

**MOTIVATION FACTORS AND MECHANISMS FOR IMPROVING
COMMERCIALIZATION OF SCIENTIFIC AND TECHNICAL PRODUCTS BY
RESEARCHERS**

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<https://doi.org/10.5281/zenodo.20600570>

ANNOTATION: This study examines the motivation factors and mechanisms influencing researchers' engagement in the commercialization of scientific and technical products in higher education institutions of Uzbekistan. Based on a survey of 245 academic staff from eight universities, the study identifies four key motivational dimensions through principal component analysis: research resources, academic recognition, financial incentives, and professional development. The most significant barrier is excessive workload and lack of time. A four-component motivation mechanism model is proposed, integrating institutional support, financial incentives, academic recognition, and professional development. The findings highlight that in the Uzbek context, access to research resources plays a more critical role than purely financial incentives, distinguishing it from many developed countries.

KEYWORDS: researcher motivation, technology commercialization, university innovation, intellectual property policy, academic entrepreneurship, Uzbekistan higher education, innovation ecosystem, technology transfer

The commercialization of scientific and technical outputs in higher education institutions has become one of the most important drivers of innovation-led economic growth worldwide. Universities are no longer seen only as knowledge-producing institutions but also as active participants in economic development through technology transfer, patenting, licensing, and the creation of spin-off companies. In this context, the motivation of researchers plays a central role in determining the effectiveness of commercialization systems.

In many developed countries, institutional structures such as technology transfer offices, innovation hubs, and venture funding mechanisms are well established. However, even in such environments, commercialization success strongly depends on the willingness of individual researchers to engage in entrepreneurial activities. In developing countries, including Uzbekistan, this dependence becomes even more pronounced due to limited infrastructure, emerging intellectual property systems, and evolving academic incentive structures.

Recent global innovation policy frameworks, including guidance from the World Intellectual Property Organization (WIPO), emphasize that researcher motivation is a multidimensional construct shaped by financial rewards, career incentives, institutional conditions, and access to resources. In emerging economies, these factors interact differently compared to mature innovation systems.

The aim of this research is to analyze the motivational structure of researchers in Uzbek higher education institutions and to propose a comprehensive mechanism for improving their engagement in commercialization activities.

The empirical basis of the study consists of a structured survey conducted among 245 academic staff members from eight leading universities in Uzbekistan: Tashkent Technical University, Tashkent State Technical University, Tashkent University of Information Technologies, Samarkand State University, Bukhara State University, Namangan Engineering Institute, Qarshi State University, and others.

The questionnaire included items measuring motivational drivers, institutional barriers, intellectual property awareness, and demographic characteristics. Responses were collected using a five-point Likert scale.

Additionally, secondary data from international innovation and intellectual property databases were analyzed to contextualize the findings within global trends.

Statistical processing was conducted using multivariate analysis techniques, including principal component analysis (PCA), correlation analysis, and descriptive statistics.

RESULTS

1. Structural Characteristics of Respondents

The sample reflects a balanced representation of academic staff with varying levels of experience and qualification. A majority of respondents had over five years of academic experience, and only a minority had direct experience in commercialization activities. This indicates that commercialization remains a relatively new practice in many institutions.

2. Motivational Structure of Researchers

The analysis revealed four dominant motivational dimensions shaping commercialization behavior.

| Motivational Dimension | Share of Explained Variance | Interpretation |
|--------------------------|-----------------------------|--|
| Research Resources | 28.3% | Access to laboratories, funding, and equipment |
| Academic Recognition | 22.1% | Career advancement and institutional status |
| Financial Incentives | 17.5% | Income from patents, licensing, and bonuses |
| Professional Development | 12.8% | Skills growth and collaboration opportunities |

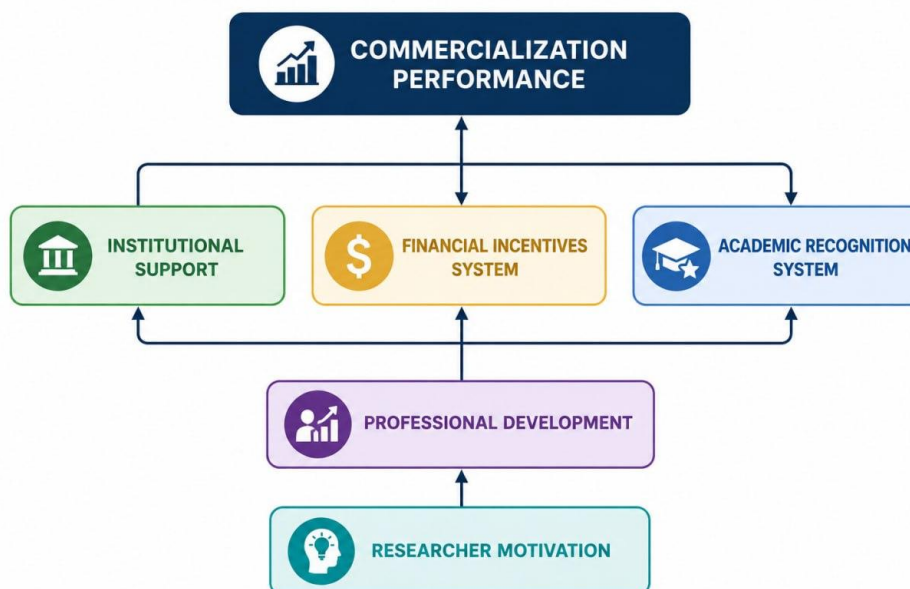
These results indicate that research infrastructure is the strongest driver of commercialization behavior. This is particularly important in contexts where laboratory equipment and funding remain limited.

A conceptual comparison shows that in many developed innovation systems, financial incentives often dominate, while in Uzbekistan, resource availability is the primary concern influencing researcher engagement.

3. Institutional Barriers to Commercialization

The study identified several key barriers limiting commercialization activity:

| Barrier | Average Score (out of 5) | Relative Importance |
|-------------------------------------|--------------------------|---------------------|
| Excessive teaching workload | 4.67 | Very High |
| Insufficient funding | 4.54 | Very High |
| Lack of commercialization knowledge | 4.41 | High |
| Weak intellectual property policies | 4.38 | High |
| Bureaucratic procedures | 4.22 | Moderate-High |



The findings confirm that researcher motivation in Uzbekistan is shaped more strongly by structural and institutional conditions than by direct financial incentives. This contrasts with many mature innovation systems where monetary rewards play a more dominant role.

A key insight is that improving research infrastructure may have a greater impact on commercialization outcomes than increasing financial rewards alone. This is consistent with

global innovation theories emphasizing the importance of capability building before incentive optimization.

Another important conclusion is the role of academic recognition systems. When commercialization outputs are integrated into career progression mechanisms, researchers are significantly more likely to engage in entrepreneurial activities.

The dominance of workload-related constraints highlights a systemic issue in higher education organization. Without reducing teaching obligations or providing dedicated innovation time, other policy interventions may have limited impact.

The study demonstrates that researcher engagement in commercialization activities in Uzbekistan is driven by a combination of resource availability, institutional recognition, financial incentives, and professional development opportunities. Among these, research infrastructure and resource access are the most influential factors.

The main barrier remains excessive workload and insufficient time allocation for innovation activities. Addressing this issue is essential for improving commercialization outcomes.

A balanced motivation mechanism integrating institutional, financial, academic, and developmental components is proposed as a comprehensive solution. Implementation of this model can significantly strengthen the university innovation ecosystem in Uzbekistan.

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