THE TRANSFORMATION OF THE STARTUP ECOSYSTEM IN ALBANIA: A COMPARATIVE ANALYSIS OF FUNDING AND SECTORAL TRENDS FOR THE YEARS 2024 – 2025

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Abstract

This study examines the transformation of Albania's startup ecosystem through a statistical analysis of public funding allocations for the years 2024 – 2025, with a special focus on women-led startups. Using official records of grant recipients and data-driven methods in R, the paper investigates sectoral shifts, funding distributions, and the relationship between financing stages and budget allocation.

The analysis reveals a strong positive correlation between funding phase and allocated budget, suggesting a clear trend of higher investment in more mature ventures. Technology-driven sectors – such as EdTech, FinTech, and E-Commerce – received the highest financial support, while traditional sectors like Manufacturing and Logistics showed stagnation or decline. Clustering analysis identified three distinct groups of startups, highlighting differentiated access to resources based on developmental stage.

The findings suggest an increasing digital orientation of the entrepreneurial landscape in Albania, but also point to funding imbalances that may hinder early-stage innovation and rural inclusion. The study concludes with policy recommendations to foster inclusive and balanced growth across sectors and regions, ensuring sustainable support for high-potential startups at all stages.

Keywords: Start-ups, innovation, Albania, funding

JEL: O31, O32, L26, M13, O38

Introduction

Innovation and entrepreneurship are widely recognized as fundamental drivers of economic competitiveness, productivity, and long-term growth (Ziemnowicz, 2020). In the context of emerging economies such as Albania, these elements play an even more strategic role, serving as catalysts for structural transformation and technological modernization (Mersini & Qosja, 2025). Over the last decade, Albania has undertaken various reforms and initiatives to enhance its entrepre-

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neurial climate, foster innovation, and support small and medium-sized enterprises (SMEs) as vehicles of socio-economic development (INSTAT, 2023).

One of the most remarkable developments in recent years has been the emergence of a startup ecosystem that reflects both local potential and global aspirations (Mersini & Qosja, 2025). However, despite visible progress, this ecosystem remains relatively nascent compared to EU standards, with approximately 88 startups per million inhabitants – significantly below the European average of 250 (Mehmeti & Musabelli, 2024). This gap highlights the need for structural interventions in policy, funding, and education to ensure sustainable entrepreneurial growth. Meanwhile, research in transition economies illustrates that weak innovation infrastructure and limited national absorptive capacity can hamper the translation of entrepreneurship into macro-growth (Fayyaz & Bartha, 2025).

The digital transformation agenda is central to this evolution (Amouri et al., 2021). Projects like the Tirana Smart City initiative and the expansion of E-Albania have accelerated the integration of digital technologies into public administration and the private sector (Kolleshi & Botusha, 2025). Yet, despite these advancements, SMEs still face numerous barriers such as limited access to finance, insufficient digital literacy, and the absence of coherent regulatory frameworks (Llazo & Neza, 2024). These constraints reduce their ability to innovate effectively and to compete within an increasingly digitalised regional market. Globally, SMEs' digital transformation is slowed by skill shortages, infrastructural gaps and organisational resistance to change (Perera & Razi, 2025).

At the same time, the Albanian startup landscape has begun to show signs of diversification and specialisation (Mehmeti & Musabelli, 2024). The emergence of technology-oriented sectors – especially in EdTech, FinTech, and E-Commerce – demonstrates a shift toward knowledge-intensive activities that mirror broader European trends (Xhindi et al., 2023). Nevertheless, traditional industries such as manufacturing and logistics remain underfunded, revealing an imbalance that could impede inclusive development (Mehmeti & Korsita, 2023).

In this context, the present study investigates the transformation of the Albanian startup ecosystem by analysing public funding allocations across different sectors and financing stages during 2024 – 2025. By statistically examining relationships between financing phases and allocated budgets, this research aims to identify patterns in funding behaviour, detect sectoral trends, and provide data-driven insights for policymaking.

Specifically, the study tests two main hypotheses:

H1: There is a statistically significant positive correlation between the financing phase of a startup and the amount of public funding it receives, indicating a preference for more mature startups.

H2: Startups operating in technology-driven sectors receive significantly higher public funding than those in traditional sectors.

The findings of this study will not only illuminate the financial and structural dynamics of the Albanian startup ecosystem but also contribute to the broader debate on how targeted public investment can foster innovation, inclusivity, and balanced regional growth.

Literature Review

Innovation and entrepreneurship are central to modern economic growth theories, especially within developing and transition economies (Ziemnowicz, 2020). According to (Ziemnowicz, 2020) innovation-driven model, entrepreneurial activity introduces new combinations of resources that stimulate productivity and structural change. In Albania, policy frameworks over the past decade have sought to align with this logic by integrating innovation strategies into SME and startup development plans (INSTAT, 2023). However, structural constraints – such as limited financial depth and under-developed innovation infrastructure – still hamper their full realisation (Demeti et al., 2017). Studies on emerging economies demonstrate that even robust R&D efforts may not automatically translate into growth unless complemented by strong institutional and absorptive capacities (Fayyaz & Bartha, 2025).

Studies by Mehmeti and Korsita (2023) highlight that the digitalisation of SMEs is a key lever for improving competitiveness in Albania; however, its success depends on coherent value creation models that justify digital investment. This insight underscores the importance of linking innovation with viable business and funding ecosystems. Indeed, research emphasises that entrepreneurship ecosystems in emerging contexts must integrate financing, institutional support, and human capital to realise innovation benefits (Bradley et al., 2021).

Digital transformation has been a dominant theme in the evolution of Albania's entrepreneurial ecosystem (Curraj, 2018). Research shows that SMEs adopting advanced technologies – such as ERP, BI, and knowledge management systems – experience significant performance improvements, provided that these processes are supported by strong leadership and adaptive organisational cultures (Curraj, 2018; González-Mon et al., 2024). At the same time, systematic reviews of SME digitalisation confirm that key enablers include digital-skilled leadership, access to financial and technological resources, and favourable regulatory and market conditions (Nabi et al., 2017).

Nevertheless, Albanian SMEs face persistent obstacles including limited financial capital, inadequate human resources, and low digital literacy levels (Llazo & Neza, 2024; Tomorri et al., 2022). These barriers constrain innovation capacity, especially in rural regions where digital infrastructure remains weak.

Globally, SMEs' digital transformation is slowed by skill shortages, infrastructural gaps and organisational resistance to change (Perera & Razi, 2025).

Albania's startup ecosystem has expanded notably since 2020, but its development remains uneven (Mehmeti & Musabelli, 2024). Start-ups are concentrated mainly in urban centres – particularly Tirana – reflecting both opportunities and disparities in access to resources (OECD, 2022). Traditional sectors such as manufacturing, logistics, and agriculture continue to face under-representation in startup funding, while digital and service-oriented industries dominate new venture creation (INSTAT, 2023). This pattern aligns with the increasing global convergence toward technology-driven entrepreneurship, yet it poses challenges for Albania's balanced regional development (OECD, 2024). The country's small domestic market and limited venture capital availability further restrict startup scaling and cross-border competitiveness (European Commisson, 2022).

The Albanian government has undertaken several initiatives to support startup growth, including innovation funds, tax incentives, and public grant programmes targeting women entrepreneurs (INSTAT, 2023). However, scholars argue that these programmes often lack long-term continuity and fail to address early-stage financing gaps (Demeti et al., 2017; Mehmeti & Korsita, 2023). Comparative studies show that the structure of public funding significantly influences startup performance (Bradley et al., 2021). Targeted financial instruments, when aligned with development stages and sectoral priorities, can accelerate innovation diffusion and improve ecosystem maturity (Sagala & Ori, 2024).

The reviewed literature establishes that Albania's startup ecosystem is undergoing digital and structural transformation but remains fragmented (Curraj, 2018). Existing studies have emphasised the importance of digitalisation (González-Varona et al., 2021), yet few have quantitatively analysed how public funding shapes this transformation. The hypotheses of this paper are:

H1: There is a statistically significant positive correlation between the financing phase of a startup and the amount of public funding it receives, indicating a funding preference toward more mature startups (Phase 3) in Albania during the years 2024 – 2025.

H2: Startups operating in technology-driven sectors receive significantly higher public funding than those in traditional sectors. Methodology: This dual empirical and policy-oriented perspective aims to enrich the academic discourse on innovation ecosystems in transitional economies and inform future public funding strategies in Albania.

Methodology

The methodology of this paper is based on the official lists of women benefi-ciaries for the years 2024 – 2025. The data for each year includes identification of the industry sector in which each business operates, the financing phase in which it is included (F1, F2 or F3) and the amount of budget allocated to each of the businesses. Together, all the data form the basis for statistical analysis and inter-annual comparison of fund allocations and the structure of supported sec-tors (OECD, 2024).
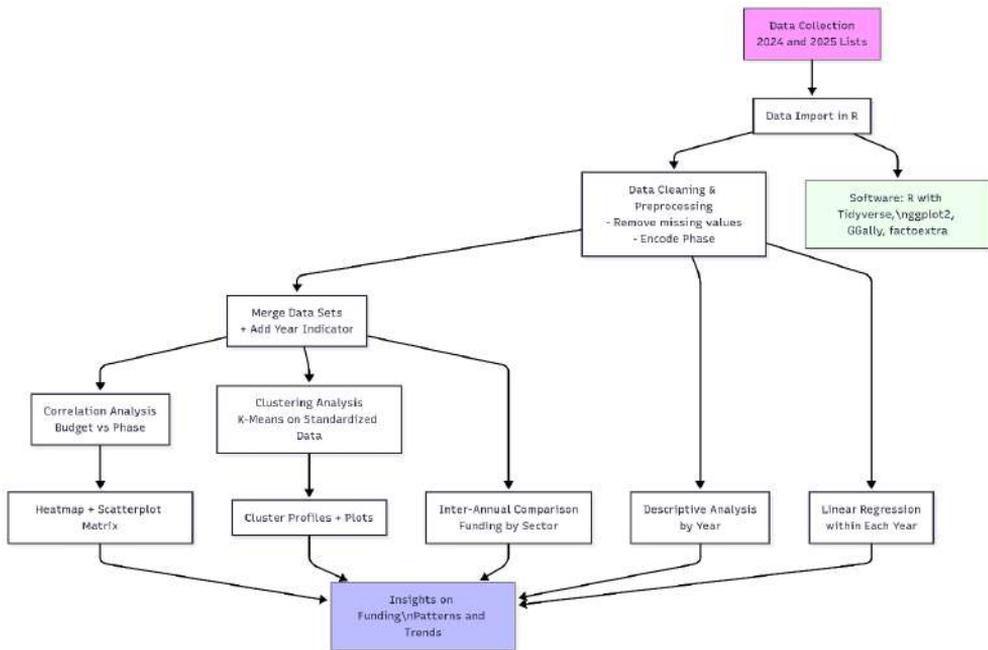
Source: Authors findings

Figure 1: Diagram of the Methodology, Data Import and Processing

Data importation and preprocessing were conducted within the R statistical environment, leveraging standard data handling techniques. The raw data under-went a cleaning process where missing or incomplete entries – particularly in the allocated budget field – were removed to ensure accuracy in subsequent analy-ses. Furthermore, the categorical variable representing the financing phase was numerically encoded to facilitate quantitative analysis; the phases *F1*, *F2*, and *F3* were mapped to the numeric values 1, 2, and 3 respectively. This newly derived numeric variable, referred to as *Fase_num*, enabled the application of regression and clustering methods requiring numeric input (James et al., 2023).

Descriptive Analysis

An initial descriptive analysis was performed separately for each year's data to characterize the sample distribution. Key summary statistics were computed, including the count of startups per industry sector and financing phase, as well as total and average budget allocations (Field et al., 2018). Visualization techniques such as bar charts and horizontal bar plots were utilized to represent these distributions graphically. This approach provided an intuitive understanding of how funding was allocated across sectors and phases, and enabled comparison within each respective year.

Linear Regression Analysis

To explore the relationship between the funding stage and the amount of budget allocated, simple linear regression modelling was applied to each data set. The mathematical model had the form:

$$Y_i = \beta_0 + \beta_1 X_i + \epsilon_i$$

where Y_i denotes the allocated budget for startup i, X_i represents the numeric financing phase (Fase_num), and ϵ_i is the error term. Coefficients of determination (R^2) and p-values for the slope parameter β_1 were examined to evaluate the model fit and the statistical significance of the association. The results were visualized with scatterplots augmented by regression lines, including clearly annotated R^2 and *p-values* to enhance interpretability (Kabacoff, 2022).

Inter-Annual Comparative Analysis

To identify temporal trends and sectoral shifts in funding allocation, the two annual datasets were merged into a single dataset with an added categorical indicator specifying the year. Aggregate budget sums were calculated for each industry sector by year. Comparative bar charts with side-by-side columns were created to visualize and highlight changes in funding patterns across sectors between 2024 and 2025. This approach provided insight into how funding priorities evolved over the examined period (Bryman, 2016).

Correlation Analysis and Visualization

A Pearson correlation analysis was conducted on the pooled data to assess the linear association between the allocated budget and the financing phase (Benesty et al., 2009). The resulting correlation matrix was visualized using heatmaps,

which graphically depict the strength and direction of relationships among variables. Complementing this, pairwise scatterplot matrices were generated to explore the distributional characteristics and bivariate relationships, facilitating a comprehensive understanding of the data structure.

Clustering Analysis

To identify natural groupings of startups with similar financial and developmental profiles, K-means clustering was applied using standardized values of allocated budget and numeric financing phase (Hartigan & Wong, 1979). Standardization ensured comparability between variables measured on different scales. The elbow method was employed to determine the optimal number of clusters, resulting in a selection of three distinct groups. Clustering outcomes were visualized through scatterplots, and descriptive summaries were produced for each cluster, including average allocated budget, average financing phase, and cluster size, providing a detailed characterization of startup profiles within each group.

Software Environment

All analyses were performed using the R statistical software environment, utilizing widely accepted packages for data manipulation, visualization, and modeling. The analytical workflow ensured reproducibility and robustness, adhering to best practices in statistical data analysis.

Results

In 2024, the distribution of startups showed a relative balance between traditional and technological sectors. Sectors such as Manufacturing and Logistics had a significant presence, while technology fields such as Education-Technology and Finance-Technology were starting to stand out. However, a more diversified distribution was observed, where even small sectors such as E-Games and Sponsored-Technology had a noticeable representation.

Number of startups by industry (2024)
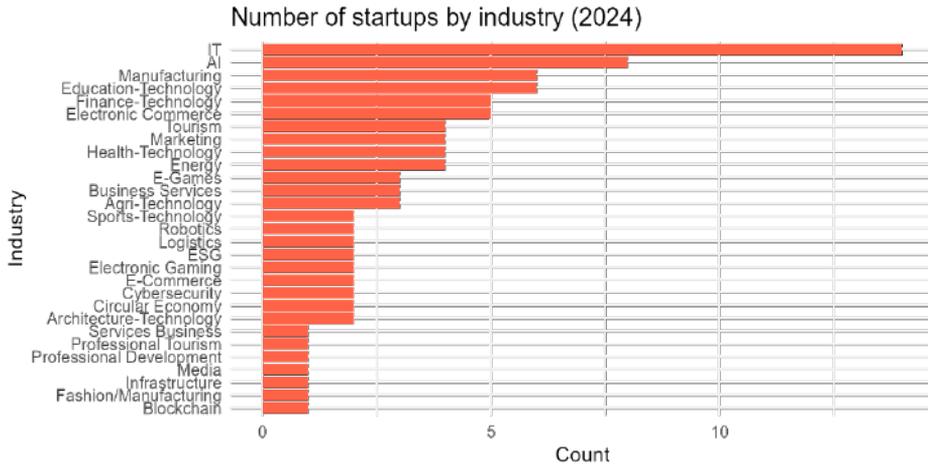
Source: Authors findings

Figure 2: Distribution of Startups across Sectors (2024)

In contrast, the year 2015 represents a clear transformation towards a more digitized economy. The IT, E-Commerce and Cybersecurity sectors showed rapid growth, becoming some of the most dominant areas in the startup ecosystem. Meanwhile, traditional sectors such as Manufacturing and Logistics recorded a slight decrease in the number of new startups. Another noticeable change was the disappearance of some small niches (such as E-Games) and the emergence of new sectors with potential such as Artificial Intelligence and Blockchain.

Number of startups by industry (2025)
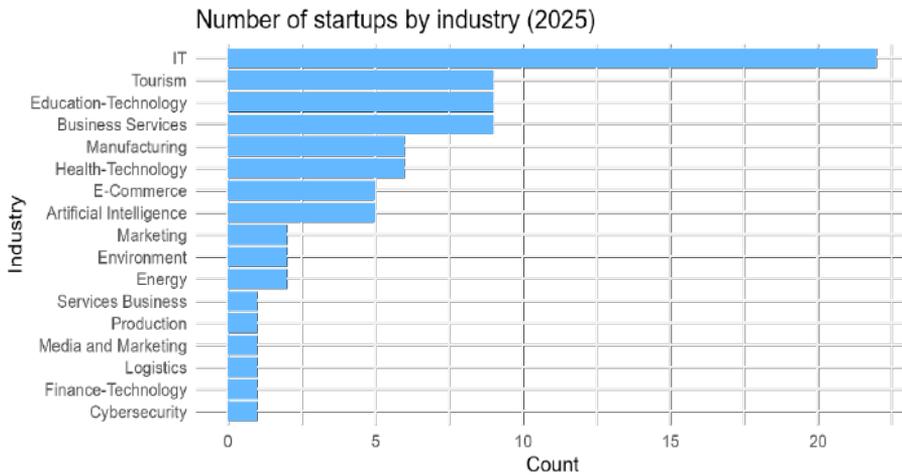
Source: Authors findings

Figure 3: Distribution of Startups across Sectors (2025)

The year-on-year comparison shows a clear shift in the focus of entrepreneurs towards technology-based sectors. If in 2024 the startup ecosystem was relatively diversified, in 2025 it seems to have consolidated around a few key technology areas. This trend corresponds to global developments in the economy and reflects an increase in investments in sectors with high growth potential.

It is worth noting that most of the sectors that showed significant growth in 2025 were the same ones that had received higher budget allocations in the previous analysis. This suggests a direct correlation between institutional investments and the development of startup ecosystems in specific areas. At the same time, the decline of some traditional and small sectors may be a consequence of changes in investment priorities and market demands.
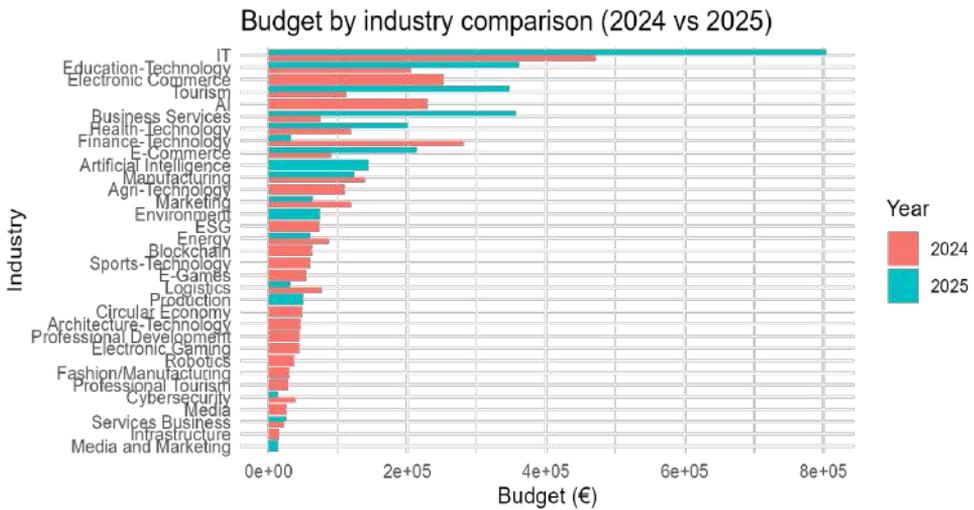
Source: Authors findings

Figure 4: Budget Allocation to Key Sectors

The analysis of the data presented in the graph shows that the budget distribution across sectors has had significant variations. The results revealed that the sectors with the highest allocations are "Education-Technology", "Electronic Commerce" and "Finance-Technology", which have reached funding levels above 600,000 euros. This trend suggests a particular concentration of financial resources in areas that combine technology with key sectors of the economy.

On the other hand, the results showed that some sectors have received relatively low allocations. "Professional Tourism", "Circular Economy" and "Media" have recorded values below 200,000 euros, which indicates a more limited distribution of resources in these areas. Other sectors of strategic importance,

such as Artificial Intelligence and Blockchain, have received moderate funding, despite the high potential they represent.

As for traditional sectors, the results revealed that Manufacturing and Logistics have maintained stable, but lower, funding levels compared to technology sectors. This phenomenon can be interpreted as an indicator of a progressive transition towards a more digitized economy, where investments are prioritized in areas with faster growth rates.

Overall, the results obtained through this graph highlight the presence of a clear division in the budget allocation, with a noticeable slope towards innovative and technology-based sectors.
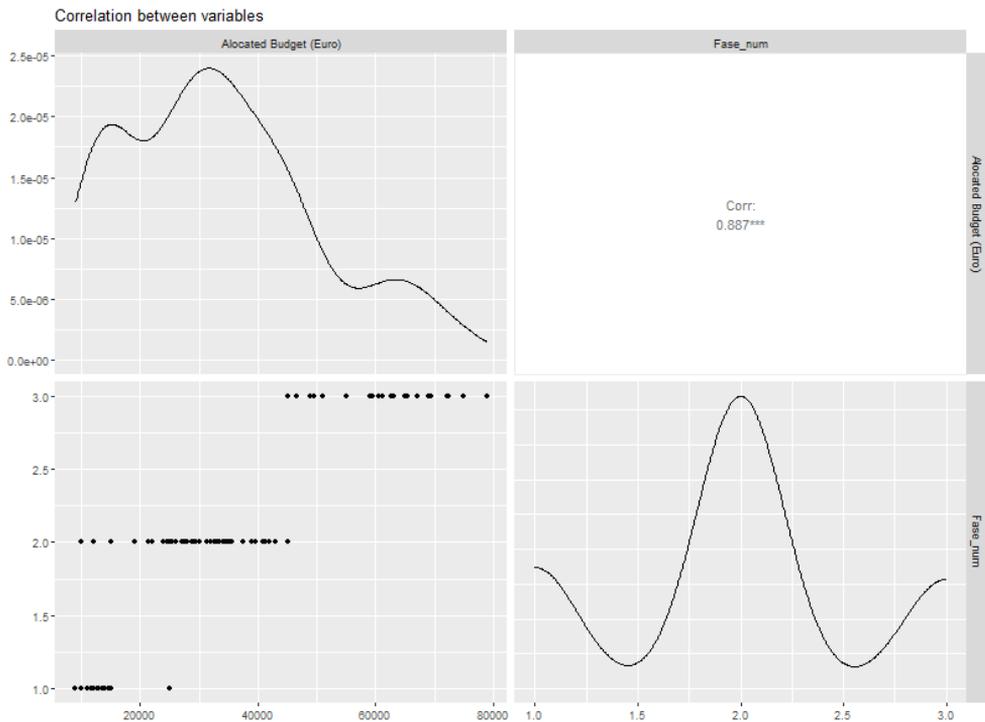
Source: Authors findings

Figure 5: Distribution and Correlation between Budget and Project Phase
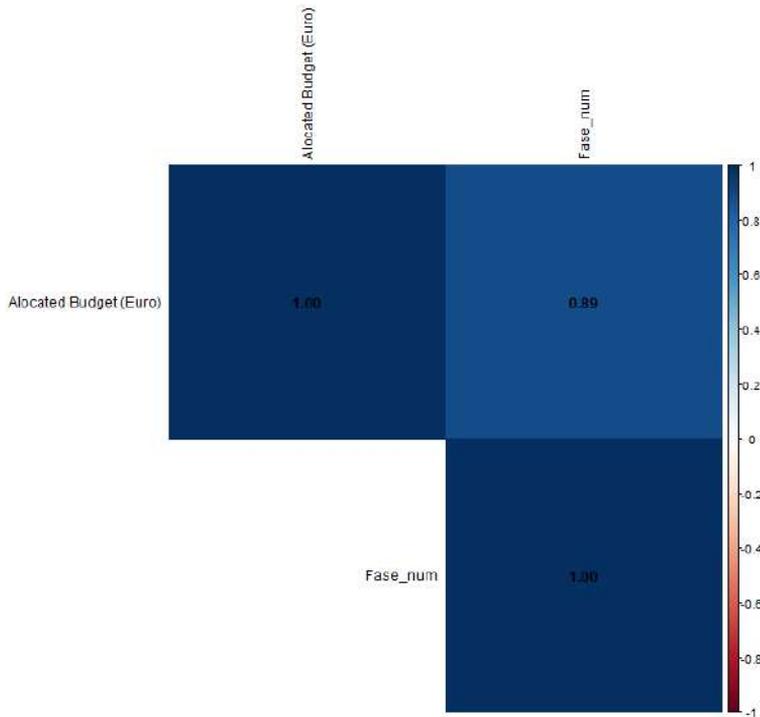
**Figure 6:** Heatmap Correlation between Allocated Budget and Funding Phase

Figure 2 presents a correlation matrix plot exploring the relationship between the funding phase (*Fase_num*) and the allocated budget in euros (*Allocated Budget (Euro)*). The analysis indicates a **strong positive correlation** between these two variables, with a **correlation coefficient of 0.887 (p < 0.001)**, as shown in the upper-right cell of the matrix. This suggests that projects in later funding phases tend to receive higher budget allocations.

The scatterplot in the lower-left cell further illustrates this relationship, revealing distinct clusters of budget allocations corresponding to the three phases. It is evident that phase 3 projects consistently receive significantly higher funding compared to phases 1 and 2. The diagonal panels display kernel density plots, which show the distribution of each variable. The budget distribution is skewed, with a concentration of projects receiving between 30,000 and 60,000 euros, while the phase variable follows a multimodal distribution with clear separation among the three discrete phases.
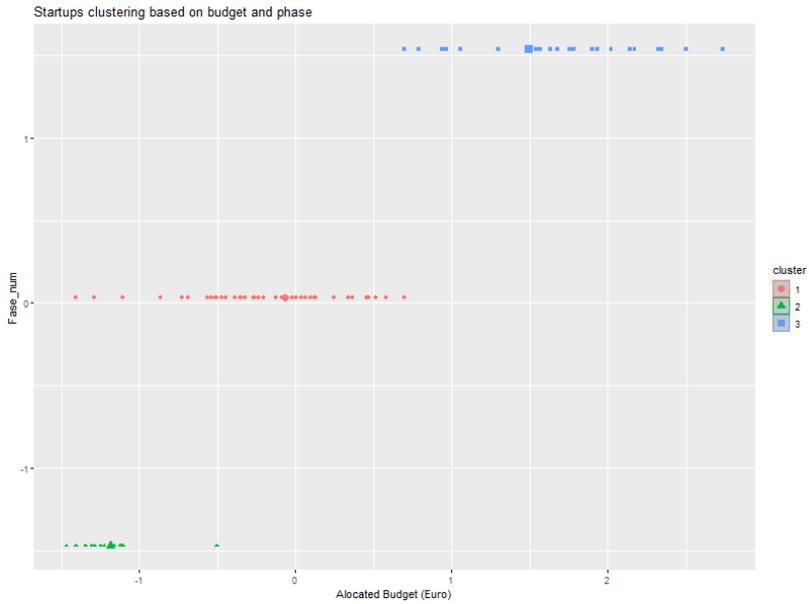
Source: Authors findings

Figure 7: Cluster classification of the Start Up
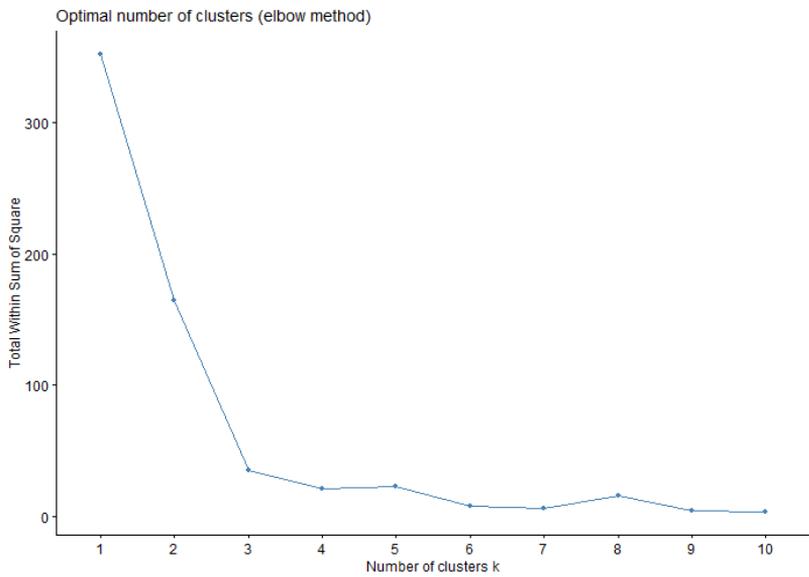
Source: Authors findings

Figure 8: Optimal cluster elbow

The results of the cluster analysis revealed that the data are best represented by a model consisting of three distinct clusters. This finding reflects a meaningful segmentation of the data, with each cluster capturing a unique pattern or structure within the observations. The selection of the three clusters was guided by an assessment of the within-cluster sum of squares at different values of k (the number of clusters). The rate of reduction in within-cluster variance decreased significantly after three clusters, indicating that further partitioning would lead to marginal gains in explanatory power, unnecessarily increasing the complexity of the model.

This three-cluster solution suggests that the data set contains natural clusters or profiles that differ in key characteristics, such as funding levels, project phases, or other relevant dimensions depending on the context of the data. These clusters likely reflect the existence of distinct structural subgroups within the population under study, each of which exhibits internal homogeneity and external heterogeneity with respect to the variables analyzed.

From a policy and strategic perspective, identifying these clusters provides valuable insights into how entities or initiatives within the data set are organized or differentiated. It provides a basis for targeted interventions, resource allocation, or further comparative analysis across clusters. The robustness of this segmentation supports its use in subsequent stages of analysis, including profiling cluster characteristics and assessing their relationship to key performance indicators or outcomes of interest.

Discussion

The findings of this study reveal critical insights about the transformation of Albania's startup ecosystem and the effects of public funding on sectoral development during 2024 – 2025. The strong correlation observed between funding stages and budget allocation ($r = 0.887$) indicates a clear policy tendency to direct resources toward more mature startups (Phase 3), reflecting a risk-management approach in which funders increase their activity as ventures demonstrate sustainability (Bradley et al., 2021; Sagala & Őri, 2024). This result aligns with Hypothesis 1 and confirms the literature emphasizing that targeted financial instruments and stage-specific funding improve the survival and growth prospects of more established startups (Demeti et al., 2017; OECD, 2024).

However, clustering analysis identified three distinct groups of startups – early-stage, mid-stage, and well-resourced Phase 3 ventures – highlighting a potential stratification in resource access. This stratification could inadvertently hinder early-stage innovators lacking seed capital, a challenge previously discussed in studies of emerging economies where limited financial depth and underdeveloped innovation infrastructure constrain entrepreneurship (Fayyaz & Bartha, 2025;

Ziemnowicz, 2020). The observed patterns suggest that while Albania's funding policy supports startup maturation, additional mechanisms might be needed to reduce entry barriers for nascent ventures (Mehmeti & Korsita, 2023).

Sectoral analysis demonstrates dynamic growth in technology-driven areas such as EdTech, FinTech, and E-Commerce, each receiving over €600,000 in funding. This finding is consistent with global trends in digital entrepreneurship, where technological sophistication and innovation intensity attract higher investment (Curraj, 2018, 2018; González-Mon et al., 2024). The emergence of AI and Blockchain startups in 2025, albeit at moderate funding levels, indicates that Albanian entrepreneurs are gradually adopting advanced technologies and participating in knowledge-intensive sectors (Xhindi et al., 2023). These results support Hypothesis 2, showing that technology-driven sectors receive more substantial public funding than traditional sectors, echoing the evidence that digitalization enhances SME competitiveness in transitional economies (Mehmeti & Korsita, 2023).

Conversely, traditional sectors such as Manufacturing and Logistics continue to receive lower allocations (under €300,000), raising concerns about industrial diversification and economic resilience. The limited funding in these sectors reflects a broader structural challenge: the Albanian entrepreneurial ecosystem is heavily urban-centric, and policy interventions may insufficiently support industries with longer-term growth potential (European Commisson, 2022; INSTAT, 2023). Similarly, the disappearance of Electronics startups between 2024 – 2025 highlights the risk of uneven sectoral development and underscores the need for policies that balance innovation with industrial breadth (Curraj, 2018).

Finally, the urban-rural digital divide emerged as a key barrier to inclusive entrepreneurial growth. Startups based in Tirana benefit from established infrastructure and digital literacy, whereas rural regions face significant gaps in broadband access, technological skills, and market linkages. This finding mirrors literature emphasizing that digital and human-capital disparities in emerging economies can exacerbate regional inequalities and limit the effectiveness of innovation policies (Nabi et al., 2017; OECD, 2022; Perera & Razi, 2025). Addressing these spatial imbalances is crucial to ensuring equitable participation in Albania's evolving startup ecosystem.

The findings of this study integrate and extend the existing literature by empirically demonstrating how funding stage and sectoral orientation shape the Albanian startup ecosystem. They highlight the dual need for targeted support to mature startups and broader inclusion of early-stage ventures and traditional industries, as well as the importance of addressing geographic disparities in digital and financial access (Bradley et al., 2021; Fayyaz & Bartha, 2025; Sagala & Őri, 2024).

Conclusions

This study demonstrates that digital transformation is fundamentally reshaping Albania's small business and startup landscape, although progress remains uneven across sectors, regions, and stages of development. The startup ecosystem is rapidly evolving, with digital and technology-driven sectors attracting a disproportionate share of funding and entrepreneurial activity. While this focus creates opportunities in high-growth areas, it risks neglecting traditional industries that continue to employ significant portions of the population. The observed strong correlation between startup maturity and funding allocation reflects a coherent investment strategy but may disadvantage early-stage innovators, highlighting the need for policy mechanisms that support promising ventures in the initial development phases. Emerging technologies, including AI and Blockchain, are gaining traction with moderate funding, signaling that Albanian entrepreneurs are increasingly capable of adopting advanced solutions. However, the disappearance or underrepresentation of certain sectors may reduce the overall diversity of innovation in the ecosystem. Geographic disparities in digital infrastructure and skills further exacerbate unequal opportunities, emphasizing the importance of targeted rural development programs. The identification of three distinct startup groups indicates a stratification of resources within the ecosystem, underscoring the need for policies that facilitate mobility and access across these levels. Overall, sustaining Albania's digital and entrepreneurial transformation requires a balanced approach that combines nationwide digital skills training, strategic financing for traditional sector modernization, the development of rural digital infrastructure, stage-independent funding for high-potential startups, and policies that promote diversification in innovation. These measures collectively can ensure that digital technologies deliver inclusive, long-term benefits for Albanian businesses and the broader economy.

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