master students	452	541	215	454	554	193
- PhD students	62	84	4	48	66	3
Annual graduation	1448	1770	599	1013	1224	462
Full-time faculty	318	346	242	323	331	301
- Full Professors	3.1	3.1	3.1	2.5	2.6	2.1
- Assoc. Professors	19.2	22.2	11.4	190	2.6	2.1
Govt's subsidy per student (Million VND)	3.4	4.1	0.0	3.8	4.6	0.0
Annual tuition (million VND)	14.1	11.6	25.0	18.0	13.0	41.0

Source: Ministry of Education and Training [28,58].

### 3.2. Efficiency Analysis of Vietnam Universities

With the input orientation method, universities' efficiency was assessed using the BCC and CCR models with inputs/outputs in Table 1. The DEAP application (Version 2.1) was employed to calculate the DEA model. The efficiency scores achieved using DEA are presented in Table 4 (see below).

**Table 4.** Efficiency scores and causes of inefficiency of Vietnamese universities (DEA results).

University Group	No. of Uni.	General Efficiency (CRS%)	Internal Efficiency (VRS%)	External Efficiency (Scale%)	Cause of Inefficiency
		GE	IE	EE	
The year 2018					
Efficiency	14	100	100	100	-
External Inefficiency	5	91.4	100	91.4	EE
In/external Inefficiency	13	80.2	83.4	96.1	IE, EE
Average	32	90.6	93.3	97.1	IE, EE
The year 2021					
Efficiency	18	100	100	100	-
External Inefficiency	5	92.3	100		EE
In/external Inefficiency	9	77.6	82.8	93.7	IE, EE
Average	32	92.5	95.2	97.1	IE, EE

A university's general efficiency (CRS) is determined by its capacity to effectively employ resources (inputs) and surmount external challenges to deliver services of the highest quality compared to the most preeminent university. Complete efficiency is attributed to the university when the general efficiency reaches 100 percent. Internal efficiency (VRS) pertains to the capacity of the university administration to maximize the utilization of its available resources (inputs) to deliver optimal educational and research services to the recipients (outputs). The external efficiency (scale efficiency) of a university refers to the ability of university administration to surmount external variables that detract from the quality of service rendered (outputs) [59,60].

As of 2018, fourteen universities had achieved complete efficiency, while eighteen universities were at this level in 2021. However, the average general efficiencies of the 32 universities in 2021 and 2018 are 92.5 and 90.6 percent, respectively. Thus, for a given output level (including the number of graduates, number of citations, graduates' employment, and graduate results), a university could reduce inputs by 7.5% in 2021 and 9.4% in

2018 on average. The relatively high and similar efficiencies suggest that universities in Vietnam probably exhibit comparable instructional and research techniques.

Nine universities were considered inefficient in 2021 (as opposed to thirteen institutions in 2018) because of a confluence of internal and external causes, as determined by decomposing general efficiency into internal and external efficiencies. Universities had an average internal efficiency (IE) of 95.2 percent in 2021 and 93.3 percent in 2018. In 2021, universities had an average external efficiency (EE) of 97.1%, while this was 97.1 percent in 2018. This finding suggests that inefficiencies in internal operations management, rather than the ability to manage and overcome external environmental restrictions, were the primary cause of universities' failure to reach complete efficiency.

### 3.3. TFP Change Analysis of Vietnam Universities

As shown in Table 5 and Figure 1, the total factor productivity of Vietnamese universities increased between 2018 and 2021, with an average increase of 10% (TFPCH = 1.10). Of these universities, only nine experienced decreased productivity (accounting for 27.9% of surveyed universities). This fact indicates recent progress in the productivity of Vietnam's higher education system. Additionally, enhanced technical efficiency (EFFCH = 1.007) and instructional technology (TECHCH = 1.092) contribute to increased productivity (TFPCH = 1.100). It is worth noting that the DEA model, with inputs/outputs in Table 1, measures the mixed teaching and research performance of universities.

**Table 5.** Productivity, efficiency, and technology of Vietnamese universities (DEA output).

Criteria	Technology (TECHCH)	Technical Efficiency (EFFCH)	Total Factor Productivity (TFPCH)
Index values			
2019	1.069	0.987	1.055
2020	1.023	1.017	1.041
2021	1.189	1.018	1.211
Period 2018–2021	1.092	1.007	1.100
Number of universities (2018–2021)			
Advanced	28	14	26
Unchanged	1	13	1
Decreased	3	5	5
Total	32	32	32

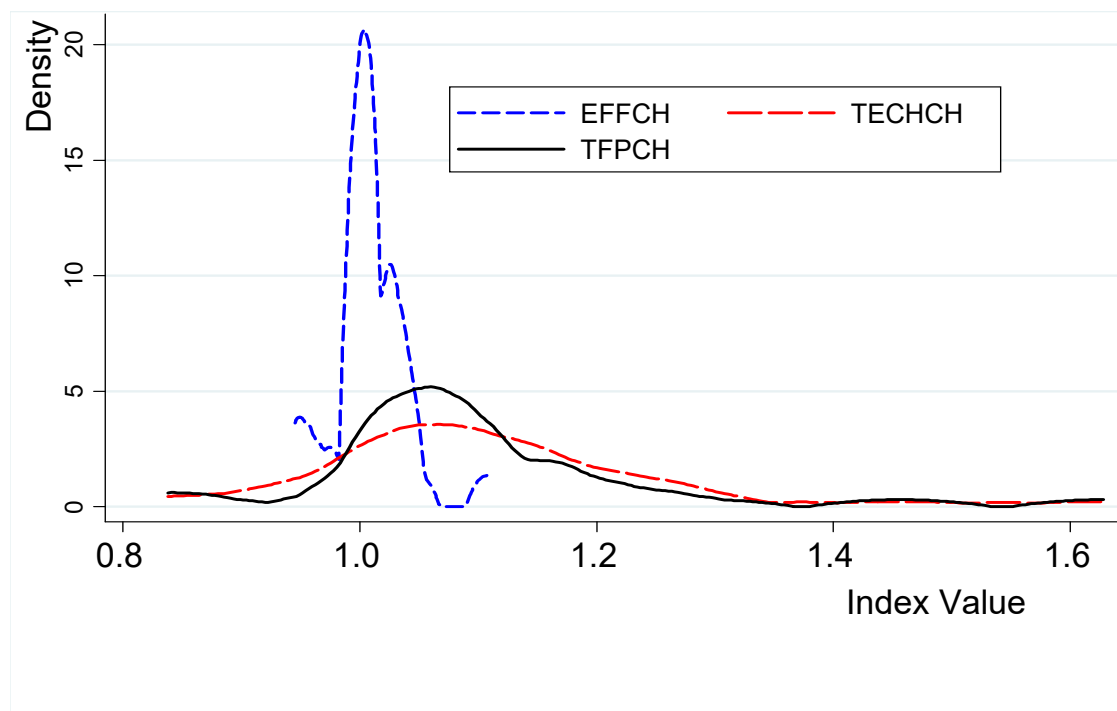
Source: DEA outputs.

From 2018 to 2021, technical efficiencies (EFFCHs) rose, suggesting perhaps that universities had made similar efforts in this regard. However, this growth has been modest, accounting for only 0.7 percent. Concerning the number of universities, fourteen universities out of thirty-two could be advancing in this manner, representing 43.7 percent of observed universities. A more significant percentage (56.3%) was seen to have stagnated or declined in technical efficiency.

Concerning technology, namely, the capacity to realign the PPF of the entire Vietnamese higher education system to the right, 96.7% of universities, or 28 out of 32 institutions, reported advancements over this time. This collaborative endeavor demonstrates that universities in Vietnam are not merely benchmarking with one another but also contributing to the advancement of educational technology of the whole system.

The primary factor driving the change in TFP, as illustrated in Figure 1, is the progression of technology. As stated above, the performance features are represented by proxies comprising the performance index (TFPCH, EFFCH, and TECHCH). We used the geometric means of these indices (spanning 2018 to 2021) to draw Figure 1 to represent the sustainable performance of higher education institutions. Thus, the advancements in productivity and technology indicate that universities in Vietnam have successfully and sustainably developed during the transition.





**Figure 1.** The density of EFFCH, TECHCH, and TFPCH (geometric means).

### 3.4. Factors Affecting the Performance of Vietnamese Universities

In this section, we analyze the factors affecting the increase of total factor productivity (TFPCH), technical efficiency (EFFCH), and technological level (TECHCH) of Vietnamese universities. The specific model is shown in Table 6.

**Table 6.** Dependent and independent variables assigned in the regression model (based on [33,44–49]).

Variable	Type	Descriptions	Expected Signs
Dependent variables			
Y: TFPCH	Cont.	A proxy for the ability to improve the total factor productivity of a university during 2018–2021	
Y: EFFCH	Cont.	A proxy for individual improvement or the ability of a university to benchmark the best universities (the universities on the PPF) during 2018–2021.	
Y: TECHCH	Cont.	A proxy for the ability to shift the PPF outward during 2018–2021	
Explanatory variables			
X <sub>1</sub> : STUNUMBER	Discrete	Student population of the university	+/-
X <sub>2</sub> : FANUMBER	Discrete	Number of the academic staff of the university	+/-
X <sub>3</sub> : HQFNUMBER	Discrete	Number of highly qualified faculties (full and associate professors)	+
X <sub>4</sub> : LANDPS	Cont.	The area of land (m <sup>2</sup> )	+
X <sub>5</sub> : AREAPS	Cont.	The floor area of buildings (m <sup>2</sup> )	+
X <sub>6</sub> : LABNUMBER	Discrete	Number of labs	+
X <sub>7</sub> : RESEARHFUND	Cont.	Funding for research	+
X <sub>8</sub> : GOVTSUB	Cont.	Governmental subsidy to the university	+
D <sub>1</sub> : QAMETHOD	Binary	Accreditation by accreditation organizations: Foreign 0; Vietnamese: 1.	-
D <sub>2</sub> : OWNERSHIP	Binary	Private: 0; Public: 1.	+/-
D <sub>3</sub> : LOCATION	Binary	The main campus in a small city: 0, otherwise: 1.	+

The results of the regression analysis are displayed in Table 7. As mentioned above, the regression models comprise many dummy variables that remain constant over this period, including LOCATION, OWNERSHIP, and QAMETHOD (D1, D2, and D3). Considering these, random effects regression models were chosen. We first see that three intercepts or constants are positive and statistically significant. This finding shows that the autonomy

context enhances universities in performance and competitiveness. The university autonomy mechanism has incentivized institutions to improve their operational performance (TFPCH) through investments in educational technology (TECHCH) and learning from premier universities (EFFCH).

**Table 7.** Random effects regression model results.

VARIABLES	(1)	(2)	(3)
	TFPCH	TECHCH	EFFCH
X1: STUNUMBER	$-1.04 \times 10^{-6}$	$-2.66 \times 10^{-7}$	$-7.25 \times 10^{-7}$
X2: FANUMBER	0.000177	$9.14 \times 10^{-5}$	$9.01 \times 10^{-5}$
X3: HQFNUMBER	-0.00205	-0.00146	-0.000636
X4: LANDPS	-0.00326 *	-0.00312 **	$-5.65 \times 10^{-5}$
X5: AREAPS	0.000388	0.000385	$1.96 \times 10^{-5}$
X6: LABNUMBER	0.00141 ***	0.00139 ***	$8.22 \times 10^{-6}$
X7: RESEARCHFUND	0.00459 **	0.00404 **	0.000494
X8: GOVTSUB	-0.000101	$5.42 \times 10^{-5}$	-0.000139
D1: QAMETHOD	-0.149 **	-0.119 **	-0.0278
D2: OWNERSHIP	-0.118 *	-0.113 *	0.00142
D3: LOCATION	-0.0154	0.0117	-0.0133
Constant	1.179 ***	1.148 ***	1.009 ***
Observations	96	96	96
No. of universities	32	32	32
R-squared	0.233	0.277	0.048

Note: \*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$ ; Source: Regression results.

In promoting efficiency and facilitating technological improvements, universities have relied chiefly on autonomous legislative frameworks to increase professional and scholarly excellence. The autonomy context contributes a fixed value of 1.009 to the catching-up ability (EFFCH) of HEIs and a fixed effect of 1.148 on the technological advancement of the HEIs (TECHCH), two vital academic performance indicators. The intercept derived from the TFPCH regression of 117.9 percent (greater than 1) implies that the autonomy context has significantly contributed to advancements in productivity. Thus, the autonomy mechanism has been the most crucial determinant in the technological efficiency and productivity advancements of universities in Vietnam.

In more detail, we see that investments in critical resources increased productivity through technological competence (Figure 1). Specifically, the number of research laboratories ( $X_6$ , LABNUMBER), investment in research ( $X_7$ : RESEARCHFUND), or selection of foreign accreditors ( $D_1$ : QAMETHOD) increased technology and thereby increased productivity. We also found that private universities had higher progress in productivity and technology than public ones (Variable  $D_2$  (OWNERSHIP) has a negative coefficient). However, the land area per student ( $X_4$ : LANDPS) reduced productivity and technology (this coefficient is negative). A possible explanation for this may be that universities with a long history of operation are often located in big cities. Hence, their land area is smaller than those of newly established universities.

The variables associated with university scale did not exhibit any statistically significant link to universities' performance. There seems to have been no meaningful correlation between scale and academic achievement at universities in Vietnam.

Regarding the capacity to attend a preeminent university (EFFCH), we discovered that all explanatory variables are insignificant except for the intercept. This fact indicates that the explanation for this capacity is incomplete. Our presented model only demonstrates that an autonomous environment enhances this capability.

#### 4. Discussion

Prior research on the correlation between university autonomy and performance has been inconclusive. Existing literature investigating the relationship between university

autonomy and performance reveals a complex network of interrelated components, possibly explaining this lack of certainty. Performance and autonomy were found to be positively correlated, according to Aghion et al. (2010) and Agasisti and Shibanova (2020). However, Enders et al. (2013) and Fumasoli et al. (2014) cautioned against the scarcity of conclusive data and the complexity of contextual factors that affect the relationship between autonomy and performance. The importance of governance and the necessity for institutions to effectively utilize their autonomy to improve performance were emphasized by Aithal and Aithal (2019) and Belgaroui and Hamad (2021). Ritzen (2016) and Clarice et al. (1984) offer more substantiation for the proposition that political and external factors substantially impact the relationship between autonomy and performance [17,18,20–22,24,25,61].

Our paper supports the hypothesis that autonomy enhances the performance of universities. First, the high-efficiency values suggest considerable similarity in utilizing resources for educational and professional excellence. Remarkably, this capacity increases over the period. Second, the total factor productivity of Vietnamese universities increased between 2018 and 2021. This finding reveals the progress of Vietnam's higher education system. Finally, the regression outcomes demonstrate the importance of autonomy on three indices, representing the university's productivity, technology, and efficiency. The positive and significant impact of the context on university performance is strong evidence for the argument that the autonomy mechanism enhances the performance of universities.

In addition, it is crucial to note that this causal relationship was established in relation to the continued viability of collegiate activities (from 2018 to 2021). This suggests that sustainable development could potentially be achieved by implementing the autonomy-granted strategy.

## 5. Conclusions

This study investigated the relationship between the autonomy context and the performance of Vietnamese HEIs. In addition, we considered several aspects related to the sustainability of this performance. Notably, we have modified the DEA models Kuah and Wong (2011) proposed to measure the TFPCH of Vietnamese universities from 2018 to 2021. This TFPCH metric has been employed as a proxy to gauge the sustainable performance of these institutions.

The results from the DEA analysis revealed significant advancements in productivity and technology, signaling a positive paradigm shift within Vietnam's higher education system. We found that private universities exhibited higher performance progress than their public counterparts. Nevertheless, our level of confidence was insufficient to establish any correlations between the institution's performance and the main campus's size or location.

Remarkably, we found a positive impact of the autonomy context on the performance of universities in Vietnam. The positive and significant intercepts obtained from the regressions indicate that the autonomy environment is conducive to the progress of Vietnam's higher education system, particularly in terms of both components of TFPCH—namely, catch-up ability (EFFCH) and technological improvement (TECHCH). Additionally, our findings suggest that investments in critical resources, such as the number of laboratories, research funding, and quality accreditation, contribute to enhanced productivity (TFPCH) through technological improvement.

Finally, we argued that the findings above indicate a positive causal association between autonomy and sustainable development of universities, as observed for a while. Thus, we suggested that bestowing autonomy upon universities constitutes a viable strategic approach to foster the enduring growth of Vietnam's higher education system.

It is noteworthy to mention that this research does have several limitations. One limitation is the lack of homogeneity in the operation of the higher education system, which precludes the generalizability of the results. In addition, the research did not address particulars such as the university's profile. This aspect is equally crucial since it can significantly impact the scoring system's outcomes (e.g., the number of students or

citations). Ultimately, the proposed scoring methods could potentially introduce biases in performance measurement.

Finally, the findings presented herein were derived from a representative sample of 32 higher education institutions in Vietnam. Further inquiries should aim to increase the number of observations to strengthen the level of confidence.

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