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ECONOMETRIC ASSESSMENT OF INSTITUTIONAL SUPPORT AND STARTUP COMMERCIALIZATION IN UZBEKISTAN

Rijichenko Oleg Radievich

Director of the "U-ENTER" Entrepreneurship Innovation Center

o.rijichenko@gmail.com

<https://orcid.org/0009-0000-6718-1916>

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Abstract

This article develops a more formal econometric and institutional framework for assessing how new support institutions influence youth startup commercialization in Uzbekistan under conditions of digital transformation. The article is based on the analytical logic of the second and third chapters of the dissertation manuscript on the role of new institutions in the development of youth entrepreneurship. The empirical basis consists of comparative evidence from Startup Survey 2024 Uzbekistan and Startup Survey 2026 Uzbekistan, which covered 310 startup projects and 400 startup founders respectively. The analysis shows that the ecosystem is becoming more structured: compact teams, stronger founder involvement, growing trust, increasing venture participation and sectoral diversification indicate gradual maturation. Nevertheless, most projects remain concentrated at the idea and MVP stages, which means that the central development problem is the weak conversion of entrepreneurial intention into first sales, revenue, investment readiness and scalable growth. The article proposes an econometric model in which startup stage or commercialization probability is explained by education, team size, time commitment, digital-sector orientation, regional location, access to finance, mentoring, legal-accounting support and investor trust. The proposed model can be estimated by ordered

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logit/probit or binary logit/probit methods after microdata coding. The practical contribution of the article is a stage-based institutional support pipeline linking training, incubation, market validation, legal readiness, investor preparation and regional startup infrastructure.

Keywords: youth entrepreneurship, startup commercialization, digital transformation, institutional support, startup ecosystem, econometric model, Uzbekistan, investment readiness.

1. Introduction

Digital transformation is changing the structure of modern economies by reducing transaction costs, expanding online markets, increasing the value of intangible assets and creating new data-driven forms of competition. For developing economies, the startup sector is one of the channels through which digital technologies can be transformed into new products, employment, productivity gains and institutional renewal. In Uzbekistan, youth entrepreneurship is especially important because young founders are more likely to experiment with digital platforms, new business models, remote cooperation and rapid market testing.

At the same time, the existence of many startup ideas does not automatically lead to commercialization. Early-stage projects face a set of structural constraints: weak customer validation, insufficient management experience, limited access to finance, shortage of mentors, lack of legal and accounting readiness, regional isolation and low investment preparedness. Therefore, the quality of new institutions - incubators, accelerators, technoparks, university innovation centers, venture funds, mentorship networks and digital support platforms - becomes a decisive factor in the movement from idea to market.

The purpose of this article is to propose a scientific framework for measuring the influence of institutional support on startup commercialization outcomes. In

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contrast to purely descriptive studies, the article links comparative survey indicators with an econometric model that can be used to test which factors have the strongest association with startup progress. The topic is selected from the dissertation because Chapter II analyzes the startup ecosystem in Uzbekistan, while Chapter III develops practical recommendations for strengthening institutional support until 2030.

2. Literature Review and Theoretical Framework

The theoretical foundations of entrepreneurship are commonly associated with J. Schumpeter's interpretation of the entrepreneur as an agent of innovation and structural change. P. Drucker considered entrepreneurship as purposeful and systematic innovation. M. Porter emphasized the role of competitiveness and the business environment, while D. North explained institutions as formal and informal rules that structure economic interaction and reduce uncertainty. These approaches are relevant because startup development requires not only entrepreneurial motivation, but also a predictable institutional environment.

The startup ecosystem literature emphasizes the interaction of policy, finance, human capital, culture, markets and support organizations. D. Isenberg argued that entrepreneurial ecosystems should be analyzed as complex systems rather than as isolated instruments. E. Ries introduced the Lean Startup approach, where validated learning, MVP testing and customer feedback reduce uncertainty. S. Blank and B. Dorf emphasized customer development and the search for a repeatable and scalable business model. These ideas are particularly relevant for Uzbekistan because many youth startups remain at the idea and MVP stages and need systematic support to reach sales.

In the institutional interpretation used in this article, commercialization is understood as a process in which a startup moves from an entrepreneurial intention or prototype toward market validation, paying customers, revenue and investment readiness. This process depends on the interaction of internal startup

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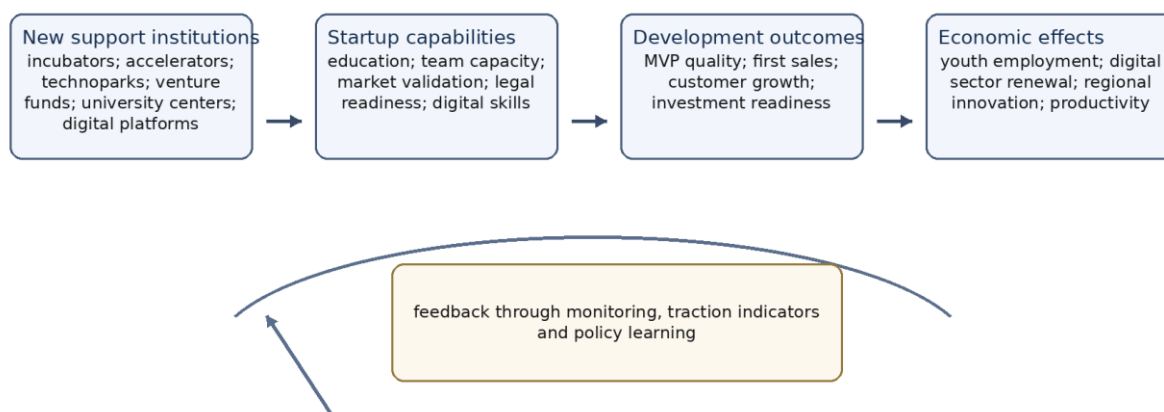
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capacity and external support institutions. Internal capacity includes education, team size, time commitment and digital competence. External support includes access to finance, mentors, accelerators, legal services, accounting support, investors and regional infrastructure.



Scheme 1. Conceptual mechanism of institutional influence on startup commercialization

3. Research Methodology

The article uses comparative statistical analysis, institutional interpretation and econometric model specification. The empirical base is formed by the Startup Survey 2024 Uzbekistan, conducted among 310 startup projects, and Startup Survey 2026 Uzbekistan, conducted among 400 startup founders. The 2026 survey used a comparable methodology and allowed the identification of key changes in founder profile, team structure, development stage, sectoral distribution, finance and ecosystem needs.

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The comparative part of the study evaluates changes in percentage points. If X2026 is the share of a category in 2026 and X2024 is the corresponding share in 2024, the change is calculated as:

$$\Delta X = X_{2026} - X_{2024}.$$

The econometric part is formulated as a research design rather than as a final estimation, because full microdata coding is required for reliable regression coefficients. Two dependent-variable options are proposed. First, startup development stage can be treated as an ordered variable: idea, MVP, first sales and growth. Second, commercialization can be coded as a binary variable, where 1 means that a startup has reached first sales or growth and 0 means that it remains at the idea or MVP stage. The first approach requires ordered logit or ordered probit estimation; the second approach requires binary logit or probit estimation.

Table 1. Data sources and analytical role

Source	Coverage	Main indicators	Role in the article
Startup Survey 2024 Uzbekistan	310 startup projects	Founder age, location, teams, stages, sectors, finance and barriers	Baseline for comparative analysis
Startup Survey 2026 Uzbekistan	400 startup founders	Founder profile, operating model, development stage, finance, ecosystem needs	Dynamic comparison and model variables
PhD dissertation, Chapter II	Startup ecosystem analysis	Descriptive statistics, comparative tables, econometric logic	Empirical and methodological foundation
PhD dissertation, Chapter III	Practical recommendations	Incubation model, policy roadmap, institutional support mechanisms	Policy interpretation of model results

Source: compiled by the author based on dissertation materials and Startup Survey 2024-2026 Uzbekistan.

4. Empirical Dynamics of the Startup Ecosystem

The comparative survey indicators show that the startup ecosystem in Uzbekistan is gradually maturing but still remains concentrated in early-stage projects. The

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age structure became broader: the share of founders aged 20-30 declined from 60 percent in 2024 to 44 percent in 2026, while other age groups increased. This indicates that startup activity is no longer limited only to very young founders and is becoming more attractive for a wider group of professionals.

Territorial concentration remains a key institutional issue. Tashkent's share increased from 42 percent to 52 percent, while the Fergana Valley declined from 24 percent to 14 percent. This may reflect stronger agglomeration effects in the capital, but it also shows the need to strengthen regional startup infrastructure and digital support platforms. Education indicators are strong: in 2026, 77 percent of startup founders had higher education, which confirms the human-capital potential of the ecosystem.

Operational indicators demonstrate more serious founder involvement. Two-member teams increased from 15 percent to 24 percent, while the share of founders devoting all 40 hours per week to the startup increased from 9 percent to 18 percent. Trust in team formation also increased from 42 percent to 68 percent. These changes indicate that entrepreneurship is gradually moving from occasional activity toward a more organized and professional model.

Table 2. Selected comparative indicators of startup ecosystem maturity

Indicator	2024	2026	Change	Interpretation
Founder age 20-30	60%	44%	-16 p.p.	Broadening of the founder age profile
Tashkent location	42%	52%	+10 p.p.	Capital concentration increased
Fergana Valley location	24%	14%	-10 p.p.	Regional participation weakened
Two-member startup teams	15%	24%	+9 p.p.	Compact team model became stronger
Full-time 40-hour involvement	9%	18%	+9 p.p.	Entrepreneurship became more professionalized
Trust in team formation	42%	68%	+26 p.p.	Social capital and openness increased
Sales-stage startups	13%	15%	+2 p.p.	Commercialization improved but remains limited

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Source: compiled by the author based on Startup Survey 2024 Uzbekistan and Startup Survey 2026 Uzbekistan.

The stage structure confirms that commercialization is still the key bottleneck. In 2026, 58 percent of startups remained at the idea stage, 27 percent were at the MVP stage and only 15 percent reached sales. The two-percentage-point increase in sales-stage projects is positive, but it is not sufficient for a strong transformation of the ecosystem. Therefore, institutional support should be evaluated not by the number of trainings or competitions, but by its effect on movement from idea to MVP, from MVP to first sales and from first sales to growth.

Table 3. Sectoral diversification and digital transformation channels

Sector	2024	2026	Change	Digital transformation meaning
EdTech	21%	15%	-6 p.p.	Still the largest sector, but relative dominance declined
Creative industries	19%	11%	-8 p.p.	Movement from content-oriented projects to more technical sectors
GreenTech / CleanTech	8%	11%	+3 p.p.	Growing importance of resource efficiency and sustainability
SaaS	6%	11%	+5 p.p.	Growing demand for business-process digitalization
FinTech	7%	10%	+3 p.p.	Expansion of digital payments, financial tools and data-based finance
GovTech	2%	4%	+2 p.p.	Digitalization of public services and citizen-service platforms

Source: compiled by the author based on Startup Survey 2024 Uzbekistan and Startup Survey 2026 Uzbekistan.

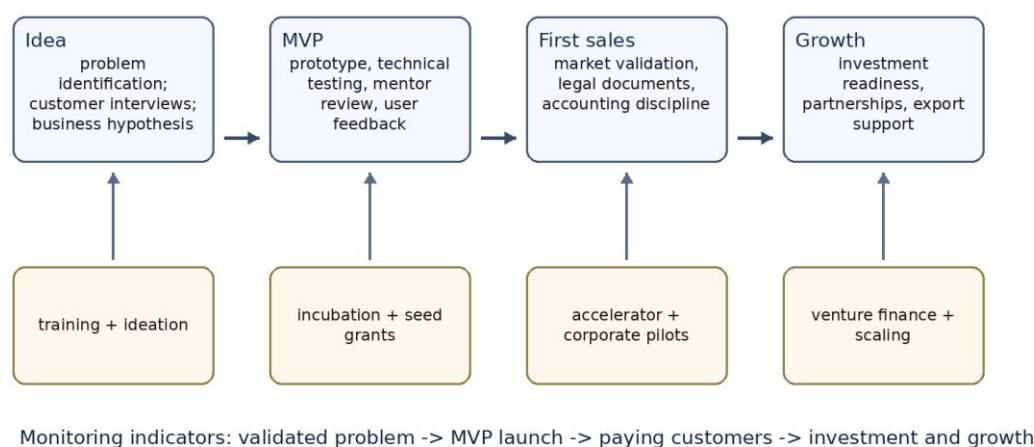
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Scheme 2. Stage-based institutional support pipeline for youth startups

5. Econometric Model Specification

The descriptive results should be transformed into a model that allows the assessment of relative effects. The proposed econometric model explains startup development outcome by a set of founder, team, sectoral, regional, financial and institutional variables. The general specification is as follows:

$$Y_i = \beta_0 + \beta_1 \text{Education}_i + \beta_2 \text{Team}_i + \beta_3 \text{Time}_i + \beta_4 \text{DigitalSector}_i + \beta_5 \text{Region}_i + \beta_6 \text{Finance}_i + \beta_7 \text{Mentoring}_i + \beta_8 \text{LegalSupport}_i + \beta_9 \text{InvestorTrust}_i + \beta_{10} \text{Year2026}_i + \epsilon_i$$

Here, Y_i is either startup stage or commercialization probability. Education_i reflects founder education; Team_i represents team size; Time_i measures weekly founder involvement; DigitalSector_i identifies whether the startup operates in a digital or technology-oriented field; Region_i measures the location effect; Finance_i captures access to external finance; Mentoring_i reflects

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participation in incubation, acceleration or mentorship; LegalSupport_i captures legal and accounting readiness; InvestorTrust_i reflects openness toward investors; Year2026_i captures changes between the two survey waves.

Table 4. Operationalization of variables for econometric assessment

Variable	Measurement logic	Expected sign	Economic interpretation
StartupStage	1 = idea; 2 = MVP; 3 = first sales; 4 = growth	Dependent	Higher value means stronger progress
Commercialization	1 = first sales or growth; 0 = idea or MVP	Dependent	Binary indicator of market validation
Education	Higher education or STEM-oriented background	+	Human capital improves opportunity recognition and product development
Team	Number of team members / compact team structure	+	Team capacity increases execution ability
Time	Weekly hours devoted to startup	+	Full-time involvement increases probability of progress
DigitalSector	EdTech, FinTech, SaaS, MedTech, e-commerce, GovTech, etc.	+/-	Effect depends on market readiness and capital needs
Region	Capital / Fergana Valley / other regions	+/-	Captures ecosystem concentration and regional constraints
Finance	Grant, venture funding, loan or other external source	+	External finance reduces resource constraints
Mentoring	Participation in incubation, acceleration or mentor network	+	Mentoring reduces managerial and market-validation risks
LegalSupport	Access to legal, tax and accounting advice	+	Legal readiness improves investment attractiveness
InvestorTrust	Trust or openness toward investor cooperation	+	Trust reduces transaction costs and improves financing prospects

Source: developed by the author based on the dissertation's econometric framework.

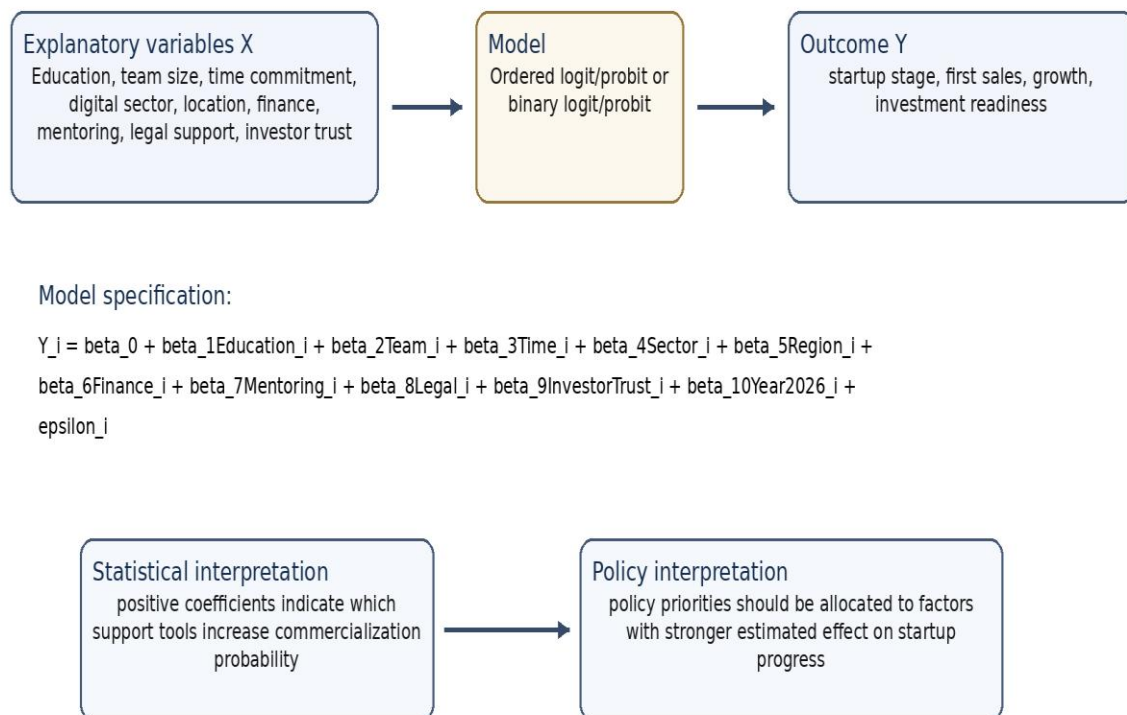
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Scheme 3. Econometric model logic and policy interpretation

6. Research Hypotheses

The proposed model can be tested through a system of hypotheses. These hypotheses connect theoretical arguments with measurable variables and policy implications. Their purpose is not only to estimate statistical associations, but also to identify which institutional instruments should be prioritized in startup policy.

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Table 5. Hypotheses for empirical testing

Hypothesis	Expected relationship	Policy meaning
H1	Founder education is positively associated with startup development stage.	Entrepreneurial education and applied university programs should be strengthened.
H2	Larger or balanced teams are more likely to reach commercialization than solo founders.	Co-founder matching and university talent pools are needed.
H3	Full-time founder involvement increases probability of first sales.	Support programs should select projects with higher commitment.
H4	External finance increases startup progress, but its effect is stronger when combined with mentoring.	Seed funding should be linked to incubation and monitoring.
H5	Mentoring and incubation have a positive effect on movement from MVP to sales.	Accelerators should focus on customer validation and traction.
H6	Legal and accounting support increases investment readiness.	Startup legal clinics and financial-reporting templates should be introduced.
H7	Regional distance from the capital reduces access to institutional resources.	Regional innovation hubs and online support platforms should be expanded.

Source: developed by the author.

7. Discussion: From Descriptive Maturity to Measurable Commercialization

The empirical dynamics show a dual tendency. On the one hand, the ecosystem is improving: founders devote more time to projects, teams become more compact, trust increases and venture participation expands. On the other hand,

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most startups still remain before the commercialization threshold. This means that the problem is not the absence of entrepreneurial ideas but the weak institutional conversion chain from idea to validated demand, first customers, revenue and investment readiness.

A purely financial interpretation is insufficient. Finance is important, but it cannot solve the problem of weak market validation, legal uncertainty, poor financial documentation or inadequate team capacity. Grants without mentoring may support the creation of prototypes but may not lead to sales. Accelerators without customer access may improve presentations but not revenue. Training without post-program monitoring may increase motivation but not commercialization. Therefore, the institutional support system should be designed as a pipeline rather than as isolated events.

For policy purposes, the econometric framework is useful because it can identify which factors have the strongest association with startup progress. If mentoring has a strong positive effect, then mentor networks and incubator quality should become a budget priority. If legal support is significant, then startup legal clinics and contract templates should be institutionalized. If the regional variable is negative, then the support system should expand beyond Tashkent through regional hubs and digital platforms. If the year dummy is positive, it would indicate general improvement in ecosystem maturity between 2024 and 2026.

8. Practical Institutional Model

The practical model proposed in the article is a stage-based institutional pipeline. It is built around the startup life cycle and connects each stage with a specific support mechanism and measurable output. The model is especially relevant for youth entrepreneurship because young founders often have strong digital skills but limited business networks, capital, legal knowledge and market experience.

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Table 6. Stage-based institutional support model

Startup stage	Main barrier	Support institution	Measurable output
Idea	Weak problem definition and lack of customer knowledge	University startup clubs, ideation programs, customer discovery training	Validated problem and target customer segment
MVP	Limited technical resources and prototype quality	Incubators, technical mentors, seed grants, cloud and software support	Working prototype and user feedback
First sales	Weak market access and legal-accounting readiness	Accelerators, legal clinics, accounting consultation, corporate pilots	Paying customers and basic financial documentation
Growth	Lack of investment and scaling capacity	Venture funds, investor networks, export support, corporate partnerships	Investment readiness, partnerships and revenue growth
Post-support	Risk of stagnation after program completion	Monitoring platform, alumni network, follow-up mentoring	Survival, repeated sales, new jobs and regional spillovers

Source: developed by the author based on dissertation recommendations.

The model should be evaluated by performance indicators rather than participation indicators. The number of trainings, applications or participants is not enough. More relevant indicators are the number of validated customer problems, MVP launches, first paying customers, investment-ready pitch decks, signed pilot agreements, created jobs, repeated sales and survival after six or

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twelve months. This approach makes startup policy more measurable and reduces the risk of formal event-based support.

9. Conclusion

The article demonstrates that the Uzbek startup ecosystem is developing under the influence of digital transformation, but commercialization remains the main bottleneck. Comparative data from 2024 and 2026 show positive signs of maturity: broader founder profile, stronger time commitment, more compact teams, higher trust and sectoral diversification. However, the share of sales-stage startups remains limited, which confirms the need for stronger institutional support.

The scientific contribution of the article is the proposed econometric framework that links startup commercialization with education, team capacity, time commitment, sector, region, finance, mentoring, legal support and investor trust. This framework allows future research to estimate the relative influence of each factor and transform general policy recommendations into evidence-based priorities. Ordered logit/probit and binary logit/probit models are recommended depending on the coding of the dependent variable.

The practical contribution is a stage-based support pipeline that connects startup stages with institutional instruments and measurable outputs. For Uzbekistan, the priority should be to move from fragmented startup events toward integrated incubation, acceleration, legal and accounting assistance, seed finance, investor preparation, regional infrastructure and post-program monitoring. Such a system can improve the transition from youth entrepreneurial intention to digital-sector innovation, first sales, investment attraction and sustainable growth.

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