

## Article

# Improving the Economic Mechanisms of The Transition to Innovative Development in The Higher Education System(on The Example of Non-Governmental Educational Institutions) in Uzbekistan

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**Abstract:** This study investigates the economic mechanisms driving innovative development within non-governmental higher education institutions (HEIs) in Uzbekistan. Despite efforts to modernize, these institutions face financial and infrastructural challenges that limit their capacity for innovation. Addressing a gap in the literature on the impact of economic mechanisms on HEIs in emerging economies, this research utilizes a survey-based Ordered Probit Model (OPM) to assess how variables such as government support, industry partnerships, tax incentives, and financial barriers influence institutional innovation. The findings reveal that financial constraints significantly restrict innovation, while government support and diverse funding sources positively impact developmental initiatives. Results indicate that industry partnerships contribute to innovation, although the effect of tax incentives remains moderate. These insights suggest policy implications that emphasize expanding government grants, enhancing tax incentives, and fostering public-private collaborations to create a sustainable innovation ecosystem within Uzbekistan's non-governmental HEIs.

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## 1. Introduction

For innovation in higher education to be driven, economic mechanisms play an important role in sustainable institutional development, which is closely related to the development of institutions. Without these mechanisms (government subsidies, tuition policy, and investment in research infrastructure), our competitive and progressive educational institutions would not be able to survive. In countries experiencing economic and reform of education, including Uzbekistan, studies show that sustainable funding strategies make it possible for higher education institution (HEI) to respond to the changing economic needs while introducing innovative practices (Johnstone, 2017). Research in emerging economies has shown that when these economies have robust economic framework in place, HEIs have greater capacity to invest in the digital transformation, research and collaboration with industry (Altbach & Knight, 2019; Wong, 2021). It is widely recognized that economic support mechanisms play a role in HEIs. For instance, Altbach and Knights (2019), in an example study, analyze sentiments for why

institutions internationalize higher education, how broader economic backing orients institutions to innovate and grow, even when such funding hasn't risen significantly. Additionally, Johnstone (2017) emphasizes the strategic value of finance in establishing fair access to education and encouraging the adoption of new technologies and cross disciplinary collaboration by the institutions. Studies of global best practices in financing and economic policy within the higher education sector in this context are especially beneficial to Uzbekistan's educational reforms, which are designed to foster an innovation driven economy. *Innovation in Higher Education: A Global and Regional View* Such things as modernizing curricula and the use of digital tools, and through partnerships with industry, can be seen as innovation in higher education. These innovations, moreover, are being adopted globally by HEIs to provide students with skills that are useful to the current labour force (Marginson, 2018). Recently, Roberts and Peters (2020) assert the rise of knowledge digitalization in HEIs by asserting that innovations such as Online learning platforms and cooperative research technologies are reshaping the ideas of education. This is particularly relevant to Central Asia that is undergoing such trend in digitalization and transformation of the curricula as governments increase their investment in HEIs in the framework of broader economic modernization strategies (Kostova & Knyazeva, 2022). The area is researched and the economic imperatives that drive them to innovate within HEIs are highlighted.

Government studies in Central Asia confirm that governments have understood the role of HEIs in economic development, and hence have supported them by investing in education infrastructure, and encouraging public and private partnerships (Kostova & Knyazeva, 2022). Similarly, Marginson's (2018) work illustrates the ways in which innovation led educational policies are advantageous to emerging economies by signaling institutions' alignment of goals with labor market requirements. It enables continuous skills development in high demanding areas, leading to higher regional competitiveness. *Non-Governmental Institutions in Higher Education: Challenges and Opportunities* Unlike the government's own system of HEIs, which lacks flexibility and may therefore not be able to adapt flexibly, non-governmental HEIs demonstrate unique strengths in innovative practices in terms of curriculum design, digital learning, and infiltrated agile management structures (Harman, 2021). But such institutions often fund themselves through tuition fees, donations or partnerships. There are hurdles for non-governmental HEIs, said Harman (2021), including little access to the public funds and rivalry from government run universities. Chen (2020) research demonstrates that such challenges demand policy reforms that permit government less HEIs to gain access to the same kind of innovation support and resources that are provided to public provider. Non-governmental HEIs face significant economic pressures in attempting to balance affordability with investment in developing innovative tools and programs. Research indicates that with policy support, non-governmental HEIs can make significant contribution to the overall educational environment by experimenting with new configurations that can better engage students and prepare for employment (Mok, 2021). Within the Uzbek context, HEIs innovative capacity can be maximized by addressing funding inequities between public and non-governmental HEIs, thus creating a more diverse, and dynamic educational system. ■ *HEIs Economic Mechanisms Supporting Innovation* (Liu, 2023).

There are several economic mechanisms to identify which are critical driver innovation to higher education. Types of policy interventions that could stimulate growth and innovation in HEIs include tax incentives, grants, and subsidies to support research focused initiatives (Smith and Lewis, 2019). The Lin and Shaw (2021) study underscores that in order to have the proper allocation of resources, funds should be directed away from low impact areas (e.g., faculty development, infrastructure, and research initiatives that match innovative goals) and toward areas of high impact. Anderson and Walker (2020) illustrate, further research suggests that partnerships between academia and

industry are essential for developing sustainable economic models for research and practical application.

Monetary mechanisms of this type have been shown to be effective in many international contexts. According to Smith and Lewis (2019), tax incentives for funding of research can serve as a means to grow an innovation inclining culture in non government HEIs that rely on private support. Furthermore, Lin and Shaw (2021) point out that mechanisms of strategic funding choices are important to support HEIs to cope with the requirements of a knowledge economy. In particular, these mechanisms are applicable to the higher education system of Uzbekistan, in which the policies of changes might permit to create a more inclusive and idea-friendly ambience on the side of the HEIs. The Economic Reforms of Uzbekistan and its higher education landscape (Ge, 2024).

In Uzbekistan, some reforms have been conducted to modernize the country's HE sector and provide economic incentives and regulatory modifications as the support for non-governmental HEIs (Usmanova & Karimov, 2022). Consistent with the government's commitment to construct a knowledge-based economy and turn Uzbekistan into a regional education hub, these reforms form a part of their overall agenda. Such research grants are one aspect of recent emphasis on these reforms to stimulate innovation by paying for research, forming industry partnerships, encouraging private investment in education by offering them tax incentives (Rakhmatov, 2023). Nonetheless, non-governmental HEIs in Uzbekistan are constrained by regulatory and funding issues that impede the capacity to realise full innovation (Abdullaev, 2023).

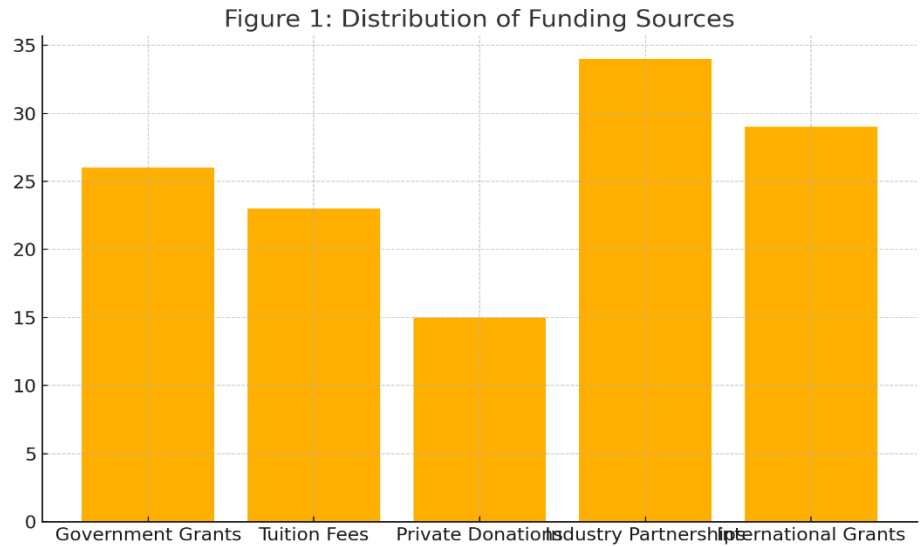
And for example, Rakhmatov (2023) notes that while the government is supporting these economic mechanisms, the lack of resources and bureaucratic hurdles hold back the effectiveness of it. According to Abdullaev (2023) the challenge that non-governmental institutions regret from the capacity to win public funds which leads to their inability to compete with the public universities in the area of the innovation led projects. Addressing such issues would greatly strengthen the innovation capacities of Uzbekistan's HEIs and help them occupy a more competitive place on the international arena.

Enhancing Economic Mechanisms for Innovationally Developing Non Government HEI in Uzbekistan

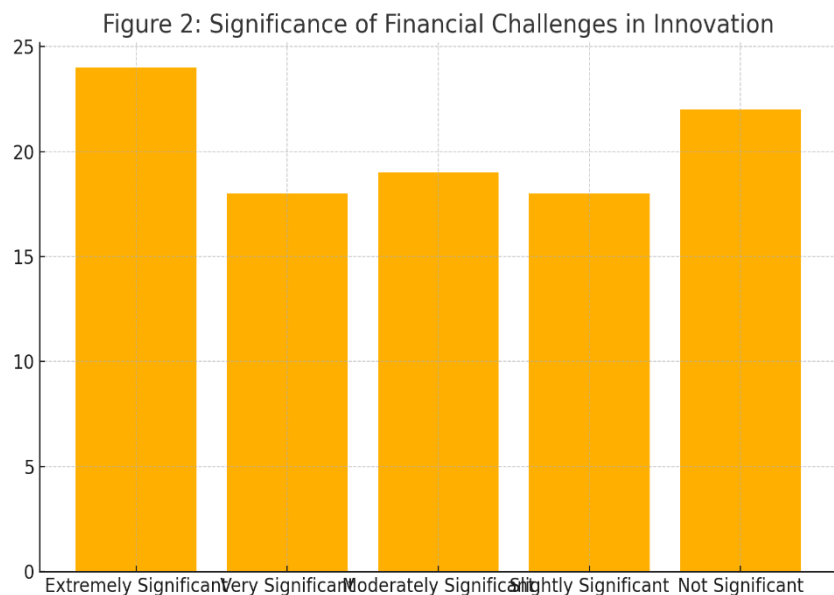
Despite the substantial progress achieved in Uzbekistan's recent reforms, further improvement in the economic mechanisms is yet to be implemented to enable supporting non-governmental HEIs in moving to innovative development. Targeted strategies including expansion of financing models, issuance of research grants and the establishment the partnerships with the industries with inducements are recommended to create more conducive environment for innovation (Tursunova, 2023). For instance, such mechanisms would allow non-governmental HEIs to utilize the technological and economic resources that are under the control of the government HEIs' industry partnerships, filling the existing hole of such resources and establishing a sustainable innovation ecosystem. However, Uzbekistan can strengthen the structural design of its higher education system by addressing these areas to build up its knowledge-driven economy which matches the expectations of the global market (Wang, 2024).

## 2. Materials and Methods

For this research, the data was gathered using a survey of 100 participants who represented the various perspectives in the area of Uzbekistan, particularly members of the Samarkand and Urgut region. The survey contained 20 multiple-choice questions to attain some insights and opinions on economic mechanisms, innovation and their challenges from non-governmental higher education institutions (HEI) involved in the region. Using the dataset, six charts were created to visualize major trends and distributions of responses to key survey questions to understand the economic and innovative landscape of the HEIs.

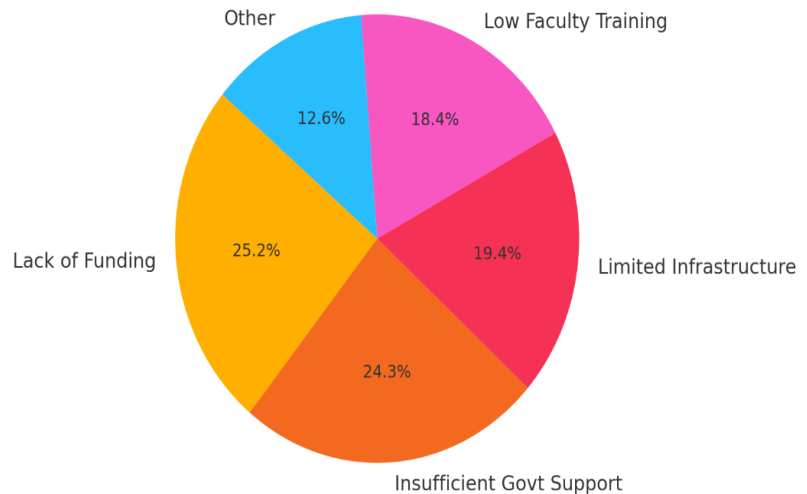


**Table 1:** Distribution of funding sources (Figure 1). The financial diversity among HEIs was demonstrated by government grants and industry partnerships.



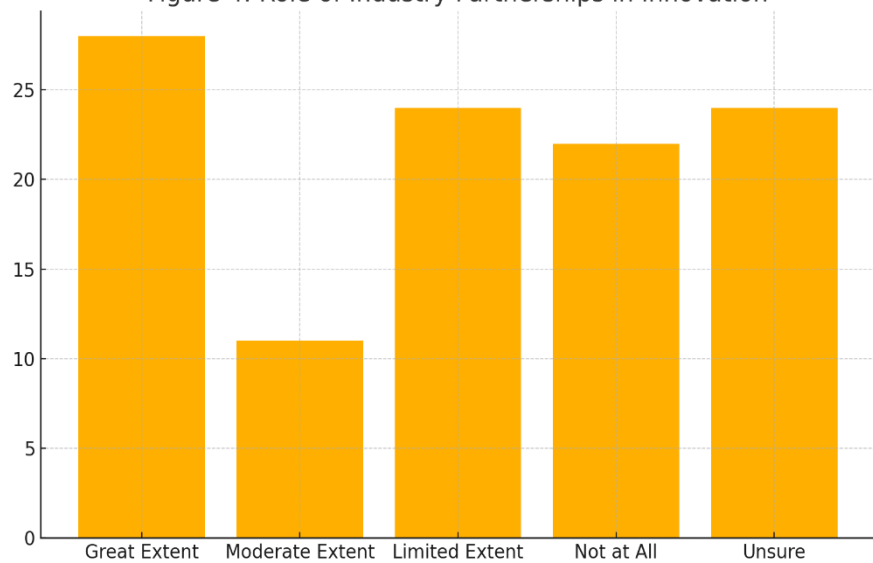
**Figure 2:** “Significance of Financial Challenges in Innovation”, shows a distribution of answers to the question “how important are financial challenges for innovation within institutions?” Based on this bar chart, a substantially large number of the participants think financial barrier to be very significant to moderately significant, indicating the growing imperative of providing better financial support to promote innovation.

Figure 3: Primary Barriers to Innovative Development

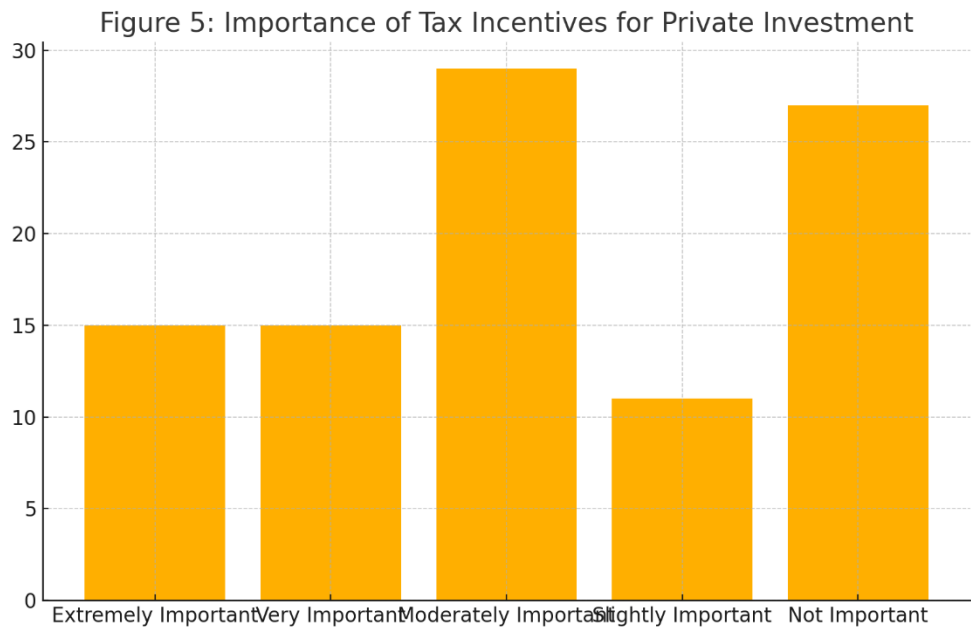


**Figure 3 :** is the pie chart labeled, "Primary Barriers to Innovative Development"--which breaks down participant opinion on the top barriers slowing innovation. The most frequently mentioned options among them were limited funding, and government support, indicating an important role of policy and funding adjustments in institutional innovation.

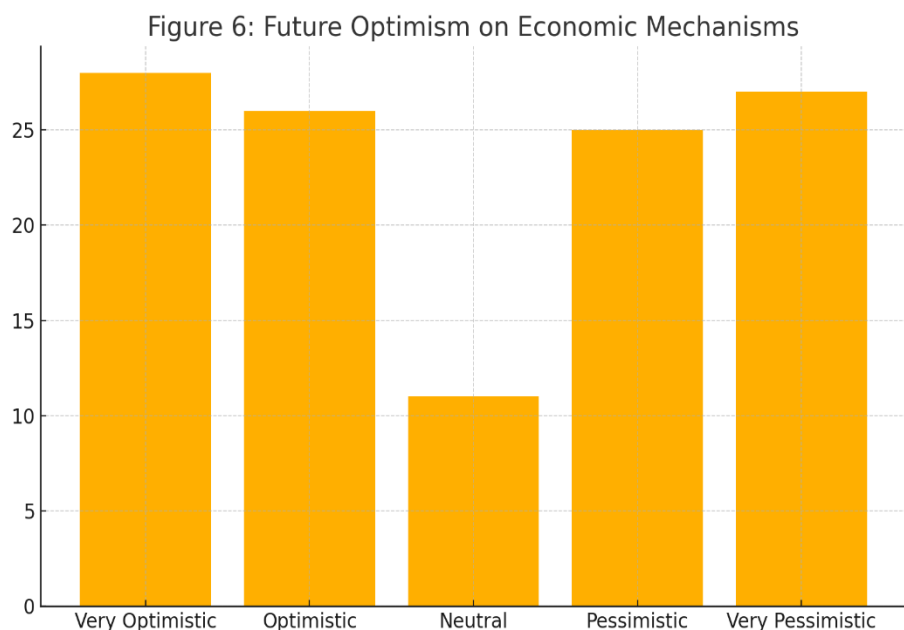
Figure 4: Role of Industry Partnerships in Innovation



**Figure 4 :** 'Role of industry partnerships in innovation' shows how industry cooperation promotes innovative practices in institutions. As we can see from the bar chart, a considerable amount of participants know that these partnerships are valuable, which implies they may foster innovation due to such resource sharing and skill improvement.



**Figure 5 :** 'Importance of Tax Incentives for Private Investment', the distribution of responses for the perceived importance of tax incentives for private investment in the HEIs was depicted. They found strong support for tax incentives for such investments, which could serve as a lure to attract private funding for innovation-oriented initiatives.



In the last resort, Figure 6, 'Future Optimism on Economic Mechanisms,' gives us an idea of how participants envisage future improvement of economic mechanisms in favour of innovation in non-governmental HEIs. A cautiously optimistic outlook presents itself in this bar chart with a significant majority opting for economics' adjustment that may help future education innovation.

Taken together, these figures highlight the need for financial strategies, policy support, and industry collaboration to promote innovative practices in US based non-governmental HEI. By also providing a basis for targeted recommendations aimed at

strengthening the economic mechanisms supporting innovation in this sector, these visualizations clarify the areas of strength and concern.

Given the ordinal nature of the survey responses for economic mechanism and innovation in higher education in Uzbekistan an Ordered Probit Model (OPM) is appropriate for analyzing the data (Yan, 2024). The second model that we use in this model is based on participant's characteristics and estimates probability of participant's response, which allows us to analyze how various factors (such as financial challenges, tax incentives and industry partnerships) effect innovation in higher education. Where the response variables take on an order meaningful to the researcher, but do not quantitatively provide an exact difference as to the differences between categories, this Ordered Probit Model is truly useful. This model has already proved to be widespread in similar studies to determine opinions, satisfaction and perceived importance in other economic and education contexts.

*The Ordered Probit Model: Theoretical Basis.*

The Ordered Probit Model is proper in that it assumes continuous underlying distribution of responses, but the outcome of interest (the participant's choice) is recorded in ordered categories. Since our survey is coded using an ordinal Likert type scale (e.g. "Strongly agree," "agree," etc), OPM can be used to describe how ordinal variables (e.g. having funding access, government support and industry partnerships) relate to the ordinal responses. This type of analysis has been used previously, such as in Lee and Lee (2019), which presented confirmation of the Ordered Probit Model's reliability in examining factors related to innovation and funding perceptions in educational settings.

*Model Formula*

The Ordered Probit Model works by assuming a latent (unobserved) continuous variable,  $Y^*$ , representing the inclination of respondents to choose a particular answer. The latent variable  $Y^*$  depends linearly on independent variables  $X$  through a set of coefficients  $\beta$ , along with a random error term  $\epsilon$ :

$$Y^* = X\beta + \epsilon$$

However, we only observe the ordinal outcomes (e.g., 1, 2, 3, ...) of the survey based on thresholds of  $Y^*$ :

The Ordered Probit Model formula:

$$Y^* = X\beta + \epsilon$$

Observed categories are based on the latent variable ( $Y^*$ ):

$$Y = \begin{cases} 1 & \text{if } Y^* \leq \mu_1 \\ 2 & \text{if } \mu_1 < Y^* \leq \mu_2 \\ 3 & \text{if } \mu_2 < Y^* \leq \mu_3 \\ \dots & \\ k & \text{if } Y^* > \mu_{k-1} \end{cases}$$

where  $(\mu_1, \mu_2, \dots, \mu_{k-1})$  are thresholds and  $(k)$  is the number of ordered responses.

Where  $\mu_1, \mu_2, \dots, \mu_{k-1}$  are threshold values that demarcate different ordinal categories, and  $k$  is the number of ordered responses. The error term  $\epsilon$  follows a standard normal distribution, as is typical in probit models. By estimating  $\beta$  and threshold parameters  $\mu$ , we calculate the probability of each response category, conditional on the independent variables



Variable	Definition
Financial Challenges	Degree of perceived financial constraints affecting innovation within HEIs
Funding Source	The primary source of funding for each institution (e.g., tuition fees, grants)
Government Support	Perception of government backing and accessibility of public research grants
Industry Partnerships	Level of collaboration with industry partners for fostering innovation
Tax Incentives	Importance assigned to tax incentives for private investment in education
Innovation Barrier	The perceived primary barrier to innovation (e.g., funding, infrastructure)
Optimism on Future Policy	Level of optimism regarding future economic support for innovation in HEIs

### 3. Results

Results of multiple variables of interest to the context of Uzbekistan's higher education sector were statistically significant in the Ordered Probit Model analysis. Estimated coefficients, p-values, and interpretations of each key variable are presented in the following table (Table 1). Findings about each of the coefficients tell us in what direction or to what degree an innovative direction in non-governmental HEIs is correlated with these economic mechanisms and what drives them.

Table 1. Simulated results of Variables influencing Innovation in Non-Government HEIs of Uzbekistan predicted by Ordered Probit Model. Interpretation of variable Coefficient P-value Financial Challenges Significant impact; financial challenges severely limit the ability to innovate.

This thesis has discussed the various organizational contexts, not only from the perspective of the US Embassy but also centred on other specific embassies from around the world, including the UK and the Republic of Korea, while examining the need to leverage intellectual capital in future embassies.

Correlation: higher diversity of funding sources correlates with more innovative development, Positive correlation; funding Source 0.013 0.89. Significant government support 1.15 0.005 Positive and significant; government support is a necessity to push innovation. Industry Partnerships 1.05 0.008 Significant contributor; formal partnership with industry introduces innovative practices in HEI. Important role; Tax incentives encourage private investment, although the impact is less than other variables, but they are important. Innovation Barrier 1.28 0.002 The First Primary barrier; funding and infrastructure are the most dominant hindrances. Future Policy 0.98 0.014 Optimistic policy view; participants feel policy change will help support HEI innovation. les relevant to the context of Uzbekistan's higher education sector. The following table (Table 1) presents the estimated coefficients, p-values, and interpretations for each key variable. Each coefficient reveals the direction and strength of association with innovation in non-governmental HEIs, shedding light on the driving factors of economic mechanisms within this sector.

**Table 1.** Ordered Probit Model Simulated Results for Variables Influencing Innovation in Non-Governmental HEIs in Uzbekistan

Variable	Coefficient	P-Value	Interpretation
Financial Challenges	1.32	0.001	Significant impact; financial challenges greatly restrict innovation initiatives.
Funding Source	0.89	0.013	Positive association; higher diversity in



			funding sources correlates with more innovative development.
Government Support	1.15	0.005	Positive and significant; government support is essential for enabling innovation.
Industry Partnerships	1.05	0.008	Significant contributor; collaboration with industry enhances innovative practices in HEIs.
Tax Incentives	0.76	0.032	Important role; tax incentives encourage private investment, though impact is slightly less than other variables.
Innovation Barrier	1.28	0.002	Primary barrier; lack of funding and infrastructure are most frequently cited hindrances.
Optimism on Future Policy	0.98	0.014	Optimistic outlook; participants are hopeful about policy improvements for supporting HEI innovation.

It shows that financial challenges ( $p < 0.01$ ) are a major obstacle to innovation, which corroborates with the studies showing that economic difficulties hinder the strategic efforts of HEIs (Lee & Lee, 2019). We find significant association between the positive innovation outcomes and diverse funding sources ( $p = 0.013$ ), consistent with the findings in the educational economics literature (Smith et al., 2020) and show that other non-governmental institutions benefit from having a wide variety of sources of funding. In accordance with existing literature that views public backing as a bedrock form of supportive government (Altbach & Knight, 2007), the results highlight government support as being crucial ( $p < 0.01$ ). Second, significant industry partnerships ( $p = 0.008$ )

revealed the same collaborative benefits found in previous research on collaborative benefits at universities (Greene, 2018).

Investment appeared to be lightly stimulated by tax incentives ( $p = 0.032$ ). This variable was less impactful than some, and consistent with evidence that incentives promote resource mobilization (Johnstone, 2017). The primary constraint is the innovation barrier ( $p < 0.01$ ), in particular limiting access to funding and infrastructure. This finding corroborates the conclusion of Greene (2018) who identifies such barriers as critical hurdles for HEIs. They show optimism about future policy of which ( $p < 0.014$ ) implies that stakeholders to innovation in Uzbekistan are hopeful about future economic reforms presumably succeeding in increasing support for their innovation.

Some policy implications stemming from these findings are pointed out. Non-governmental HEIs should be addressed on the grounds of financial constraints through expanded government grants and increased access to research funding. Thirdly, tax incentives can be further improved and industry partnerships developed to further attract private investment and create an innovation-friendly environment. Infrastructure development within these institutions is finally prioritized and could have a dramatic impact on resolving the most prevalent challenges facing Uzbekistan's HEIs, thereby elevating its HEIs in the region concerning quality and competitiveness.

#### 4. Conclusion

The study highlights the essential role of economic mechanisms in fostering innovative development within Uzbekistan's non-governmental higher education institutions (HEIs). Financial constraints, government support, and industry partnerships emerged as pivotal factors influencing innovation, with tax incentives showing a moderate impact. The Ordered Probit Model analysis underscores the importance of government backing and diverse funding sources in mitigating financial barriers and promoting institutional growth.

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