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Dmytro Loza,
Postgraduate student,
ORCID 0009-0004-5852-4998
e-mail: ankarn41k@gmail.com
Classic Private University, Zaporizhzhia

TRANSFORMATION OF THE UKRAINIAN STARTUP ECOSYSTEM: FROM STABLE GROWTH TO WARTIME ADAPTATION (2014-2024)

Introduction. The Ukrainian startup ecosystem demonstrated a unique development trajectory that combined significant potential for technological innovation with extreme challenges caused by the full-scale war. Over eleven years (2014-2024), the volume of venture investments increased from $42 million to $462 million–an 11-fold increase that included both periods of exponential growth and dramatic collapses.

This contradiction between the destruction of old financing structures and the birth of new ones posed a critical task for researchers. It was necessary not simply to describe the dynamics of capital attraction, but to determine how the ecosystem functioned under extreme conditions, what adaptation strategies market participants developed, where failures emerged, and how they could be compensated through institutional interventions. Answers to these questions would determine the ability of the Ukrainian economy to preserve innovation potential and transform wartime challenges into a stimulus for technological breakthrough.

The full-scale invasion on 24 February 2022 caused the biggest shock in the history of the Ukrainian startup industry: investments collapsed by 72%–from $832 million (2021) to $236 million (2022). However, by 2024, financing increased by 121% to $462 million, reaching 55% of the historical peak. This was the fastest recovery among countries that experienced military conflicts, but the financing structure changed dramatically: Defense Tech emerged as a dominant sector ($59 million), a shortage of business angels was revealed, and grants increased by 625%.

The study of the Ukrainian startup ecosystem gained relevance for three reasons. Firstly, Ukraine's empirical experience was unique for understanding the resilience of innovative entrepreneurship under extreme conditions. Secondly, the identified structural problems (collapse of angel financing, excessive dependence on grants, absence of late-stage capital) were typical for developing ecosystems and required systemic solutions. Thirdly, the accumulated data allowed for the formulation of practical recommendations for state policy supporting startups during crisis conditions.

Analysis of recent research and publications. Research on the Ukrainian startup ecosystem and its financing mechanisms has been the subject of growing attention from domestic scholars, especially in the context of transformation caused by the full-scale war.

Raputa K. O. [12] analysed problems and directions for improving the mechanism of venture financing of startups in Ukraine, particularly through the prism of the Ukrainian Startup Fund's activities. The author identified critical challenges: excessive number of applications with a limited number of experts, deficit of competencies in certain sectors (healthcare, security), taxation of grants (loss of up to 20% of financing), insufficient conditions for developing business angel investment. The researcher emphasised the phenomenon of «toxic» venture capital, when an aggressive growth strategy imposed by investors could contradict the long-term interests of founders.

Kovalchuk N. O. and Sopivnyk L. I. [9] studied the current state and features of venture investment development in Ukraine, analysing the dynamics of venture investment volumes, sectoral financing structure, and main barriers to venture market development. The authors found that despite the growth in venture investment volumes in the 2010s, the Ukrainian market remained insufficiently developed compared to developed countries due to a limited number of venture funds, low activity of institutional investors, and absence of systemic state support for the venture industry.

Tesliuk S. A. et al. [13] conducted a comprehensive analysis of crowdfunding platform development in Ukraine, revealing that the domestic crowdfunding ecosystem began in 2012 with the creation of the nationwide platform «Spilnokosht». From 2016, local and thematic platforms began to actively form: «Moie Misto», «GoFundEd», «Na-Starte», «dobro.ua». As of 2022, these platforms raised from 3.5 to 449 million hryvnias, financing from 101 to nearly 6,000 projects. The authors identified key factors hindering crowdfunding development: insignificant amounts of funds compared to international platforms, focus on social and cultural projects instead of technological startups, limited purchasing power demand, distrust of the financing method.

Lytvyn I. V. and Bulak Yu. V. [10] conducted one of the first studies of venture business in Ukraine during wartime, identifying serious challenges faced by the industry: financial deficit (99% of companies needed support), operational disruptions, outflow of foreign capital,

and forced relocation. However, the authors emphasised the resilience of the Ukrainian startup industry and its ability to adapt to new realities, maintaining focus on high-tech sectors. By 2022, Ukraine occupied 34th place in the global Startup Ranking, and the Ukrainian startup ecosystem was characterised by youth (74% of startups operated for less than three years), compact teams, and pronounced global orientation (60% worked on EU and US markets).

Dyba M. V. [8] and Bondarchuk N. V. [5] studied the infrastructure of venture financing and problems of venture mechanism functioning in Ukraine, emphasising structural weaknesses of the ecosystem: excessive dependence on founders' own capital (84.2%), limited development of the local venture market (3.2%), absence of tax incentives for investors, taxation of state grants (loss of up to 20%), limited expert base in high-tech sectors.

Hubarieva I. O. [7] conducted comprehensive research on startup ecosystems in Ukraine, systematising key problems of their development: limited access to financing at early stages, insufficient state support, weak links between ecosystem participants, talent drain abroad. The author identified main trends in the development of the Ukrainian startup industry and proposed recommendations for strengthening interaction among startups, investors, accelerators, universities, and state institutions to form a viable innovation ecosystem.

Despite growing attention to this issue, there remained a need for comprehensive empirical research that would analyse the dynamics of transformation of the Ukrainian startup ecosystem over an eleven-year period (2014-2024), identify critical gaps in the financing structure, and formulate priority directions for state policy supporting innovative entrepreneurship during wartime and post-war recovery.

The aim of the article was empirical analysis of the transformation of the Ukrainian startup ecosystem during 2014-2024 with identification of the impact of military conflict on the structure and mechanisms of financing innovative entrepreneurship.

To achieve this aim, the following tasks were defined:

- to study the dynamics of venture financing of Ukrainian startups during 2014-2024, identifying key periods and turning points;
- to analyse the impact of full-scale war on the financing structure by stages, investor types, and sectoral priorities;
- to identify critical gaps in financing (particularly, the collapse of angel investment) and their consequences for the future development of the ecosystem;
- to assess the role of state support programmes (Ukrainian Startup Fund, Brave1) in compensating for private financing failures;
- to formulate scientifically grounded recommendations for improving mechanisms of startup support at state and institutional levels.

Presentation of the main research material.

1. Ukrainian Startup Ecosystem: Eleven Years of Transformation (2014-2024).

The Ukrainian startup ecosystem underwent an evolution that could hardly be called linear. Analysis of data for the period 2014-2024 demonstrated an 11-fold increase in financing volume–from $42 million to $462 million [4] (Table 1). However, this trajectory was characterised by high volatility, combining phases of rapid expansion with acute crises caused by both internal imbalances and global shocks (Fig. 1).

Table 1. **Dynamics of Venture Financing in Ukraine by Year (2014-2024)**

Year	Volume ($M)	YoY (%)	Period	Key Events
2014	42	-	Formation	Beginning of ecosystem after Euromaidan
2015	146	+248%	Formation	Devaluation → IT competitiveness
2016	80	-45%	Formation	Correction, search for stability
2017	265	+231%	Growth	Recovery of growth
2018	323	+21%	Growth	Stable growth
2019	542	+68%	Growth	Grammarly unicorn ($1B)
2020	571	+5%	COVID + Peak	Resilience during pandemic, GitLab $6B, Creatio $68M
2021	832	+46%	COVID + Peak	HISTORICAL PEAK: GitLab IPO $15B, Grammarly $13B, 28 exits
2022	236	-72%	War Shock	24.02 - full-scale war, ×3.5 drop
2023	209	-11%	War Shock	Stabilisation at bottom, shortage of business angels
2024	462	+121%	Recovery	55% of peak: Creatio unicorn $1.2B, Defense Tech $59M

Source: compiled by the author based on [1; 2; 3; 4; 6]

The graph visualised the eleven-year financing trajectory, where five periods were clearly visible: ecosystem formation with high volatility (2014-2016), organic growth (2017-2019), anti-crisis resilience and peak (2020-2021), dramatic decline (2022-2023), and rapid recovery (2024). Such dynamics were unique among emerging markets and reflected both global factors (pandemic, war) and the internal strength of the ecosystem.

The first years (2014-2016) set the tone: $42 million in 2014 (the year after the Revolution of Dignity) sharply contrasted with $146 million in 2015. The hryvnia devaluation made Ukrainian IT specialists extremely competitive in the global market–a paradoxical benefit from the economic crisis. 2016 brought a correction to $80 million, but this proved to be only a pause before new growth.

The period 2017-2019 was characterised by steady volume growth: $265 million, $323 million, $542 million respectively [1; 2; 3]. Each year the ecosystem became more mature–new venture funds appeared, an accelerator network formed, and the number of startups with proven business models increased.

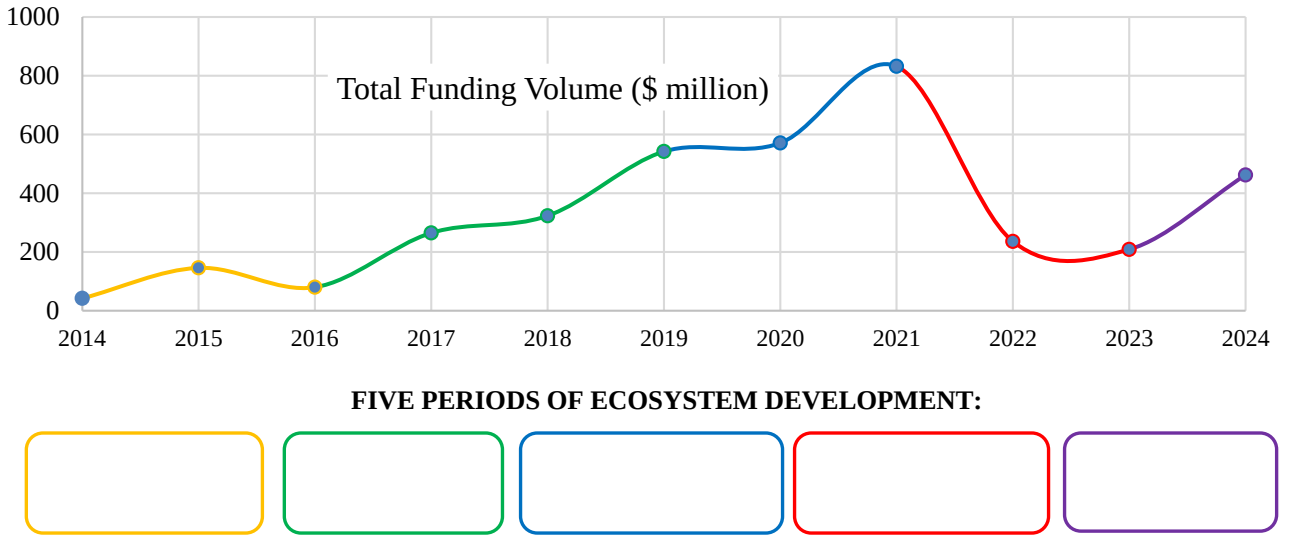

Fig. 1. **Dynamics of Venture Financing in Ukraine (2014-2024)**
Source: systematised by the author based on DealBook of Ukraine 2021-2025 [1-4]

Despite the COVID-19 pandemic, 2020 proved to be a record year for early-stage financing. Investments reached $571 million, with the Seed stage doubling to $42 million and Series A quadrupling to $119 million [1]. This was the year when the technology sector proved its anti-crisis resilience. GitLab reached a valuation of $6 billion during a secondary share sale of $195 million, Creatio attracted its first external financing ($68 million from Volition Capital and Horizon Capital), and four global companies with Ukrainian roots took 62% of the year's total financing.

2021 became the pinnacle. $832 million in investments, 28 exits (a record!), GitLab's IPO with a capitalisation of $15 billion on the first trading day [2]. Grammarly transformed into a decacorn with a valuation of $13 billion after raising $200 million, People.ai and Firefly Aerospace entered the unicorn club. Seed financing doubled again to $84 million, Series A grew to $158 million. The ecosystem appeared ready to reach a new level.

By 2022, Ukraine occupied 34th place in the global Startup Ranking [11], and the Ukrainian startup sector had several features. Firstly, it was a young ecosystem: 74% of startups operated for less than three years, 87% for less than five years, indicating active involvement of a new generation of entrepreneurs. Secondly, compact teams predominated (37% had two founders, 25% had three), typical for early stages. Thirdly, a pronounced global orientation was observed: 60% of startups worked on EU and US markets, and only a quarter focused exclusively on the Ukrainian market [11]. This export nature would prove critically important for survival during the war.

Sectoral specialisation until 2021 focused on SaaS, FinTech, E-commerce, EdTech, and HealthTech [11]. At the same time, the financing structure revealed a fundamental weakness: excessive dependence on founders' own capital (84.2%) and limited development of the institutional venture market (only 3.2% received financing from local VCs) [11] (Table 2).

Table 2. **Sources of Financing for Ukrainian Startups (before 2022)**

Financing Source	Share (%)	Characteristics
Own Capital	84.2%	Dominant source; bootstrapping
Ukrainian Startup Fund	31.0%	State financing of early stages
Other State Grants	18.4%	Innovation support programmes
Foreign Venture Capital	8.9%	Mainly from USA and EU
Local Business Angel	7.6%	Limited number of active angels
Foreign Accelerator	6.3%	Y Combinator, Techstars
Foreign Business Angel	5.1%	Connections through diaspora
Local Venture Capital	3.2%	Insufficiently developed market
Local Accelerator	3.2%	Unit.City, iHUB
Crowdfunding	3.8%	Mainly international platforms
Bank Credit	1.9%	Minimal role for startups

Source: [11], cited from: [10]
**Note:* The sum exceeds 100% because startups can use multiple sources simultaneously

The role of the Ukrainian Startup Fund (USF), created in 2018, became an important step in developing state innovation support. The Fund provided grants of up to $75 thousand (up to $25 thousand at Pre-seed and up to $50 thousand at Seed stages) for startups in priority areas: artificial intelligence, augmented reality, BigData, blockchain, cybersecurity, medical technology, fintech, edtech, e-commerce, Internet of Things [7]. However, as noted in [7], USF faced a number of challenges: excessive number of applications with a limited number of experts, deficit of competencies in certain sectors (healthcare, security), risk of financing limitations due to economic crises, and taxation of grants (loss of up to 20% of financing).

2. Impact of War: 2022-2023 Collapse and Critical Financing Gap.

The full-scale invasion on 24 February 2022 caused the biggest shock in the history of the Ukrainian startup industry. Investments collapsed from $832 mil-

lion (2021) to $236 million (2022)–a 72% drop, or 3.5-fold [4]. This was not just a decline but an almost complete halt to financing in the war's first months, when 99% of companies found themselves in a critical situation requiring urgent support [10]. Since 51% of Ukrainian startups generated no revenue, they were completely dependent on external financing, which suddenly disappeared.

2023 became a year of stabilisation at the bottom: investments totalled $209 million (-11% compared to 2022), indicating a cessation of free fall but not recovery [4]. Meanwhile, it was during this period that the most dangerous structural problem of the Ukrainian startup ecosystem manifested–the collapse of angel financing.

According to the analytical report [6], the ecosystem experienced a shortage of qualified and experienced business angels, limiting access to «smart capital» at early stages of startup development. This was not just statistics–it was the destruction of a critically important link in the startup financing chain. Business angels traditionally provided not only capital at Pre-seed and Seed stages ($20-500 thousand) but also mentorship, access to networks, strategic advice, and legitimisation of projects in the eyes of institutional investors. Their almost complete absence created a «black hole» at early stages: startups with an idea or prototype could not attract first financing to prove the concept to a minimum viable product (MVP).

The reasons for the outflow of business angels were obvious: relocation abroad, loss of wealth due to devaluation and economic crisis, sharp increase in risk aversion, reorientation of capital to survival of own businesses [6]. Meanwhile, the consequences of this reduction would be felt for many years, as without angel financing at Pre-seed/Seed stages, a gap formed in the startup flow that would have reached Series A in 2-3 years and generated significant investments.

3. 2024 Recovery: New Financing Structure.

2024 brought unexpected recovery: investments grew to $462 million (+121% compared to 2023), reaching 55% of the 2021 historical peak [4]. This was rapid recovery for a country where active combat operations continued. At the same time, the 2024 financing structure strikingly differed from the pre-war structure, reflecting deep ecosystem transformation.

According to [4; 17], the distribution of investments by stages revealed imbalance and new realities (Table 3). The Seed stage attracted $88 million (19% of total volume) through 146 rounds, indicating a healthy base of young startups. Series A suddenly grew by 115% to $58 million (13%) with 58 rounds, signalling the return of international venture funds. Series B comprised $43 million (9%), demonstrating investor caution regarding scaling under conditions of uncertainty.

Additional information: Early stages (Seed + Series A) = 32% ($146M), Late stages (Series B + C) = 57% ($266M), Defense Tech = 13% ($59M, of which $41M grants, $18M equity investments).

Table 3. **Financing Structure by Stages in 2024**

Stage	Volume ($M)	Share (%)	Number of Rounds	Key Features
Series C	223	48%	-	90% = Creatio $200M Without Creatio: only $23M (5%)
Seed	88	19%	146	Record level, healthy base of young startups
Series A	58	13%	58	+115% YoY, return of international VCs
Grants	50	11%	1,500+	+625% YoY: Brave1 $40M, USF $10M
Series B	43	9%	-	Investor caution, scaling complexity
Total	462	100%	200+	+121% YoY compared to 2023

Source: systematised by the author based on [4]

The most controversial was Series C: formally $223 million (48% of total volume), but 90% of this amount was one Creatio round ($200 million from Sapphire Ventures) (Table 4). Without this mega-deal, Series C represented only $23 million (5%), closer to the reality of an ecosystem developing during war. This revealed a fundamental problem: absence of late-stage capital for scaling successful startups into global companies.

Instead, a new category emerged–grants, totalling $50 million (11%), growing by 625% compared to 2023 [4]. Programmes Brave1 ($40 million for ~1,000 Defense Tech startups), Ukrainian Startup Fund (380+ projects at $25-50 thousand), and Google Ukraine Support Fund (82 projects at $100 thousand) partially compensated for the absence of business angels. However, grants did not replace equity financing: they did not provide mentorship, access to networks, and personal interest of investors.

Table 4. **Top-5 Investment Deals of the Ukrainian Startup Ecosystem in 2024**

No.	Company	Volume ($M)	Stage	Sector	Investors
1	Creatio	200.0	Series C	Marketing & Sales (No-code CRM)	Sapphire Ventures, StepStone Group, Volition Capital, Horizon Capital
2	Carmoola	19.2	Series A	FinTech (auto financing)	QED Investors, VentureFriends, InMotion Ventures, u.ventures
3	Jome	9.8	Series A	PropTech (AI real estate)	Geek Ventures, u.ventures, Toloka VC, Vesna Capital, Roosh Ventures + 4 others
4	IN1	6.0	Seed	FinTech (fiat + crypto)	Brainstorm Ventures
5	Fintech Farm	5.0	Series B ext	FinTech (neobanks)	Bank of Georgia

Source: systematised by the author based on [4]

The top-5 deals of 2024 (Table 4) revealed several key trends in financing the Ukrainian startup ecosystem:

1. Capital concentration. The five largest deals accumulated $240 million, representing 52% of total financing volume ($462 million). This was typical for

markets recovering from crisis, when investors focused on proven companies with validated business models.

2. FinTech dominance. Three of the five top deals (Carmoola $19.2M, IN1 $6M, Fintech Farm $5M) belonged to the fintech sector, confirming Ukraine's traditional strength in financial technologies and their resilience to geopolitical risks.

3. Creatio phenomenon. The $200 million round from leading global funds (Sapphire Ventures, StepStone Group) confirmed the possibility for Ukrainian companies to achieve unicorn status ($1.2B valuation) even during war. However, this deal distorted Series C statistics, as it comprised 90% of this category.

4. International syndication. The Jome deal ($9.8M) with involvement of 9 investors demonstrated a trend towards co-investment models, when international and local funds jointly reduced risks through diversification.

5. AI integration in traditional sectors. Jome used artificial intelligence for PropTech, reflecting a global trend of competitive advantages of Ukrainian developers in AI/ML technologies.

A particularly important achievement of 2024 was that Creatio joined the elite club of Ukrainian unicorn companies with a valuation exceeding $1 billion. As of 2024, Ukraine had six companies with Ukrainian cofounders that achieved unicorn status, demonstrating the ecosystem's ability to generate global tech leaders even during war (Table 5).

Table 5. **Ukrainian Unicorns (as of 2024)**

No.	Company	Valuation ($B)	Year of Status	Sector	Status
1	Grammarly	>13.0	2019 (unicorn) 2021 (decacorn)	Writing Assistant (AI)	Decacorn Baillie Gifford, BlackRock
2	GitLab	>10.4	2018	DevOps Platform	Public (IPO 2021) NASDAQ: GTLB, $15B cap
3	BITFURY	>2.0	2018	Blockchain Infrastructure	Unicorn Spun-off $2B SPAC
4	airSlate	>1.25	2022	Workflow Automation	Unicorn Morgan Stanley led
5	Creatio	1.2	2024 NEW	No-code CRM/BPM	NEW Unicorn 2024
6	People.ai	1.1	2021	AI Platform for Sales	Unicorn Series D $107M

Source: compiled by the author based on [4]

Key findings: 6 unicorns with Ukrainian founders, Grammarly–first decacorn ($13B), GitLab–most successful exit through IPO, Creatio–only new unicorn in 2024 despite war, SaaS/AI dominated (4 of 6), all had headquarters abroad (USA), R&D in Ukraine.

4. Unique Model: Local Investor Dominance.

The most unexpected discovery of 2024 was the investor structure by capital origin (Fig. 2). Ukrainian investors provided 40% of all early-stage rounds, mixed financing (Ukrainian + foreign funds jointly) – 30%, purely foreign investors – 29%, and accelerators and grants – 1%. This was an abnormally high indicator of local participation for an ecosystem developing under military conflict conditions [4].

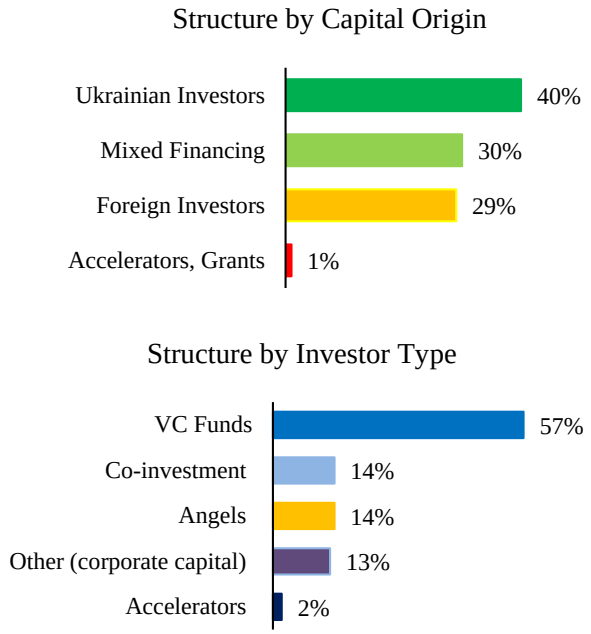

Fig. 2. **Structure of Venture Financing in Ukraine by Investor Types and Capital Origin at Early Stages in 2024**

Source: systematised by the author based on [3; 4]

This structure had a dual nature. On one hand, 40% Ukrainian participation indicated maturity and resilience of the local ecosystem, patriotic motivation of investors, and their willingness to take risks during war. On the other hand, this was a forced reaction to the caution of foreign VCs, who often required a local co-investor for due diligence verification and understanding of Ukrainian market specifics under conditions of uncertainty.

Distribution by investor type revealed a different picture [4]: venture funds provided 57% of financing, co-investment models (Angels + VC jointly)–14%, purely angel investments–14%, accelerators–2%, other (including corporate capital and undisclosed sources)–13%. The particularly low share of business angels (14%) quantitatively confirmed the problem of shortage of qualified and experienced business angels [6], which was one of the most acute structural problems of the Ukrainian ecosystem.

Figure 2 visualised two key aspects of the 2024 financing structure. Firstly, the dominance of Ukrainian investors (40% of early stages) was an abnormally high indicator for a developing ecosystem. Secondly, the limited share of business angels (14%) quantitatively confirmed the most acute structural problem of the Ukrainian ecosystem–critical shortage of «smart capital» at early stages.

5. Defense Tech: New Ecosystem Driver.

Particularly indicative was the growth of the Defense Tech sector to $59 million (13% of total volume), of which $18 million was equity investments and $41 million was grants [4] (Table 6).

Table 6. **Defense Tech Financing in 2024**

Category	Volume ($M)	Share of DefTech	Mechanism	Key Programmes/ Investors
Grants	41	69%	Financing without equity dilution	Brave1 (~1,000×$25K), USF, Google Ukraine Support Fund (82×$100K), NATO IFW
Equity Investments	18	31%	Seed, Series A	D3 VC, MITS Capital, Nezlamni Fund, Green Flag Ventures, United Angels Network, SMRK
Total Defense Tech	59	100%	Mixed Model	1,500+ teams received support

Source: compiled by the author based on [4; 15]

This was not just a sectoral change but the emergence of a new class of investors: specialised Defense Tech VCs (D3, MITS Capital), the United Angels Network focusing on military technologies, and state grants Brave1. More than 1,000 teams received support in this segment, creating a foundation for future export of Ukrainian defense technologies (Fig. 3).

Defense Tech became a new ecosystem driver. The unique financing structure of the Defense Tech sector was observed, where 69% comprised grants ($41M) and

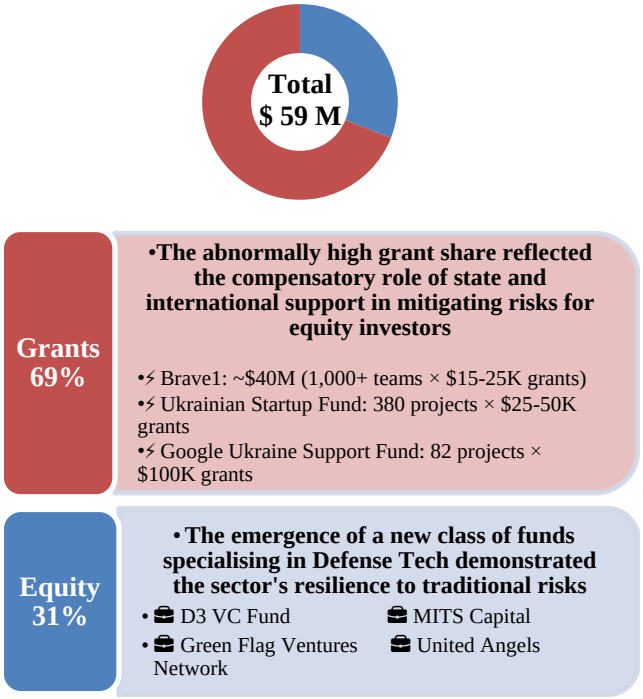

Fig. 3. **Defense Tech as a New Driver of the 2024 Ecosystem**

Source: systematised by the author based on [3; 4]

31%–equity investments ($18M). This reflected the compensatory role of state and international support (Brave1, Google Ukraine Support Fund) in a sector with elevated risks, while the presence of equity investors indicated long-term commercial potential of Ukrainian defense technologies.

6. Positive Trends and Global Position

Despite war and structural problems, the analytical report [6] recorded unexpectedly positive trends. Ukraine rose from 50th place (2022) to 46th place (2024) in the global startup ecosystem ranking, demonstrating resilience during a period when most developing economies fell due to global venture financing decline. The number of active startups grew to 2,600+, and their valuations tripled since 2020 [6].

Ukrainian IT exports reached $6.7 billion in 2023, representing 41% of the country's service exports, and the number of IT specialists exceeded 346,000, maintaining Ukraine in second place in Central and Eastern Europe for IT outsourcing volumes [6]. This created a powerful talent pool for startups and ensured foreign currency receipts critically important for the economy during war.

At the same time, the report identified important challenges alongside opportunities. Among challenges: shortage of qualified business angels, growing dependence on grants, talent drain, risks for investors, limited access to late-stage capital. Among opportunities: EU candidacy (access to European Innovation Council and Horizon Europe programmes), unique expertise in Defense Tech and Cybersecurity, demand for reconstruction technologies (Energy, Infrastructure, Logistics), growth of support from international organisations [6].

The sectoral structure of wartime financing demonstrated dramatic transformations caused by adaptation to new realities and the impact of individual large rounds (Fig. 4). In 2023 (total volume $209 million), the structure was determined by EdTech with a 41% share ($85 million), largely due to Preply's Series C round of $70 million. The second group comprised IT Services (14%), Finance (14%), and Retail (10%). Defense Tech was just beginning to emerge as a separate category, remaining within «Other» (14%).

2024 (total volume $462 million) brought cardinal changes. Marketing & Sales became the absolute leader (46%, $215 million), almost entirely due to Creatio's $200 million round (no-code CRM platform with AI components). Defense Tech finally separated into a distinct category (13%, $59 million), confirming the ecosystem's strategic pivot. EdTech contracted to 9% ($39 million), although it remained significant in absolute figures. Finance grew by 41% in absolute figures to $41 million (9%) but lost share due to the dominance of Creatio's large round.

This transformation reflected several key trends: firstly, the ecosystem demonstrated dependence on individual mega-rounds (Preply in 2023, Creatio in 2024), which significantly distorted the overall structure. Secondly, Defense Tech established itself as a strategic priority, with 69% of its financing ($59 million) coming through grants, the rest through equity investments. Thirdly, traditional sectors (EdTech, Finance) maintained presence, but their share fluctuated depending on large

deals. This volatility underscored market immaturity and critical need for diversification of financing sources to reduce dependence on individual transactions [4].

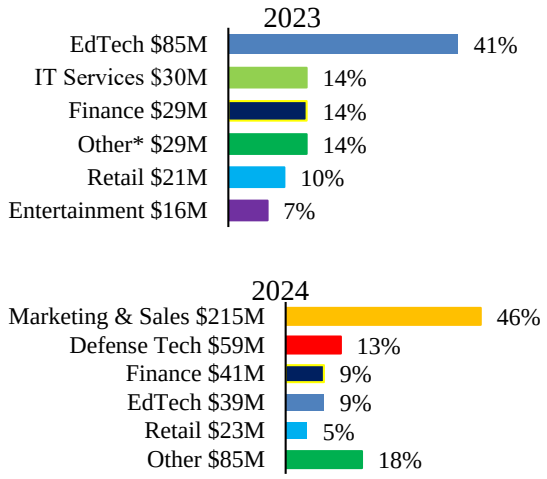

Fig. 4. **Evolution of Priority Sectors for Financing Ukrainian Startups (2023 vs 2024)**
Source: systematised by the author based on [3, 4]
* Other includes military tech (Defense Tech was forming)

6. State Support: Evolution from Ukrainian Startup Fund to Defense Tech

The Ukrainian Startup Fund, created in 2018, adapted its activities to wartime realities, but structural problems identified earlier in [7] intensified. The Fund financed 380+ projects in 2024 with grants of $25-50 thousand [4], maintaining focus on critical technologies: AI, cybersecurity, medical technology, fintech. The problem of grant taxation (loss of up to 20% of financing) remained unresolved, and a limited expert base in deep tech sectors constrained quality project assessment.

Instead, an alternative model emerged–the Brave1 programme, launched by the Ministry of Digital Transformation for Defense Tech startups. In 2024, Brave1 allocated ~$40 million to over 1,000 teams, providing grants of $15-25 thousand for rapid prototyping of military technologies [4]. This was financing without equity dilution, allowing founders to maintain control, but it did not solve the problem of absent mentorship and access to networks that equity investors traditionally provided.

The key weakness of state support remained the absence of follow-on financing. USF and Brave1 financed Pre-seed/Seed, but there were no mechanisms to support startups that achieved product-market fit and needed $1-5 million for scaling (Series A stage). This created a financing gap, especially critical under conditions of business angel shortage and limited presence of international VCs.

7. Strategic Directions for Ukrainian Startup Ecosystem Development

Analysis of 2014-2024 dynamics and 2024 financing structure revealed both achievements and critical gaps that determined priorities for startup support policy:

Tax incentives. Introduction of tax benefits for business angels and venture investors to stimulate private investments in startups at early stages.

Strengthening international connections. Intensification of cooperation with European and American venture funds, accelerators, and corporations to attract capital, expertise, and market access.

Defense Tech support. Creation of specialised support programmes for startups in defense technologies, critically important both for national security and development of high-tech exports.

Development of ecosystem institutions. Strengthening the role of business incubators, accelerators, and technology parks in providing not only space but comprehensive support to startups (mentorship, investor access, legal support, training).

Conclusions. The conducted empirical study of the transformation of the Ukrainian startup ecosystem during 2014-2024 allowed for formulation of a number of important conclusions of practical and strategic character.

1. Unique trajectory of resilience: from $42 million to $462 million over 11 years. The dynamics analysis revealed unprecedented resilience of the Ukrainian startup industry. Over 11 years, investments grew 11-fold, survived a historical peak of $832 million (2021), collapsed by 72% to $236 million (2022) after the full-scale invasion, and rapidly recovered by 121% (2024). Reaching 55% of the peak within two years was a unique indicator among countries that experienced military conflicts. This confirmed the hypothesis about the anti-crisis nature of the technology sector and the global orientation of the Ukrainian ecosystem (60% of startups worked on EU/US markets), ensuring independence from the domestic market.

2. Critical gap: collapse of angel financing as the most dangerous threat. The most alarming conclusion was the identification of a structural gap at Pre-seed/Seed stages due to shortage of qualified and experienced business angels [6]. This was destruction of a critical link in the ecosystem, as angels provided not only capital ($20-500 thousand) but also mentorship, access to networks, and project legitimisation. The share of business angels in 2024 financing was only 14% ($20 million), which was a critically low indicator. Attempts to compensate for their absence with grants (+625% growth to $50 million) were a palliative solution that did not replace «smart capital». The consequences of this shortage would manifest in 2-3 years in the form of an «empty pipeline» of startups at Series A stage, creating a risk of ecosystem degradation.

3. Transformation of 2024 financing structure: new realities. The 2024 financing structure differed dramatically from pre-war structure. The Seed stage attracted $88 million (146 rounds), Series A grew by 115% to $58 million (58 rounds), but Series C was artificially inflated by one Creatio round ($200 million of $223 million).

Grants grew by 625% to $50 million, compensating for absent equity financing. Defense Tech became a new dominant with $59 million (13% of total volume), with 69% through grants, 31% through equity investments. Most unexpected was the dominance of local investors (40% of early-stage rounds), which was an abnormally high indicator for a developing ecosystem but simultaneously revealed forced dependence on local capital due to international VC caution.

4. Structural challenges of the pre-war period, intensified by war. The study revealed that many problems existed before 2022, but war intensified them: excessive dependence on founders' own capital (84.2%), limited development of the local venture market (3.2%), absence of tax incentives for investors, taxation of state grants (loss of up to 20%), limited expert base in high-tech sectors. War added challenges of relocation, operational disruptions, outflow of foreign capital.

5. Strategic development priorities. Based on the conducted analysis, key directions were identified, prioritised by criticality:

Priority No. 1: Restoration of angel financing. Introduction of tax benefits for business angels similar to the British SEIS/EIS model (100-150% tax relief), creation of co-investment schemes (state + private angels 1:1), development of angel networks and syndicates, diaspora engagement programmes, investor protection through simplified legal procedures.

Priority No. 2: Improvement of state support. Cancellation of grant taxation, creation of follow-on financing mechanisms (Series A Support Fund) for successful grant recipients, expansion of USF and Brave1 expert base in deep tech sectors, integration of mentorship components into grant programmes.

Priority No. 3: Development of Defense Tech as a new driver. Creation of specialised equity funds for military technologies (in addition to Brave1 grants), support for export of Ukrainian Defense Tech solutions to NATO/EU markets, integration of Defense Tech startups into global defense technology supply chains.

6. Practical significance for different stakeholders. Startup founders gained understanding of the real 2024 financing structure (146 Seed rounds at $0.5-1 million, 58 Series A rounds at $5-10 million) and could plan financing attraction strategies considering limited angel capital. Investors saw quantitative confirmation of the uniqueness of the Ukrainian model (40% local investors, 13% Defense Tech) and opportunities for co-investment with local funds. State bodies received a prioritised reform roadmap, where restoration of angel financing was defined as critical task No. 1. International donors could use the identified gap (limited business angel share of 14%) to develop targeted support programmes for precisely this segment.

7. Prospects for further research. The conducted study outlined directions for further scientific inquiry: longitudinal analysis of war impact on the Ukrainian startup ecosystem with tracking of individual startup trajectories; comparative study of effectiveness of different state startup support mechanisms under crisis conditions; study of the Ukrainian diaspora's role in financing domestic startups; research on the socio-economic impact of the Defense Tech sector on national economy and security; analysis of factors of successful adaptation of Ukrainian startups to wartime conditions (relocation, business model changes, entry into new markets).

Thus, the Ukrainian startup ecosystem demonstrated a unique combination of resilience and structural challenges. Successful development required a comprehensive approach combining tax incentives, institutional support, international integration, and addressing the critical gap of angel financing. Implementation of the proposed strategic directions would not only facilitate recovery and growth of innovative entrepreneurship but also create a foundation for strengthening Ukraine's economic resilience and competitiveness in the post-war period.

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Loza D. Transformation of the Ukrainian startup ecosystem: from stable growth to wartime adaptation (2014-2024)

The article was devoted to an empirical analysis of the transformation of the Ukrainian startup ecosystem over an eleven-year period (2014-2024), with a particular focus on the impact of the full-scale war on the structure and mechanisms of financing innovative entrepreneurship. The study examined the evolution of the ecosystem from a period of formation and organic growth through a historic peak to the dramatic shock of war and subsequent recovery.

A comprehensive analysis of financing dynamics by stages, investor types, and sectoral structure was conducted. Critical structural changes were identified: the collapse of angel financing, creating a gap in early-stage startup support; the emergence of a unique model of local investor dominance, contrasting with traditional dependence on foreign capital; the rapid growth of grant mechanisms; and the formation of Defense Tech as a new ecosystem driver. The role of state support programmes (Ukrainian Startup Fund, Brave1) in compensating for private financing failures and ensuring ecosystem sustainability during wartime was analysed.

Based on identified structural challenges, priority directions for state policy were formulated: restoring angel financing through tax incentives, improving state support mechanisms for early stages, and strategic development of Defense Tech as a future export sector. The research findings had practical significance for startup founders, investors, government bodies, and international donors in developing strategies to support innovative entrepreneurship during wartime and post-war recovery.

Keywords: startup ecosystem, venture financing, innovation policy, institutional investors, business angels, Defense Tech, ecosystem resilience, wartime transformation.

Лоза Д. Ю. Трансформація української стартап-екосистеми: від стабільного зростання до воєнної адаптації (2014-2024)

Статтю присвячено емпіричному аналізу трансформації української стартап-екосистеми протягом одинадцятирічного періоду (2014-2024), з особливим фокусом на вплив повномасштабної війни на структуру та механізми фінансування інноваційного підприємництва. Досліджено еволюцію екосистеми від періоду формування та органічного зростання через історичний пік до драматичного шоку війни та наступного відновлення.

Проведено комплексний аналіз динаміки фінансування за стадіями, типами інвесторів та галузевою структурою. Виявлено критичні структурні зміни: колапс ангельського фінансування, що створює прогалину в підтримці ранніх стадій розвитку стартапів; поява унікальної моделі домінування локальних інвесторів на противагу традиційній залежності від іноземного капіталу; стрімке зростання ролі грантових механізмів; формування Defense Tech як нового драйвера екосистеми. Проаналізовано роль державних програм підтримки (Український фонд стартапів, Brave1) у компенсації провалів приватного фінансування та забезпеченні сталості екосистеми в умовах воєнного часу.

На основі виявлених структурних викликів сформульовано пріоритетні напрями державної політики: відновлення ангельського фінансування через податкові стимули, вдосконалення механізмів державної підтримки ранніх стадій, стратегічний розвиток Defense Tech як майбутнього експортного сектору. Результати дослідження мають практичне значення для засновників стартапів, інвесторів, державних органів та міжнародних донорів у розробці стратегій підтримки інноваційного підприємництва в умовах воєнного часу та післявоєнного відновлення.

Ключові слова: стартап-екосистема, венчурне фінансування, інноваційна політика, інституційні інвестори, бізнес-ангели, Defense Tech, екосистемна резильєнтність, воєнна трансформація.