

STARTUP ECOSYSTEMS IN DEVELOPING COUNTRIES AND THE ROLE OF THE STATE: INTERNATIONAL MODELS AND THE CASE OF AZERBAIJAN

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Abstract. This study examines startup ecosystem formation in developing countries through institutional, economic and political lenses. Analyzing successful models alongside Azerbaijan's 2026-2029 Digital Economy Strategy, the findings reveal that the planned startup ecosystem model in Azerbaijan represents a hybrid development approach characterized by strong state leadership in the early stages, with a gradual transition toward deeper market-based mechanisms in the long run.

Keywords: Startup, startup ecosystem, entrepreneurship, developing countries, Azerbaijan.

İNKİŞAF ETMƏKDƏ OLAN ÖLKƏLƏRDƏ STARTAP EKOSİSTEMLƏRİ VƏ DÖVLƏTİN ROLU: BEYNƏLXALQ MODELƏR VƏ AZƏRBAYCAN NÜMUNƏSİ

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Xülasə. Məqalədə inkişaf etməkdə olan ölkələrdə startap ekosisteminin formalaşması institusional, iqtisadi və siyasi cəhətlərdən araşdırılmışdır. Azərbaycanın 2026-2029-cu illər üçün Rəqəmsal İqtisadiyyat Strategiyası ilə yanaşı uğurlu modelləri təhlil edən nəticələr göstərir ki, Azərbaycanda planlaşdırılan startap ekosistem modeli erkən mərhələlərdə güclü dövlət liderliyi ilə xarakterizə olunan hibrid inkişaf yanaşmasını təmsil edir və uzunmüddətli perspektivdə daha dərin bazar əsaslı mexanizmlərə tədricən keçid baş verir.

Açar sözlər: Startaplar, startap ekosistemi, sahibkarlıq, inkişaf etməkdə olan ölkələr, Azərbaycan.

1. Introduction

The concept of a startup does not have a single, universally accepted definition in the international literature; however, it generally refers to early-stage, innovative and technology-oriented ventures that aim to develop original solutions to existing problems and possess high growth potential [7]. Beyond this general understanding, the definition of startups is not limited solely to firm age or sector of activity; rather, it is also shaped by a set of structural and functional characteristics that distinguish them from traditional businesses. In this context, startups are typically characterized by their openness to external investment, the presence of scalable business models, management by relatively small and flexible teams despite being in the process of institutionalization and their operation under high levels of uncertainty, which entails the assumption of comparatively higher risk.

Although the concept of a startup had been used prior to the 2000s, its entry into the literature and widespread adoption in its contemporary sense largely occurred during the 2000s. Until the 1980s, the term “startup” was rarely employed in academic studies and was

generally used to describe the early stage of any new business in a broad sense. However, with the turn of the 2000s, the concept gained prominence, particularly due to the success of technology-based ventures centered in Silicon Valley. The global achievements of companies such as Apple, Google, Facebook and Amazon played a decisive role in embedding the startup concept both in the entrepreneurship literature and in practice [15].

Today, a substantial share of the world's highest market-capitalization companies is observed to have begun their operations as ventures with startup characteristics in their early stages. This pattern indicates that startups have assumed an increasingly prominent role within the global economic system and national economic structures, occupying a critical position in terms of economic growth, innovation and competitiveness.

Although there is no standardized and centralized international database providing uniform data on the number, growth and performance of startups, datasets produced by globally active research institutions and consulting firms are widely utilized in the literature. Existing studies demonstrate that startup success varies significantly across countries and that these differences are closely associated not only with entrepreneurial characteristics but also with the structural features of the startup ecosystems in which ventures operate.

A startup ecosystem is defined as a holistic system in which a wide range of stakeholders - including public institutions, private sector actors, universities, financial institutions, professional networks, regulatory frameworks and support mechanisms - interact to enable the emergence, development and scaling of startups [23]. For this reason, in scientific research and analytical models related to startups, focusing on the concept of the startup ecosystem - rather than on startups as isolated entities - is considered to be more explanatory.

The literature emphasizes that startup ecosystems in developed and developing countries exhibit significant differences in both financial and institutional dimensions. While entrepreneurial ecosystems in developed countries tend to display more mature and market-driven structures, developing countries face various structural constraints in areas such as access to finance, institutional capacity, human capital and regulatory frameworks. In this context, understanding how startup ecosystems in developing countries can be strengthened has emerged as a key research question.

This study aims to examine the institutional, economic and political factors influencing the formation and success of startup ecosystems in developing countries and evaluates the applicability of successful country models to such economies by analyzing Azerbaijan as a case study. In addition, the study compares the measures aimed at developing the startup ecosystem outlined in Azerbaijan's digitalization roadmap adopted at the end of 2025 with established models in the literature and international country experiences and derives policy recommendations accordingly.

The structure of the article is as follows. The first section outlines the conceptual framework of startups, while the second section discusses the theoretical framework and the

relevant literature on startup ecosystems. The third section provides a comparative analysis of ecosystem differences between developed and developing countries. In the fourth section, the programme adopted by Azerbaijan is analyzed in comparison with established models in the literature and international country practices and policy recommendations are presented.

2. Methodology

2.1. Research design

This study is designed using qualitative research methods and comparative case analysis. The primary objective is to systematically examine the institutional, economic and political factors that shape the development of startup ecosystems in developing countries. The research aims to answer three key questions:

- What factors determine the success of the startup ecosystem in developing countries?
- How can models from developed countries be adapted to developing countries?
- What unique features does Azerbaijan's 2026-2029 Digital Economy Strategy have when compared to international experiences and what should be the next steps for Azerbaijan in this regard?

From an analytical perspective, the study is primarily grounded in a deductive framework. Principles derived from theoretical frameworks such as Schumpeter's theory of creative destruction, Porter's Competitive Advantage model, the National Innovation Systems approach and the Triple Helix model have been tested through country experiences and the case of Azerbaijan. In terms of methodological format, an embedded single-case design - which combines an in-depth examination of a single country (Azerbaijan) with a systematic comparison to internationally successful models - has been adopted.

2.2. Country selection

The countries included in the study were selected using purposive sampling. The selection criteria were defined as geographic representation, level of development, the nature of the ecosystem model and comparability with Azerbaijan.

Among developed countries, the United States has been included in the analysis due to its market-oriented structure and global leadership in the venture capital ecosystem. Israel is represented by its military-rooted innovation culture and the state-supported Yozma program. Estonia was selected for its digital governance capabilities and its position in the field of cyber entrepreneurship. Germany, meanwhile, has been added to this group due to its industry-focused innovation structure and export strength.

Among developing countries, China is examined in light of the government's strategic guiding role and the advantages of its large domestic market. The United Arab Emirates and Saudi Arabia are analyzed in terms of their global talent attraction strategies and public

investments. Turkey has been included in the analysis due to its large domestic market and potential for regional leadership. Azerbaijan, meanwhile, has been positioned as a key case study within the framework of the 2026-2029 Digital Economy Strategy.

2.3. Data sources

The data used in the study were systematically selected from secondary sources. The guiding principle in data selection was to use current, internationally recognized sources that measure ecosystem performance using institutional and financial metrics.

Primary documents include the Presidential Decree on the “Strategy for the Development of the Digital Economy for 2026-2029”, approved by the Office of the President of Azerbaijan, as well as publications by the Azerbaijan Innovation and Digital Development Agency (İDEA).

Secondary sources include Startup Genome’s Global Startup Ecosystem Index 2025 report, data sets from CB Insights and Dealroom, the World Bank’s Doing Business and Enterprise Surveys data and the Global Innovation Index (WIPO). In terms of academic literature, the study drew on peer-reviewed articles, conference papers and doctoral theses retrieved from the Web of Science and Scopus databases.

2.4. Analytical framework

The comparative analysis was conducted across six key dimensions that structurally distinguish the startup ecosystems of developed and developing countries. These dimensions are market orientation (local vs. global), growth momentum, the role of the government (facilitator or strategic investor), talent management, access to financing (venture capital maturity) and legal infrastructure.

2.5. Analysis approach

Three methods were applied in combination.

Qualitative content analysis: Theoretical models and country experiences were compared systematically using thematic coding. For each country, the factors driving or constraining ecosystem success were identified and synthesized through comparative tables.

Comparative case analysis: Selected countries were compared against the dimensions in the analytical framework. The comparison was designed to expose both the developed-developing country divide and variation within each group.

Policy analysis: Azerbaijan's 2026-2029 Strategy was evaluated in parallel with successful international models. This analysis was organized around identifying the strategy's strengths, structural risks and implementation priorities.

2.6. *Validity, reliability and limitations*

The validity and reliability of the study were supported by several measures. Triangulation was performed across different types of sources (academic literature, international reports, official documents) and the data sources and analytical steps were reported transparently. The historical and institutional specificities of each country were also taken into account in the analysis.

However, this study has certain limitations. Due to the limited use of quantitative indicators, causal relationships cannot be definitively established. The dynamic nature of startup ecosystems implies that the data pertains to a specific time period. Additionally, due to the scarcity of academic publications on the subject, the study relies on research and reports from international organizations and institutions for its assessments. Finally, since the research is grounded in a specific theoretical perspective, it acknowledges that alternative interpretations are possible.

3. *An overview of startups and their conceptual framework*

It is estimated that more than 150 million startups operate globally. Approximately 1.14 million of these ventures are reported to have emerged in the United States. In addition, more than 50 million new startups are established worldwide each year, corresponding to an average of around 137,000 new ventures entering the market on a daily basis. However, findings in the literature indicate that only about 10% of startups achieve sustainable success, while nearly 90% discontinue their activities for various reasons. While the average initial capital at the founding stage of startups is estimated to be approximately USD 40,000, it is also reported that around 1,600 startup ventures worldwide have attained “unicorn”¹ status by surpassing a valuation of one billion US dollars [2; 3; 12].

Table 1. Distribution of startups by country

Country	Number of Startups
USA	1,148,296
India	493,582
UK	368,665
Canada	180,147
Germany	139,516
China	102,231
Australia	98,747
France	77,973
Italy	55,558
Singapore	42,599

Source: [12]

¹A unicorn is a term used to describe innovative ventures with high growth potential that, while still in the early or growth stages, achieve a valuation exceeding one billion US dollars in private markets prior to an initial public offering (IPO).

Data for 2025 indicate that more than 2,800 startups have attained unicorn status globally. Country-level distribution analyses show that a substantial share of these high-valuation ventures are headquartered in the United States, underscoring the country's dominant position within the global unicorn ecosystem. This finding suggests that the United States continues to sustain a strong capacity to generate high-value startups, supported by its advanced entrepreneurial ecosystem, deep capital markets and robust innovation infrastructure.

While startup failure rates vary across countries, the underlying causes of these failures also.

Table 2. Factors contributing to startup failure

Failure Cause	Share
Lack of Product-Market Demand	34%
Marketing Challenges	22%
Team-Related Issues	18%
Financial Constraints	16%
Technical Issues	6%
Legal and Regulatory Issues	2%
Operational Challenges	2%

Source: [12]

Table 3. Distribution of unicorns by country

Country	Number of Unicorns (2025)	Number of Unicorns (2023)
USA	1,720	1,500
China	438	348
UK	183	147
India	117	87
Germany	72	64
Canada	71	52
Israel	119	46
France	60	37
Sweden	46	37
Netherlands	33	29

Source: [4]

From a sectoral perspective, unicorn startups are observed to operate predominantly in sectors characterized by high technology intensity and scalable business models. In particular, areas such as enterprise technologies, financial technologies (fintech²), health technologies, transportation, marketing solutions and security-related sectors stand out [4]. The prominence of these sectors indicates that areas characterized by high levels of digitalization, data intensity and rapid scalability to global markets possess a greater capacity to generate unicorn ventures.

²Fintech is a concept that encompasses ventures and applications offering innovative solutions in financial services - such as payments systems, credit, insurance, asset management and banking - by leveraging digital technologies.

In addition to the global distribution of startups, their distribution over time is also of particular importance. When examining the period after 2012, it is notable that the “upswing” phase of startups becomes especially pronounced in the post-2020 period. Although the startup “boom” observed in 2021 represents a clear turning point, subsequent years indicate that startup numbers reverted to levels closer to those observed prior to 2021 and have since continued along a relatively stable trajectory.

The findings indicate that the 2021 breakpoint cannot be explained by a single factor; rather, it reflects a “boom” period driven by the combination of post-pandemic digital demand growth, abundant liquidity and elevated risk appetite and a favorable exit window. International reports note that 2021 was a record year for global venture capital funding and unicorn formation, emphasizing that venture capital activity followed a “boom-and-bust” cycle throughout the pandemic period [24].

Examining the same data from a geographic perspective reveals a strong concentration at the country level. The United States alone accounts for most of the cluster, with China emerging as the second largest hub, followed by India and the United Kingdom. This pattern indicates that the “unicorn” phenomenon is less a “universal entrepreneurial outcome” and more one that is concentrated in ecosystems characterized by deep capital markets, ample exit opportunities, large domestic markets and scalable talent pools. Consistent with this view, a substantial share of the increase observed during the 2021 surge originated from these core ecosystems.

In light of the evidence presented above, it is evident that successfully scaled startups are clustered in a limited number of countries. This observation leads to the conclusion that a pronounced polarization exists between developed and developing countries with respect to startup outcomes.

The emergence and growth of successful startups in countries are directly linked to the characteristics of their respective startup ecosystems [28]. For this reason, when examining startups across regions, analyzing the startup ecosystem constitutes a primary analytical priority.

The success of startup ecosystems is shaped not only by the individual characteristics of ventures but also by the holistic interaction of the institutional, economic, legal and political structures that surround them. Countries that are able to balance these dynamics effectively tend to exhibit greater success in the creation and development of startups.

The Global Startup Ecosystem Index 2025 report [22] highlights that the polarization between developed and developing countries is both deep and multi-layered in financial and structural terms from an ecosystem perspective.

Beyond investment gaps, the report identifies three structural divides: developed countries attract global talent while developing ones lose it - around 25% of startups from

developing countries relocate to hubs like Silicon Valley after reaching unicorn status - and rigid bankruptcy laws make failure costly enough to deter re-entry. Market orientation diverges along the same lines, with developing-country startups typically focused on local demand rather than global scale.

4. Success dynamics in startup ecosystems: A theoretical and conceptual framework

4.1. The historical theoretical background of the growth-innovation-entrepreneurship relationship

Joseph A. Schumpeter, in his theory of “Creative Destruction”, argues that the fundamental driving force of economic growth lies in innovations carried out by entrepreneurs and that these innovations transform the economic structure by exerting a process of “creative destruction” on existing production structures, firms and technologies [19]. Within this framework, Schumpeter conceptualizes entrepreneurs not merely as “young firms” or new market entrants, but as central theoretical agents of economic growth. Considering that economic structures in many developing countries are typically based on low value-added and relatively inefficient sectors - such as natural resources, mining and textiles - the Schumpeterian approach extends beyond micro-level firm success and assumes a decisive role in macro-level economic transformation and development. For the process of “creative destruction” envisioned by this theory to be continuous and sustainable, entrepreneurial efforts alone are insufficient; rather, a functioning startup ecosystem capable of operating as an integrated system is required.

Michael E. Porter argues that the sustainable competitive advantage of countries and regions depends not only on labour and natural endowments, but also on a set of elements that are systematically interconnected through structured relationships [16]. Known as the “Diamond Model”, this framework consists of four core components which, when functioning together, generate competitive advantage. When the corresponding counterparts of these key components are examined within the context of startup ecosystems, the following Table 4 emerges.

Building on Porter's “Diamond Model”, an important implication emerges: while the conditions specified by the model are more readily fulfilled in developed countries, they are generally difficult to establish in developing economies. In the latter, factor conditions are often characterized by limited or uneven talent availability; demand conditions tend to exhibit weak innovation pressure; access to venture capital within supporting industries remains constrained and the intensity of competition is typically low.

While Schumpeter's concept of “Creative Destruction” explains the role of entrepreneurship as a dynamic force driving economic transformation, Porter's “Diamond Model” elucidates how this transformation should function as a mechanism and under which institutional and structural conditions it can become sustainable.

Table 4. Mapping the core components of the “Diamond Model” to the startup ecosystem

No.	Key Components of the “Diamond Model”	Corresponding Elements in the Startup Ecosystem
1	Factor Conditions: Human capital, technological infrastructure, access to capital, digital and physical infrastructure	Talent pool, software developers, R&D activities, digital infrastructure
2	Demand Conditions: Size of the local market, level of demand sophistication, pressure for quality and innovation	Early adopters, access to corporate customers
3	Related and Supporting Industries: Suppliers, service providers, supporting industries, universities	Venture capital firms (VCs), incubators, accelerators, legal and accounting services
4	Firm Strategy, Structure and Rivalry: Ease of firm entry and exit, intensity of competition, market entry-exit dynamics	Number of startups, pressure to scale, exit strategy culture

Source: [16]

Unlike classical growth theories that largely exclude entrepreneurship and innovation from the core of growth analysis, “Endogenous Growth Models” place these concepts at the center by emphasizing that the source of economic growth lies not in exogenous technological shocks, but in decisions and investments made within the economy. In this framework, long-term economic growth is sustained through internal mechanisms such as knowledge creation, research and development (R&D) activities, human capital accumulation and innovative efforts. Consequently, growth is no longer viewed as the outcome of “random technological progress”, but rather as a process that can be shaped and directed through policies and institutional arrangements [18].

Insights derived from “Endogenous Growth Models” make the importance of startups - particularly for developing countries - more explicit. While knowledge is partially a public good that diffuses across the economy, it does not automatically translate into economic growth. Startups intervene precisely at this juncture, functioning as key institutional mechanisms that enable the commercialization and scaling of knowledge generated within universities, R&D centers and through individual human capital. As emphasized by this framework, long-term growth depends less on capital accumulation and more on the diffusion of knowledge-intensive activities and the effective utilization of human capital. In this context, startups help break resource dependence by facilitating low-cost yet highly knowledge-intensive growth, while simultaneously integrating young and educated populations into the economy. For these reasons, endogenous growth theory provides a strong theoretical foundation for explaining why startup ecosystems are increasingly regarded as strategic policy instruments in developing countries.

From a “National Innovation Systems” perspective, entrepreneurial ecosystems constitute a critical mechanism - particularly in developing economies - for transforming knowledge generated within universities and research institutions into economic value [8; 13].

Building upon the National Innovation Systems perspective, Nelson [14] conducts a comparative analysis across countries and demonstrates how institutional differences shape innovation performance, thereby offering an adaptable framework for both developed and developing economies.

National Innovation Systems represent an approach that highlights innovation as an inherently multi-actor and interactive process. Within this framework, the state's policy and incentive mechanisms, universities, collaborative networks and the private sector collectively constitute a dynamic system. From this perspective, the fundamental challenge in developing countries is not the absence of innovation actors, but rather the lack of interaction, coordination and institutional coherence among these actors.

One of the approaches emphasizing the mutual interaction between universities, government and industry in fostering innovation and entrepreneurship is the “Triple Helix” model [5; 6]. The Triple Helix model conceptualizes the state's role as a catalyst, network builder and first customer rather than a traditional regulator.

Put concretely, this approach allows the roles within the startup ecosystem to be allocated as follows: universities generate knowledge; startups commercialize that knowledge; the state shares risk and accelerates the process and industry scales entrepreneurial activity.

The Triple Helix approach constitutes one of the most influential theoretical frameworks arguing that, in developing countries, the primary barrier to innovation and entrepreneurship is not a lack of resources, but rather a deficiency in institutional interaction and coordination.

4.2. Key frameworks and factors explaining startup ecosystems in the modern literature

According to the conceptual framework analysis presented by the World Bank in *Developing the Entrepreneurship Ecosystem for Digital Businesses and Beyond*, startup development depends not on a single factor but on a complex and interdependent entrepreneurial ecosystem structure. The World Bank's framework identifies startup development as depending on several interconnected layers: a foundation of talent, finance and knowledge infrastructure; digital-specific factors such as economies of scope, intangible capital and market size and a regulatory progression moving from basic adoption rules through trust-building measures to equity and competition policy [27].

In the same report, the World Bank proposes three distinct roadmaps based on market size and the level of digital maturity:

- **Type 1. Large Economies:** In countries with large-scale domestic markets - such as

China and India - startups should be allowed to scale within the domestic market before pursuing global expansion.

- **Type 2. Small and Open Economies:** Countries with limited market size, such as Estonia, are encouraged to compensate for market constraints through progressive policies, technological experimentation and talent attraction strategies.

- **Type 3. Small and Closed Economies:** In such contexts, priority should be given to fostering digital adoption and cultivating a supportive digital culture.

The Institutional Voids approach, which entered the literature in the early 2000s, explains the underdevelopment of markets in developing countries through the inadequacy or absence of institutional structures responsible for market functioning. According to this perspective, weaknesses in key institutions underpinning market operations - such as property rights, contract enforcement, financial intermediation mechanisms, information flows and regulatory frameworks constrain the ability of economic actors to operate effectively. In this context, institutional voids are regarded as a structural barrier, particularly impeding startups' access to finance, their capacity to scale and their ability to achieve sustainable growth [10].

One of the modern approaches to explaining startup ecosystem development is the framework proposed by Spigel [20]. Spigel emphasizes that startup ecosystems should be understood not merely in terms of the presence of actors, but rather through the relational structures connecting these actors. According to this perspective, the success of entrepreneurial ecosystems depends on how cultural, social and material elements interact with one another.

Spigel conceptualizes the ecosystem as comprising cultural, social and material (tangible) elements. Cultural elements include societal attitudes toward entrepreneurship, risk-taking culture and perceptions of failure. Social elements encompass networks among entrepreneurs, investors, mentors and institutions, as well as trust and knowledge-sharing mechanisms. Material elements refer to components such as financial resources, support institutions and legal frameworks. A key insight of this approach is that these elements are not sufficient in isolation; rather, ecosystem success emerges from their interaction. From this perspective, Spigel's framework highlights that in developing countries, ecosystem failure is driven less by resource scarcity and more by weak networks and low levels of trust.

Similarly, the approach proposed by Erik Stam argues that the success of entrepreneurial ecosystems depends less on which elements are present and more on how these elements interact as a system and whether they generate tangible outcomes [21].

The theoretical foundations of entrepreneurial ecosystems begin with Joseph A. Schumpeter's concept of "creative destruction", which defines the entrepreneur as the central agent of economic transformation. While Paul Romer places knowledge-based growth at the core of economic development, Michael E. Porter highlights the role of clustering in enhancing competitiveness. Richard R. Nelson's National Innovation Systems model conceptualizes

innovation through system-level interactions among actors, whereas Henry Etzkowitz's Triple Helix framework emphasizes the role of university-industry-government relations in knowledge production and innovation. Ben Spigel underscores the importance of cultural and social ties, while Erik Stam evaluates ecosystem success through the lens of productive entrepreneurial outcomes. Taken together, these approaches demonstrate that ecosystem success depends not merely on the presence of individual elements, but on their capacity to form an interactive, output-oriented system.

5. A comparative analysis of startup ecosystems in developed and developing countries

In light of the theoretical approaches discussed above, a comparative analysis of startup ecosystems in developed and developing countries is of critical importance for accurately identifying the dynamics of success in developing economies and for designing forward-looking policy roadmaps. However, the direct replication of developed-country models without due consideration of contextual differences does not constitute an effective strategy for developing countries. At the same time, completely disregarding successful international experiences may also slow down or hinder ecosystem development. Therefore, adaptive and context-sensitive strategies derived from comparative analyses play a pivotal role in the construction of sustainable startup ecosystems in developing countries.

To identify the underlying dynamics of success, the experiences of developed countries that have achieved success in building startup ecosystems should be examined as a priority.

According to the Global Startup Ecosystem Index report, the United States recorded the highest ecosystem growth rate in 2025, at 18.2%. The analysis of the report's data attributes the United States' clear global leadership not only to the abundance of capital, but also to a high tolerance for risk and a legal environment that is supportive of entrepreneurship [22]:

- **Bankruptcy Laws:** Flexible bankruptcy laws in the United States allow entrepreneurs to try again after failure without incurring severe financial or reputational losses.

- **Market Orientation:** A structure shaped predominantly by profit motives and market dynamics, with limited public intervention, has facilitated the emergence of some of the world's most successful startups.

The factors that distinguish the United States from other countries extend beyond capital availability to encompass institutional structures. A strong risk-taking culture and flexible bankruptcy laws enable entrepreneurs to re-enter the startup process without facing severe penalties in the event of failure. At the same time, limited public intervention and a market mechanism driven predominantly by private-sector incentives and profit motives foster the emergence of some of the world's most successful startups.

However, alongside these success dynamics, several risks confronting the United States have also become apparent. In particular, concerns related to public safety and the overall

business environment have begun to generate a loss of momentum. Government-imposed tariffs and ongoing trade disputes have made it more difficult for US startups to scale in international markets. Finally, the continued rapid rise of China - the United States' most significant commercial rival - poses increasing uncertainty for the future prospects of some US startups.

With respect to external factors, startup hubs in the United States - such as Silicon Valley, New York and Boston - benefit from close ties with leading universities, including Stanford University, Massachusetts Institute of Technology and Harvard University, which facilitates access to the global talent pool. In Germany, by contrast, the predominance of German as the language of instruction at universities is identified as a barrier that complicates the attraction of international talent.

In addition, a large share of US consumers belongs to the “early adopter” group and are therefore more willing to experiment with new technologies. German consumers, on the other hand, tend to be more risk-averse, which makes the market adoption of new ideas relatively more challenging.

Turning to support mechanisms, the comparison highlights the relative success of co-working spaces in Germany, while also pointing out that German entrepreneurs face more limited access to finance - particularly international funding - compared to their US counterparts [9].

Beyond the United States and Germany, Israel represents a prominent model as one of the most successful startup ecosystems shaped by strong national startup culture and effective university-government-industry collaboration. The success of Israel's software-based startup ecosystem has emerged from a multi-layered interaction of socio-cultural, institutional and educational factors, transforming the country into a leading global innovation hub. One of the core drivers of this success is compulsory military service, which - through elite technology units such as Unit 8200 and Mamram - provides young individuals with advanced technical skills, leadership experience and strong professional networks. This process enables individuals to acquire hands-on experience in high-technology fields before entering the labour market.

This foundation is further supported by internationally recognized academic institutions and their well-functioning technology transfer offices, which facilitate the systematic commercialization of scientific research outputs. From a cultural perspective, Israel's startup ecosystem is characterized by a questioning, bold and improvisation-oriented entrepreneurial mindset. Shaped in part by regional geopolitical uncertainty, this cultural context increases entrepreneurs' willingness to take risks and encourages the perception of failure as a manageable, learning-oriented process.

At the institutional level, the state's strategic and targeted interventions have played a decisive role in ecosystem development. In particular, the Yozma Programme pioneered the establishment of a mature and sustainable venture capital market in Israel, functioning as a leverage mechanism that stimulated private-sector investment. Moreover, the limited size of the domestic market compels Israeli startups to pursue global markets from an early stage, with the United States and Europe among their primary target destinations.

As a result of these multidimensional dynamics, Israel has become one of the most densely concentrated startup ecosystems in the world in terms of startups per capita. The information and communication technologies (ICT) sector accounts for more than 30% of the country's total exports, while the capital and accumulated knowledge generated through successful exits are reinvested into new ventures, creating a self-reinforcing and sustainable ecosystem cycle [11; 22].

In the case of Estonia, a country with a small population, it is possible to observe that success has been achieved by extending the startup ecosystem beyond its physical boundaries. Building on early successes in telecommunications startups, the Estonian public sector played a significant role in shaping the country's entrepreneurial identity through bold and highly effective marketing initiatives. Such approaches are rarely observed elsewhere in the world. Prominent examples include globally replicated innovations such as the e-Residency programme, digital nomad visas and the positioning of companies as fully digital entities [22]. This example illustrates how the public sector can integrate into the ecosystem and accelerate national development through principles of collaboration and support. At the same time, it is observed that Estonia has been able to effectively transfer and leverage its earlier experiences across subsequent entrepreneurial initiatives.

In global startup ecosystem reports [22], Singapore consistently ranks among the top performers and embodies several important dynamics. First, due to its limited domestic market, startups in Singapore tend to focus on global and cross-border markets from the early stages of their formation. In addition, the country's financial stability, tax advantages and transparent legal system have positioned Singapore as a global startup hub.

Based on the reports discussed above, a concise summary of the key success dynamics of developed countries and the policy approaches they have adopted is presented in the table below:

Table 5. Key success dynamics of startup ecosystems in developed countries according to the global startup ecosystem index report

Country	Core Success Dynamic	Illustrative Example/Indicator
United States	Sectoral dominance and risk culture	Global leader in software, data and AI; San Francisco alone hosts an AI ecosystem larger than that of many countries. Institutional structures, legal frameworks and a strong risk culture support the startup ecosystem.
UK	Financial hub and language advantage	London's role as a global financial Centre fuels fintech innovation; the use of English attracts global talent.
Israel	Entrepreneurial spirit and military experience	The IDF functions similarly to a startup accelerator; global leader in cybersecurity with a score twice that of the USA.
Singapore	Regional gateway and financial stability	Asia's leading startup hub; ranked first globally in financial services.
Sweden	Green technology and sustainability	Ranked second globally in energy and environmental industries; Stockholm is a global Greentech hub.
Germany	Urban diversity and logistics strength	Decentralized ecosystem: Berlin specializes in fintech (2nd in the EU), while Munich leads in transportation (1st in the EU).
France	E-commerce leadership and public support	Ranked 6th globally in e-commerce and retail; Paris is the EU's fastest-growing unicorn ecosystem.
Switzerland	Decentralized structure and healthtech	Balanced distribution across cities such as Zurich and Lausanne; ranked third globally in healthtech.
Netherlands	Global mindset and tax advantages	Known as the “Gateway to Europe”; high English proficiency and tax structures that attract foreign talent.
Estonia	Digital governance and success cycle	Capital and know-how from Skype's success (“Skype Mafia”) fuel new ventures; e-Residency attracts digital nomads.
Australia	Business-friendly environment and established brands	Presence of global brands such as Canva and Atlassian, supported by entrepreneur-friendly legal frameworks.
Japan	Corporate collaboration and technical legacy (R&D)	Large firms (e.g., Sony, Panasonic) collaborate with startups through “Open Innovation” laboratories.
South Korea	Hardware engineering and large-scale investment	Presence of conglomerates such as Samsung and LG; government target to create five new unicorns by 2027.

Source: [22]

Developing countries currently exhibit the fastest-rising indicators in global rankings and the growth rates of their startup ecosystems have begun to surpass those of developed economies. As in developed countries, success dynamics in developing countries also vary across national contexts. One of the key advantages of developing countries lies in their large and rapidly expanding domestic markets, which are enabling this group to narrow the gap with developed countries at an accelerating pace.

After many years of prioritizing its domestic market due to security considerations - often associated with the so-called “Great Firewall” - China recorded the highest ecosystem growth rate among the top 35 countries in 2025, at 45.9%. Chinese startups have increasingly become a significant competitive threat to global incumbents. Apart from the United States, China is the only country with six cities ranked within the global top 50 - Beijing, Shanghai, Shenzhen, Hangzhou, Hong Kong and Guangzhou. China continues to consolidate its global

leadership in several critical technologies. In transportation - and particularly in the automotive industry - cities such as Shanghai, Beijing and Nanjing have achieved a position of clear dominance. At the same time, China has risen to top global ranks in information and communications hardware and health technologies (healthtech). Beyond these sectors, despite Western restrictions on advanced chips, China has emerged as a leading competitor in artificial intelligence by developing cost-efficient and rapidly deployed models, strengthening its position in the global AI race.

Reports identify China's technological self-sufficiency strategy and proactive state-led policies as the primary drivers behind these achievements [22].

In summarizing China's success dynamics, it becomes evident that the country exhibits several distinctive features that differentiate it from conventional developed-country models:

- Strategic steering role of the state;
- Coordination between state institutions and the broader innovation ecosystem;
- Advantage of a large domestic market and rapid commercialization capacity;
- Extensive use of state-backed financing instruments;
- Expanding human capital and research infrastructure [25; 26].

The recent achievements of startup ecosystems in the United Arab Emirates and Saudi Arabia - both of which have implemented similar yet context-specific policies to reduce their dependence on oil revenues - are increasingly noteworthy.

The United Arab Emirates has focused on attracting global talent through initiatives such as the Golden Visa programme, offering tax advantages via free zones (e.g., Dubai Internet City) and strengthening regional cooperation through diplomatic initiatives such as the Abraham Accords.

Although Saudi Arabia began implementing startup-oriented policies later than the UAE, it has progressed rapidly. Through the National Technology Development Programme (NTDP) and the Public Investment Fund (PIF), the government has provided billions of dollars in direct financing. Radical reforms - such as the introduction of a “one-click company registration” portal and the removal of restrictions on foreign ownership - have served as key drivers of this acceleration [22].

Located within the MENA region and providing access to a market of more than 450 million consumers, Saudi Arabia has emerged as a strategically important country for startups and currently hosts more than 1,600 ventures. These startups are supported by over 140 programmes and venture capital networks. At the same time, the government actively promotes and develops the startup ecosystem through a range of policy instruments and incentive mechanisms.

The National Technology Development Programme (NTDP) is a national initiative designed to strengthen and enhance the effectiveness of the Kingdom's technology ecosystem. It aims to reinforce the technology market and position the country as a regional innovation

and investment hub through complementary support mechanisms that promote sustainable growth. Under this programme, instruments such as Technology Development Financing, Next Era, Boost, Tech Crew and Relocate are provided.

The Saudi Unicorns programme is a national initiative that supports high-growth technology companies in reaching unicorn status. It offers an integrated set of support mechanisms, including global expansion assistance, talent development and employment facilitation, investor and private-sector linkages, mentorship and access to government institutions [1].

The Centre of Digital Entrepreneurship (CODE) is a technology center established to capitalize on the rapid growth of Saudi Arabia's digital economy. With the objective of empowering local talent and supporting digital entrepreneurship at all stages, CODE organizes networking events, incubation and acceleration programmes and digital capability development initiatives.

When examining startup ecosystem models in developing countries, the experience of Türkiye deserves to be placed at the center of the analysis.

As Türkiye continues to advance in global startup ecosystem indices, the combination of its large domestic market and its position as a regional power has created favourable conditions for startups to emerge in specific sectors. Naturally, Istanbul's inclusion among the world's top 50 global startup cities has further strengthened the country's visibility and standing within the global ecosystem.

From a sectoral perspective, Türkiye's prominence in the gaming industry can be interpreted as a signal of the importance of building upon existing national strengths. The success in gaming illustrates how leveraging comparative advantages can accelerate ecosystem development and enhance global competitiveness.

From another perspective, Türkiye's social and demographic structure has also had a notable impact on its startup ecosystem. A young, dynamic and highly skilled entrepreneurial community - combined with a strong culture of ecosystem-building and mutual support - constitutes one of the key distinguishing features of the country. Moreover, Türkiye's continuous exposure to geopolitical and economic challenges has endowed its entrepreneurial community with a distinctive sense of resilience.

Due to its strategic location at the intersection of Europe, Asia and the Middle East, entrepreneurs operating from Türkiye have been able to access these markets relatively easily. The success stories of several unicorn startups - such as Getir, Trendyol and BiTaksi - serve as illustrative examples.

In addition to these structural and cultural strengths, public support mechanisms have further contributed to ecosystem development. The “Turcorn 100” programme, for instance,

provides mentorship and various forms of support to startups that have moved beyond the early stage and demonstrate the potential to reach a valuation of USD 1 billion.

Beyond this initiative, the Türkiye Tech Visa programme has facilitated the attraction of international talent and eased the process for foreign entrepreneurs to establish businesses in the country. In addition, the effective implementation of the university–industry collaboration model has yielded positive outcomes, particularly through the prominent role of techno parks within the ecosystem [22].

The case of Türkiye can be further examined in depth as a model for developing countries and may serve as a practical reference for policy design and implementation.

Having reviewed illustrative models from both developed and developing countries, it is now possible to group the most significant differences between their startup ecosystems as presented in the table below:

Table 6. Key differences between startup ecosystems in developed and developing countries

Characteristic	Developed Countries (e.g., USA, UK, Israel, Estonia)	Developing Countries (e.g., China, India, UAE, Türkiye)
Market Orientation	Generally, “Born Global” ; due to smaller domestic markets, startups target international markets from inception.	Typically, regionally oriented ; large populations allow startups to scale domestically before entering global competition.
Growth Momentum	Slowing and stabilization ; as mature systems, growth rates tend to be lower (e.g., US 18.2%).	High momentum and rapid acceleration ; strong growth rates and upward ranking movements (e.g., Saudi Arabia 236.8%).
Role of the State	Facilitator and regulator ; predominantly private-sector-driven, based on profit and market dynamics.	Strategic investor and driving force ; state vision and large public funds actively steer ecosystem growth (e.g., Vision 2030).
Talent Management	Talent magnet ; visa programmes and digital nomad schemes attract global talent.	Brain drain risk ; economic and regulatory uncertainties may lead to the loss of skilled entrepreneurs.
Access to Finance	Mature venture capital (VC) markets ; abundant capital and experienced investor networks.	Developing or state-supported financing ; VC ecosystems are emerging or rely heavily on public grants.
Source of Digital Transformation	Innovation often stems from long-established university-industry linkages (e.g., Switzerland's healthtech leadership).	Ecosystem development frequently driven by direct state investment in technological infrastructure (e.g., UAE's blockchain initiatives).
Legal Infrastructure	Transparent and predictable ; bankruptcy laws and intellectual property rights protect entrepreneurs.	Still evolving ; regulatory uncertainty and bureaucratic barriers may hinder scaling.

Source: [22]

In conclusion, the structural divergence in entrepreneurship and innovation dynamics between developed and developing countries has become evident. In developed countries, stable yet relatively slower growth, mature venture capital markets and robust institutional frameworks stand out as defining characteristics. In contrast, developing countries exhibit

ecosystems in which the state plays a more active role and scaling potential is high, yet institutional uncertainty and the risk of brain drain remain more pronounced. These findings indicate that, for developing countries, strengthening institutional capacity and designing complementary mechanisms in collaboration with the private sector are of critical importance in policy formulation.

6. Azerbaijan's startup ecosystem: Present conditions and strategic transformation path

While many of the general challenges and characteristics observed in other developing countries also apply to Azerbaijan, the country possesses several context-specific features of its own in its recent efforts to build a startup ecosystem. Azerbaijan has demonstrated notable progress, particularly in terms of digital transformation capacity and regional leadership potential. Report findings indicate that Azerbaijan has been steadily strengthening its startup ecosystem both at the national level and specifically in its capital, Baku.

As of 2025, Azerbaijan advanced six positions in the global rankings, reaching 74th place and became one of the few countries to record ecosystem growth for four consecutive years. This performance represents the highest-ranking increase in the Central Asia region, while the country's annual startup ecosystem growth rate of 24.46% surpassed that of its regional competitors. These indicators suggest that Azerbaijan has entered a phase of steady and accelerating growth in its entrepreneurial ecosystem [22].

The acceleration of the startup ecosystem in Azerbaijan has been significantly shaped by the systematic and coordinated support of public institutions. In this context, the Innovation and Digital Development Agency (IDDA) has formed the institutional backbone of the ecosystem through the development of techno parks, the strengthening of digital infrastructure and the establishment of financing mechanisms. Established in 2021, IDDA has positioned Baku as a testing ground for digital transformation policies.

In addition, ASAN Service³ contributes to the support of early-stage startups through training programmes, financial services and entrepreneurship-focused initiatives. The “Digital Azerbaijan 2020” roadmap, launched in 2015, together with the Smart City pilot projects implemented in Baku, has further strengthened the institutional and technological foundations of the ecosystem.

In line with its economic diversification objectives, Azerbaijan has implemented reforms aimed at creating an investment environment that supports non-oil sectors. Within this framework, some of the country's first venture capital funds - such as Caucasus Ventures and

³ASAN Service, established in 2012 in Azerbaijan, is an innovative public service delivery model designed to provide government services through a centralized, efficient, transparent and citizen-oriented system. Developed with the objectives of digitalization, reducing bureaucracy and improving service quality, ASAN Service has become an internationally recognized example in the fields of good governance and public-sector innovation.

the e-commerce-focused INMerge Ventures - provide financing to early-stage and growth-stage startups.

Moreover, the regulatory sandbox model introduced by the Central Bank enables fintech startups to test their products through simplified licensing procedures. The Azerbaijan Cybersecurity Centre, established in 2024 in cooperation with international partners, contributes both to the development of qualified human capital and to the provision of technical support for technology-based ventures.

Within the broader context of global digitalization and regional development dynamics, Azerbaijan has defined a strategic roadmap to further strengthen its startup ecosystem and position the country as a significant startup hub in the near future. The programme titled “Development of Azerbaijan's Digital Economy for 2026-2029”, approved by the President of Azerbaijan in December 2025, sets a target of establishing 250 new startups in the country by 2029 [17].

The Strategy for the Development of the Digital Economy for 2026-2029, approved in the Republic of Azerbaijan, should be regarded not merely as an isolated or short-term policy document, but rather as a comprehensive transformation programme shaped at the intersection of global technological pressures, national development objectives and existing structural needs. Based on the Strategy document and the related Presidential Decree, the principal factors necessitating the adoption of this programme can be summarized as follows:

Global Technological Transformation Pressures: With the advent of the Fourth Industrial Revolution, digitalization, artificial intelligence and data-driven production processes have become primary determinants of economic growth. This shift has made it imperative for Azerbaijan to adapt to the global technological transformation.

National Strategic Commitments: The programme represents a natural extension of the 2022-2026 Socio-Economic Development Strategy and the “Azerbaijan 2030” vision, both approved by the President, in which digital transformation is defined as a national priority.

Economic Competitiveness and Export Imperatives: Enhancing the productivity levels of domestic enterprises, integrating into global value chains and expanding export capacity - particularly through digital channels - have rendered digital transformation an economic necessity.

Uncertainties in the Global Investment Environment: The global decline in foreign direct investment has required Azerbaijan to strengthen domestic financing mechanisms and public-private partnerships in digital infrastructure and entrepreneurship.

Human Capital and Labour Market Mismatch: The shortage of qualified professionals in information and communication technologies and cybersecurity, coupled with the risk of brain drain, has necessitated a comprehensive education and talent development policy focused on digital skills.

Efficiency in Public Administration and the Need for Data-Driven Decision-Making: Limited data integration and analytical capacity within existing governance and planning processes have increased the need to transition toward AI-supported and data-driven decision-making mechanisms in public policy.

In summary, the primary motivation behind the adoption of the strategy is to prevent Azerbaijan from being marginalized within the global digital economy, to enhance the productivity of non-oil sectors and to position the country as a regionally competitive digital hub by retaining qualified human capital.

The primary objectives outlined within the programme can be summarized as follows:

Table 7. Key objectives of the 2026-2029 digital economy development strategy from a startup ecosystem perspective

Strategic Objective Area	Target by 2029	Implications for the Startup Ecosystem
New Startup Formation	Establishment of 250 new startups	Expansion of early-stage venture creation and deepening of ecosystem density
Digital Skills Development	Training 40,000 citizens in digital skills	Broadening qualified human capital and reducing the talent gap
SME Digitalization	Increasing the number of SMEs accessing digital markets to 200	Encouraging startup-SME collaboration and expanding scaling opportunities
Artificial Intelligence Economic Impact	Generating 70 million AZN in economic value through GenAI utilization	Creating new market spaces for deep-tech and AI-based startups
Global Market Integration	Integration into international e-commerce and digital platforms	Promoting the “born-global” startup model

Source: [17]

In line with the objectives outlined above, Azerbaijan's startup ecosystem is required to undergo a defined process of transformation and structural change. Prior to implementing this transformation, however, the strengths and weaknesses of the country's ecosystem - also emphasized within the programme - must be carefully assessed.

Azerbaijan's digital economy and startup ecosystem possess several structural advantages, including relatively advanced digital infrastructure, a nationally secure cloud system and comparatively low-cost information and communication technology (ICT) services. The country's strategic geographic location offers additional opportunities, particularly in digital logistics, fintech and regional e-commerce solutions. Nevertheless, the shortage of qualified human capital in ICT and cybersecurity, disparities in digital skill levels and gaps in data sharing and standardization between the public and private sectors emerge as key weaknesses that constrain ecosystem development.

Notably, the government's potential role as the primary user and first major customer of startup projects represents a distinctive advantage that differentiates Azerbaijan from many

other countries. In this regard, the country has established a well-functioning e-government infrastructure. Following the development of e-government systems, private-sector actors - particularly fintech firms - have rapidly leveraged this infrastructure.

Table 8. Proposed policy instruments and their corresponding startup ecosystem components

Policy Area	Planned Action/Mechanism	Details and Illustrative Model
Entrepreneurship & Finance	Startup Chile Model	Mentorship and grant support to attract both foreign and domestic entrepreneurs (“New Business Creation” programme).
	Regulatory Sandbox	Establishment of controlled environments enabling new technologies to be tested without full regulatory exposure.
	Venture Capital and Crowdfunding	Tax incentives for venture funds and the establishment of a digital crowdfunding platform.
	Spin-off Support	Grant schemes for new ventures emerging from existing companies.
Human Capital	Bootcamp and Training Camp	Training programmes implemented in cooperation with major global firms such as Cisco, Oracle and Microsoft.
	Legalization of Freelance Work	Formal legal recognition of independent digital professionals.
	Scholarship Programmes	Short-term ICT training abroad and annual ICT-focused scholarship schemes.
Infrastructure & Enterprises	Next-Generation Technology Centre	Transformation advisory services for firms, modelled after Türkiye's MEXT and Singapore's transformation centers.
	Digital Solutions Platform	A centralized platform enabling businesses to access certified digital service providers (inspired by the UK model).
	Private Data Centers	Incentives for the establishment of private data centers through public-private partnerships.
Global Integration	E-Commerce Integration	Agreements with Amazon and AliExpress to integrate domestic SMEs into global marketplaces.
	Open Patent Registries	Public access to patent and trademark databases to enhance innovation transparency and monitoring.
	National Artificial Intelligence Model	Development of an Azerbaijani-language, economy-oriented generative AI (LLM) model.

At the same time, planned investments in artificial intelligence, e-government applications and data-driven public administration create new growth opportunities for technology-based ventures. Conversely, the outward migration of qualified talent and high dependence on external technology suppliers constitute major risks confronting Azerbaijan's digital transformation process.

In light of the current conditions and structural needs outlined above, the policy framework aimed at developing Azerbaijan's digital economy and startup ecosystem has been constructed upon a comprehensive approach that relies on the simultaneous deployment of financial, institutional and regulatory instruments.

The 2026-2029 Digital Economy Development Strategy envisages targeted policy interventions designed to address the identified weaknesses within the ecosystem while effectively leveraging its existing potential. In this context, Table 8 summarizes the core policy

instruments formulated under the strategy and specifies which components of the startup ecosystem each instrument is intended to strengthen.

As reflected in the programme design, Azerbaijan has developed a context-specific model for advancing its startup ecosystem by drawing upon the experiences of countries with successful practices in this field - such as Chile, Singapore, Germany, Türkiye and the United Kingdom - while adapting these models to its own structural conditions.

7. Comparative evaluation of the azerbaijan model in light of the literature and international country experiences

The theoretical approaches and country cases analyzed in this research demonstrate that the success of startup ecosystems should not be evaluated through isolated policy instruments, but rather within a systemic framework shaped by the interaction of institutional structures, market mechanisms and socio-cultural dynamics. The startup ecosystem model designed under Azerbaijan's 2026-2029 Digital Economy Development Strategy partially aligns with this systemic perspective. However, in light of the critical success conditions emphasized in the literature, it exhibits both notable strengths and certain structural limitations.

At the outset, the Azerbaijan model reflects a structure in which the state assumes an active catalytic role during the early stage of ecosystem formation. This approach is largely consistent with the literature on National Innovation Systems and the Triple Helix framework. Particularly in developing countries where venture capital markets remain underdeveloped and institutional voids are pronounced, the positioning of the state as a coordinating and risk-sharing actor is widely advocated in the literature. Successful examples of this approach include Israel's Yozma Programme⁴, Singapore's state-backed investment funds and China's strategic steering model.

An additional factor that further strengthens this argument is the substantial potential of the state in small economies such as Azerbaijan to serve not only as a supporter but also as a major lead customer for startups.

However, when considered through the lens of Michael E. Porter's competitiveness framework and Erik Stam's emphasis on “productive entrepreneurship”, it becomes critically important that, in the medium to long term, the state transitions from a substitutive role to one that gradually withdraws and encourages market deepening. Otherwise, the institutionalization of grant-heavy support mechanisms may reduce startups' sensitivity to market signals and ultimately constrain ecosystem efficiency.

⁴The Yozma Programme, launched in 1993 by the Government of Israel, was an entrepreneurship support initiative designed to stimulate private-sector investment through publicly backed venture capital funds and to improve early-stage technology startups' access to finance. The term Yozma, derived from Hebrew, means “initiative”, “incentive” and “taking action”. The programme played a decisive role in the development of Israel's venture capital market and in positioning the country as a leading actor within the global startup ecosystem.

Comparative analyses demonstrate that competition and market discipline play a central role in successful startup ecosystems. In the cases of the United States and Israel, startups are tested by private-sector demand and global markets from the early stages, allowing unsuccessful ventures to exit rapidly and enabling resources to be reallocated more efficiently. By contrast, in the model envisaged for Azerbaijan, public institutions are expected to assume the role of the first major customer. While this approach may compensate for demand deficiencies in the short term, it also carries the long-term risk of insufficient competitive intensity.

For this reason, alongside implementing this model, Azerbaijan may consider designing medium- and long-term programmes aimed at gradually transferring some of the state's roles to market mechanisms. The literature suggests that public demand can function as a temporary accelerator, but that startups should ultimately be directed toward private-sector and international markets during the scaling phase.

The targets and training programmes outlined in Azerbaijan's strategy for enhancing digital skills provide a positive foundation in this regard. However, comparative evidence indicates that generating human capital through education alone is insufficient; institutional and economic incentives that ensure the retention of this capital within the country must be simultaneously developed.

As observed in the cases of Israel and the United States, the reinvestment of capital and accumulated knowledge into the ecosystem following successful exits generates a sustainable cycle of innovation and growth. In Azerbaijan, however, the possibility that globally scaling startups may relocate their headquarters abroad raises concerns frequently emphasized in the literature, namely the risks of brain drain and “value leakage”. Such dynamics may constrain the country's long-term capacity for local knowledge production and ecosystem consolidation.

Ben Spigel's approach, which conceptualizes entrepreneurial ecosystems as the interaction of cultural, social and material elements, points to one of the relatively weaker dimensions of the Azerbaijan model. While material components - such as financing mechanisms, infrastructure and regulatory frameworks - are addressed in considerable detail within policy documents, cultural and relational dimensions receive comparatively limited attention. These include risk-taking culture, societal attitudes toward failure, the visibility of entrepreneurial role models and the strengthening of informal networks.

Overall, the planned startup ecosystem model in Azerbaijan corresponds to a hybrid development approach widely discussed in the literature on developing economies - one that is initially state-led but is expected to gradually transition toward market-driven mechanisms. While the model holds strong potential for addressing institutional voids and constructing an early-stage ecosystem, its long-term success will depend on the gradual redefinition of the state's role, the intensification of competitive pressures, the retention of human capital within the country and the strengthening of socio-cultural ecosystem components.

The adoption of a state-led hybrid model in Azerbaijan is not merely a policy preference, but a structural necessity dictated by the country's specific economic conditions. Why is this happening? Drawing on the 'Institutional Voids' theory, emerging ecosystems like Azerbaijan lack the mature venture capital networks, trust-based angel investor cultures and historical university-industry linkages present in developed models like the US or Israel. Therefore, the state is compelled to act as the primary catalyst and 'first customer' to artificially create the initial market momentum and absorb early-stage risks. Furthermore, characterized as a 'small and open economy' (consistent with the World Bank's Type 2 ecosystem classification), Azerbaijan lacks the massive domestic demand seen in China or India. This structural reality forces the ecosystem to adopt a 'born-global' orientation from its inception, necessitating aggressive state-backed digital integration and e-commerce initiatives.

In this respect, the Azerbaijan case does not present a universal blueprint for developing countries; rather, it contributes to the literature by illustrating the importance of context-sensitive and phased policy design in ecosystem development.

8. Discussion, conclusion and policy implications

This article has examined startup ecosystem models within a comparative and theoretical framework, analyzing the role of the state in developing countries through the case of Azerbaijan. Drawing upon Schumpeter's creative destruction approach, Porter's competitiveness framework, the National Innovation Systems perspective, the Triple Helix model, institutional voids theory and contemporary entrepreneurship ecosystem literature, the analysis demonstrates that the planned startup ecosystem model in Azerbaijan represents a hybrid development approach characteristic of transition economies.

The findings indicate that the Azerbaijan model is neither fully market-driven nor entirely state-centered. Rather, it is grounded in an initial phase in which the state assumes a catalytic role, focusing on addressing market failures such as limited access to finance, weak institutional coordination, regulatory uncertainty and infrastructure deficiencies. In this respect, the approach exhibits a high degree of alignment with the National Innovation Systems and Triple Helix literature, particularly within the context of developing countries where institutional depth and private venture capital markets remain limited.

When compared with international experiences, several structural strengths of the Azerbaijan model become evident. Public coordination, investments in digital infrastructure, regulatory sandbox practices and targeted support mechanisms display similarities to the policy approaches adopted during the early development stages of startup ecosystems in countries such as Israel, Singapore and Estonia. From the perspective of institutional voids theory, these policy instruments can be interpreted as deliberate interventions aimed at compensating for missing or underdeveloped market institutions.

Moreover, the emphasis on digitalization and integration into global markets represents a rational response to the structural constraints faced by small and open economies with limited domestic markets. In addition, certain sectors that have shown notable development in the Azerbaijani economy in recent years provide an important foundation for the construction of a distinctive startup ecosystem model. In particular, the institutional capacity and public policy priorities emerging in areas such as defense industries and social services may enable the formulation of targeted entrepreneurship policies focused on specific sectors.

Such a sectoral specialization approach may facilitate a more efficient allocation of resources while supporting the development of an ecosystem model built upon the country's existing capabilities rather than simple policy imitation. In this respect, the Azerbaijani case suggests the potential for a context-sensitive ecosystem strategy grounded in local competitive advantages.

Nevertheless, comparative analyses point to several important limitations concerning the long-term sustainability of the Azerbaijani model. In particular, if the state's locomotive role becomes permanent, there is a risk that market mechanisms may weaken and competitive pressure may decline. Porter's competitiveness framework and Stam's productive entrepreneurship perspective both emphasize that a healthy and sustainable startup ecosystem depends on the active role of the private sector, the maintenance of competitive intensity and the efficient allocation of resources according to market conditions. Accordingly, if public support mechanisms fail to evolve into market-based instruments over time, the ecosystem may risk transforming into a structure that is unable to function through its own internal dynamics and remains dependent on continuous public intervention.

At the same time, evaluating the strategy through the lens of human capital yields a paradox. The government's ambitious goal of training 40,000 citizens in digital skills will significantly expand the talent pool. However, if this is not matched with corresponding institutional incentives, dynamic exit markets and a resilient socio-cultural trust environment (as emphasized by Spigel's relational model), the ultimate result will be a severe 'value leakage'. Without robust local retention mechanisms, Azerbaijan risks becoming a state-funded incubator that subsidizes human capital for developed startup ecosystems, accelerating the brain drain rather than reversing it.

The analysis also highlights structural challenges related to retaining human capital and preserving knowledge within the country. While the development of digital skills and entrepreneurship education is necessary for ecosystem formation, the absence of institutional and economic incentives capable of retaining successful ventures and qualified talent domestically increases the risk of value leakage and brain drain. This issue constitutes a fundamental structural constraint that may hinder developing countries' transition from technology users to knowledge producers.

Another notable limitation of the startup ecosystem model envisioned for Azerbaijan is its relatively limited emphasis on fostering a risk culture. Entrepreneurship literature demonstrates that, particularly in developing countries, risk-taking behavior, societal perceptions of failure and the level of social support for entrepreneurship play a critical role in ensuring ecosystem sustainability. In this context, risk culture should be viewed not only as an individual entrepreneurial trait but also as an indicator of society's broader attitude toward startup activity and the legitimacy granted to such initiatives.

Simultaneously, Azerbaijan - known for its relatively high level of tolerance toward different cultures and civilizations - possesses significant potential to attract foreign capital and qualified human resources. To effectively leverage this potential, it is important to simplify the legal framework applicable to foreign investors and experts, facilitate work and residence procedures and strengthen mechanisms of social integration through targeted state support. Such measures would not only encourage financial capital inflows but also promote knowledge transfer and the integration of international experience into the local ecosystem.

Overall, the Azerbaijani case demonstrates that there is no universal policy blueprint for startup ecosystem development. Rather, the effectiveness of such models depends on phased policy designs aligned with country-specific institutional capacity, market size and level of development. Within this framework, three key policy recommendations emerge. First, the state's early-stage facilitating and risk-sharing role should be maintained, but in the medium and long term, public interventions should be gradually redesigned to create greater space for market mechanisms. Second, competitive intensity should be strengthened through the deepening of venture capital markets and the reinforcement of private sector leadership. Third, institutional incentive mechanisms should be developed to ensure the retention of human capital and the reinvestment of accumulated knowledge back into the ecosystem.

Briefly, this study demonstrates that hybrid models initiated under state leadership can serve as functional instruments during the transition phase of startup ecosystem development in developing countries. However, the long-term success of such models depends on the nature of public intervention, the strengthening of private sector dynamics and the continuity of institutional learning processes. In this regard, the Azerbaijani experience offers not a template to be replicated, but rather an analytical reference point for context-sensitive and evolving policy design.

Ultimately, although the concrete outcomes of this comprehensive digitalization program may be difficult to observe in the short term, Azerbaijan has the potential to successfully implement the best practices of developed ecosystems by carefully adapting them to its unique cultural and economic context. In particular, the limited size of the domestic market must act as a driving force, compelling local startups to adopt a 'born-global' mindset and prepare for international competition from their very inception. Consequently, the entire

startup ecosystem - ranging from regulatory frameworks and public funding mechanisms to educational initiatives - must be strategically synchronized to serve and accelerate this overarching goal of global integration.

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