

# UKRAINIAN STARTUP ECOSYSTEM AS A DRIVER OF ECONOMIC AND STRATEGIC RESILIENCE

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## Lukianenko I. G., Sova Ye. S. Ukrainian Startup Ecosystem as a Driver of Economic and Strategic Resilience

The aim of the article is to comprehensively analyze the key adaptive transformations in the technological ecosystem of Ukraine during the wartime period as a driver of its economic and strategic development, in particular in the period of post-war reconstruction, as well as to generalize the most relevant approaches and features of evaluation of startups. Particular attention is paid to strategic startups in the field of defense, cybersecurity, deep learning algorithms, space and other advanced production technologies, in particular in the context of specific aspects that should be taken into account when assessing their value. The study uses general scientific methods and specific economic and statistical approaches, in particular methods of analysis and synthesis to classify approaches to evaluating startups, as well as descriptive statistics and graphical analysis to identify structural changes in the technological ecosystem of Ukraine. The carried out study showed that in recent years there has been a significant increase in the number and variety of startups specializing in strategic sectors of the economy. Their development is due to both the strategic needs of the State for means to increase defense capability and national security, and global technological trends, in particular in the field of artificial intelligence and cybersecurity. In addition, it is determined that for assessing the value of startups in strategic sectors of the economy, the most flexible and relevant are the method of real options, the method of testing hypotheses, and the approaches based on scenario analysis. The results of the presented study can be taken into account when improving traditional and new methods of evaluating startups and new companies, in particular in terms of taking into account their strategic value using premiums or other valuation techniques. Prospects for future research in this direction are to improve the existing methods for evaluating startups from strategic industries, taking into account the specifics of the sector and the high level of geopolitical and macroeconomic uncertainty.

**Keywords:** strategic industries, defense technologies (defensetech), startup ecosystem, evaluation of startups, investments, risks, post-war reconstruction, economic development.

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## Лук'яненко І. Г., Сова Є. С. Українська стартап-екосистема як рушій економічної та стратегічної стійкості

Метою статті є комплексний аналіз ключових адаптивних трансформацій у технологічній екосистемі України воєнного періоду як рушія її економічного та стратегічного розвитку, зокрема в період повоєнної відбудови, а також узагальнення найбільш релевантних підходів та особливостей оцінювання стартапів. Особливу увагу приділено стартапам стратегічного спрямування у сфері оборони, кібербезпеки, алгоритмів глибокого навчання, космічних та інших передових технологій виробництва, зокрема в контексті специфічних аспектів, які варто враховувати при оцінці їхньої вартості. У дослідженні використано загальнонаукові методи та специфічні економіко-статистичні підходи, зокрема методи аналізу та синтезу для класифікації підходів до оцінювання стартапів, а також описової статистики та графічного аналізу для виявлення структурних змін у технологічній екосистемі України. Проведене дослідження продемонструвало, що протягом останніх років суттєво збільшилася кількість і різноманіття стартапів, що спеціалізуються на стратегічних секторах економіки. Їхній розвиток зумовлений як стратегічними потребами держави в засобах для підвищення обороноздатності та національної безпеки, так і загальносвітовими технологічними тенденціями, зокрема в галузі штучного інтелекту та кібербезпеки. Окрім цього, було визначено, що для оцінювання вартості стартапів у стратегічних секторах економіки найбільш гнучкими та релевантними є метод реальних опціонів, метод тестування гіпотез і підходи, що ґрунтуються на сценарному аналізі. Результати дослідження можуть бути враховані при вдосконаленні традиційних і новітніх методик оцінки стартапів і нових компаній, зокрема в частині врахування їхньої стратегічної вартості за допомогою премій або інших технік оцінки. Перспективами майбутніх досліджень у даному напрямі є вдосконалення наявних методів оцінювання стартапів зі стратегічних галузей з урахуванням специфіки сектора і високого рівня геополітичної та макроекономічної невизначеності.

**Ключові слова:** стратегічні галузі, оборонні технології (defensetech), стартап-екосистема, оцінювання стартапів, інвестиції, ризики, повоєнна відбудова, економічний розвиток.

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After the full-scale invasion in 2022, most sectors in Ukrainian economy became negatively impacted by the war implications, especially the companies in capital-intensive industries located in the Eastern and Southern parts of the country. Apart from security risks, numerous companies faced deterioration in the customer base, issues with supplies, outflow of skilled labor force, power outages, and many other challenges varying by sector. The overall drop in the real GDP in 2022 was 29.1%, which was the most significant decline in Ukrainian modern history, based on World Bank's data [18].

Despite this unprecedentedly challenging environment, Ukrainian tech sector demonstrated its relatively high business resilience. Instead of reducing innovative activities, the tech sector has adapted to wartime conditions changing the structure of its business operations, product and service mix as well as flexibly revising strategic plans. Additionally, new startups have emerged to meet the demand for products and services that have strategic importance for a country's defense capabilities.

For many years, the IT sector has been among the major drivers and hallmarks of Ukrainian economy. According to the report of Lviv IT Cluster (prepared in partnership with the Ministry of Digital Transformation of Ukraine and with the support of the USAID Competitive Economy Program in Ukraine), the total direct and indirect effects of Ukrainian IT sector comprised approximately \$12.7 billion, and the sector's turnover amounted to \$7.97 billion in 2022, while its share in GDP comprised 4.9% [5]. The computer services represented the largest item among Ukrainian export services (44% and 41% in 2022 and 2023, respectively) [3]. The number of IT-specialists working in Ukrainian IT industry comprised, on average, 307 thousand in 2023, out of which 65 thousand were located abroad [5].

In light of the current and potential strategic role of the Ukrainian tech industry for the country's economic development and rebuilding (in particular, the role of its startup ecosystem), the analysis of the sec-

tor's specifics and structural changes during wartime is both appropriate and timely.

In academic literature, the structure of startup ecosystems and their role in economic development have been discussed from different angles. N. Tripathi et al. conducted an extensive literature review to understand researchers' perspectives on startup ecosystems. As summarized by N. Tripathi et al., the key elements and sub-elements of startup ecosystems, as defined in academic literature, include the following: entrepreneurs, support factors (e.g. incubators, accelerators, co-working spaces, events, government), finance (e.g. funding, seed investment, venture capitalists), demographic factors (e.g. culture, history, language, geography), market (e.g. global and local markets), human capital (e.g. talents, education, policy) and technology (e.g. innovations, technologies, products) [4].

In analyzing the economies of Canada, China and South Korea, M. Ressin identified a strong direct relationship between the growth in the number of startups and the achievement of economic, social, environmental and institutional United Nations' Sustainable Development Goals [9]. Based on comprehensive bibliometric analysis of the subject literature, H. Khuan et al. discussed the role of startups as a post-pandemic driver of economic growth through innovation, digital transformation, collaboration and other channels [15]. M. Dorosh-Kizym and M. Dorosh discussed the importance of startups for accelerating the economic recovery during the wartime, analyzed the sources of startups' funding and key problems that they are usually facing [2].

Given the rising interest of investors in startups, many practitioners and academic researchers have focused on enhancing the existing valuation techniques or introducing non-traditional approaches that are particularly suitable for young companies. Based on their systematic literature review, D. Montani et al. discussed the need for non-traditional methods when approaching startups' valuation and prepared a summary of major alternative techniques

such as venture capital method, real option method, the Berkus method, simplified empirical approaches, and other methods [7]. A. Damodaran discussed key challenges inherent in startup valuation arguing that the venture capital approach is worth modifying or being replaced. Instead, the author suggests how to apply conventional valuation techniques to young companies, though with certain modifications, e. g., using real option premiums [1]. D. Shestakov extended the real option theory using a set of hypotheses for evaluating innovative projects across different stages of their development [10].

In spite of the considerable level of attention of researchers to the startups' activities, the existing studies, to the authors' best knowledge, have not widely investigated the inherent resilience and adaptability of startup ecosystems and its high transformational potential in the period of extreme geopolitical, military and economic shocks, and how to consider this in the startups' valuation.

The *aim* of the article is to provide a comprehensive analysis of key adaptive transformations in the Ukrainian wartime tech ecosystem as a driver of Ukrainian war and postwar development, with a special focus on the strategic sectors, as well as to summarize the most appropriate valuation approaches and considerations when evaluating the startups from strategic defense-related subsectors.

In this study, we utilized economic and statistical methods revealing major trends in Ukrainian startup ecosystem and identifying key issues which are particularly applicable and essential for consideration when evaluating the startups from strategic sectors.

Our research approach included the following phases:

- ✦ General overview of Ukrainian tech ecosystem structure based on information from the online database of Ukrainian IT companies available at the “Ukrainian Tech Ecosystem Overview” platform [20]. The platform is a collaborative project of Ukrainian tech market actively supported by the Ministry of Digital Transformation of Ukraine. Using this data, we visualized the distribution of Ukrainian product startups by geographic location of offices, key sector and team size (for selected strategic sectors).
- ✦ We then defined which sectors are strategic for war and postwar development of Ukraine, namely Advanced Manufacturing, Cybertech, Deep & Spacetech, and Defensetech. Using a sample of Ukrainian startups serving defense purposes (as prepared by [6]), we analyzed the evolution of Ukrainian startups in 2012–2023 by key vertical with a particular focus on the war-time period.

- ✦ Finally, we summarized common approaches to startup valuation and determined which methods have the greatest potential for evaluation of Ukrainian startups in strategic economic sectors, considering their specifics.

**B**efore delving into the risks and potential of Ukrainian startups in supporting the country's resilience during the war, as well as their further role in postwar reconstruction, we analyze the current landscape of Ukrainian IT sector.

## UKRAINIAN STARTUP ECOSYSTEM

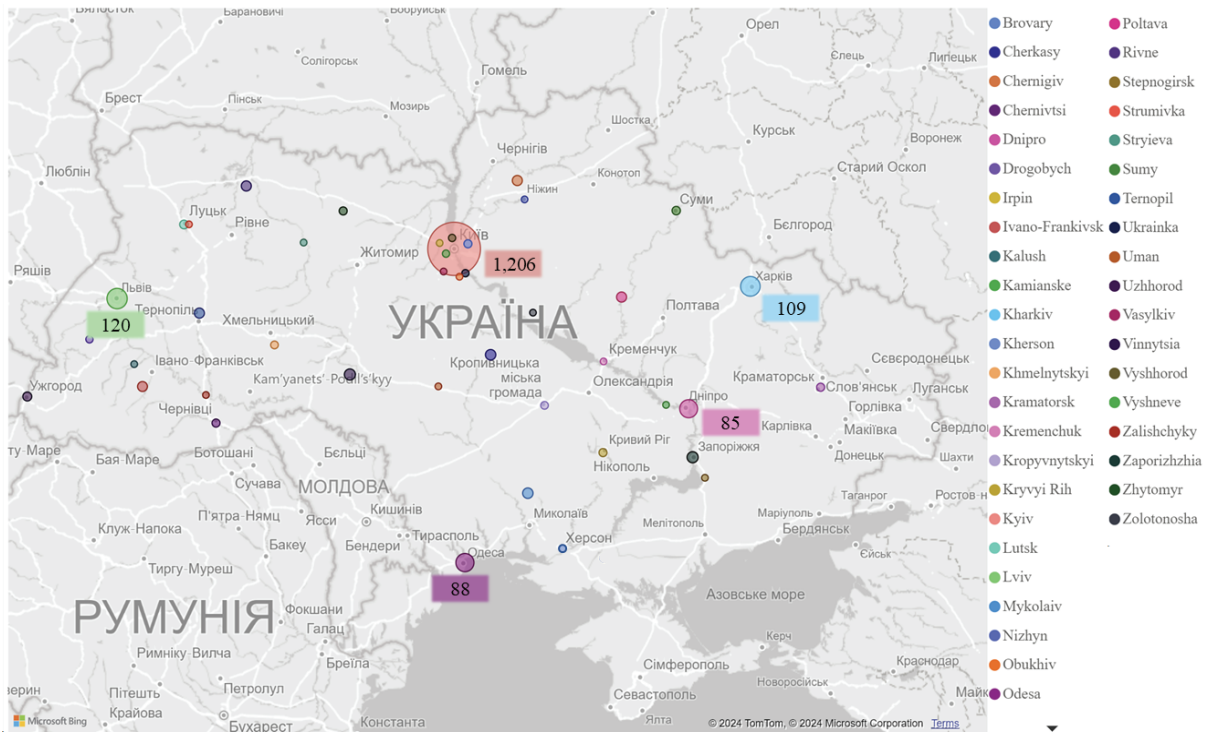
As presented on “Ukrainian Tech Ecosystem Overview” platform [20], as of April 2024 there were more than 2,300 tech companies in Ukraine, out of which 72% represented product companies, 24% – service companies, 4% – R&D centers.

While most of the product startups have offices in the largest Ukrainian cities such as Kyiv (1,206 and its suburbs (13), Lviv (120), Kharkiv (109), Odesa (88) and Dnipro (85), there are up to 200 locations of startups which are evenly distributed between smaller towns in the Western and Central parts of Ukraine, as depicted in *Fig. 1*. It is also noteworthy that some startups have offices across Europe and the USA (more than 40 in total). Many startups and tech companies are establishing offices in the USA or Europe to expand globally and be able to attract financing from international funds [14]. Successful examples of such global expansions include GoIT (an Edtech platform with R&D team and home market in Ukraine, which subsequently entered the markets of Poland, Romania, Colombia, Mexico and the Philippines), Nova Post (express delivery company that has opened branches in Poland and Lithuania and has plans for further expansion to Romanian and German markets), Monobank (Ukrainian fintech project announcing a launch of a similar product in Poland), Makeup (Ukrainian cosmetics online retailer operating in 36 countries across the globe), Uklon (online ridesharing service operating in Ukraine, Azerbaijan, Uzbekistan with plans to further expansion of its franchise to Poland, Slovakia, the Czech Republic, Baltic States).

Currently, most of Ukrainian product tech companies are represented by such segments as Business Productivity, Martech & Media, Fintech & Insurtech, Healthtech & Wellness, E-commerce & Retail, Hardware & IoT, as presented in *Fig. 2*.

## STRATEGIC NICHES IN THE TECH SECTOR

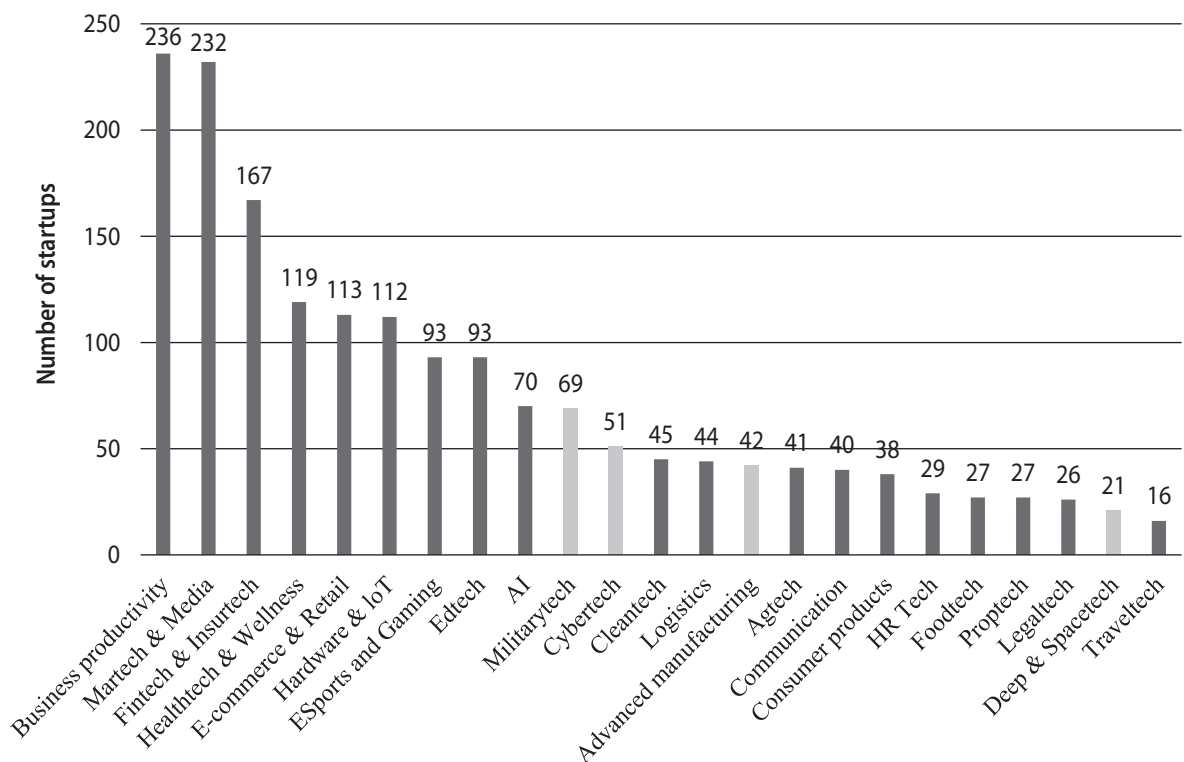
As mentioned by Mykhailo Fedorov, the Minister of Digital Transformation, in [16], “We put a special emphasis onto developing *defense tech solutions* that will let our country win and defend our freedom and



**Fig. 1. Office location of product tech companies in Ukraine**

**Notes:** 1) the size of a circle reflects the number of offices in the respective location; 2) the number of offices in each location is presented for indicative purposes only, as (a) they are constantly evolving or closing and (b) there may be other startups which were not included into the database [14]; 3) many tech companies have offices in several locations in Ukraine and abroad

**Source:** prepared by authors using data from [14].



**Fig. 2. Ukrainian product tech companies by vertical (niche market)**

**Notes:** 1) the yellow columns represent potential priority segments from strategic and economic perspective of Ukraine based on the authors' analysis; 2) the number of companies in each segment is presented for indicative purposes only, as (a) they are constantly evolving or closing and (b) there may be other startups which were not included into the database [20]; 3) many tech companies may be classified to several verticals.

**Source:** prepared by authors using data from [20].

democracy”. Ukrainian Startup Fund (officially titled as Innovation Development Fund), which is managed by the Ministry of Digital Transformation, prioritizes the support of startups from such segments as *Defensetech*, *Cybertech*, *Edtech*, *Healthtech* and *Infrastructure* [12].

Ukraine’s spending on defense as % of GDP (Fig. 3) reached its record high in 2022 at the level of 33.5%, which significantly exceeds Ukraine’s pre-war spending (3.2% in 2021) and expenses of any other country or region across the world in 2022, including countries affected by conflict or fragile situations (4.9% in 2022), United States (3.5% in 2022), China (1.6% in 2022) and EU (1.6% in 2022). It is highly probable that investments in enhancement of defense capabilities will be one of Ukrainian top priorities in the following decade, considering current security situations, which will stimulate a development of the Defensetech and related sectors.

Given current strategic priorities of Ukrainian economic and security development, we focused our further analysis on the sample of product IT companies and startups from Advanced Manufacturing, Cybertech, Deep & Spacotech and Defensetech sectors (collectively, the strategic sectors). Most of startups in the sample (Fig. 4) comprise of small teams of 1–10 (30.4%) or 11–20 specialists (27.5%). Almost a quarter of the startups consist of 21–50 employees, while

it was relatively uncommon for startups from strategic sectors to have much larger teams of 51–100 (8.7%) or 101–500 (10.1%) professionals.

The cumulative share of these selected target verticals (represented by lighter columns in Fig. 2) comprises approximately 10%. Nevertheless, significant developments in the defense-related sector since the beginning of the full-scale war have led to an intensification of innovations in this field. As presented in Fig. 5, most of the selected startups in the Defensetech were launched either in the beginning of full-scale invasion in 2022 or after the start of military actions in the Eastern part of Ukraine in 2014. Most of the startups in the sample (prepared by [6]) are related to the development of drones or robotic vehicles as well as supporting systems (including data analysis and electronic warfare).

From 2014 to 2023, the Ukrainian startup ecosystem demonstrated a sophisticated technical base, an ability to innovate in order to fulfill urgent needs of Ukrainian society, high growth potential, and flexibility in responding to external threats under unprecedentedly challenging circumstances. Notably, it was not only new tech companies that appeared in the market, but also well-established companies that re-profiled their production to serve the defense sector. For example, VACA, established in 2019 as a software developing company, pivoted to UAV (unmanned aeri-

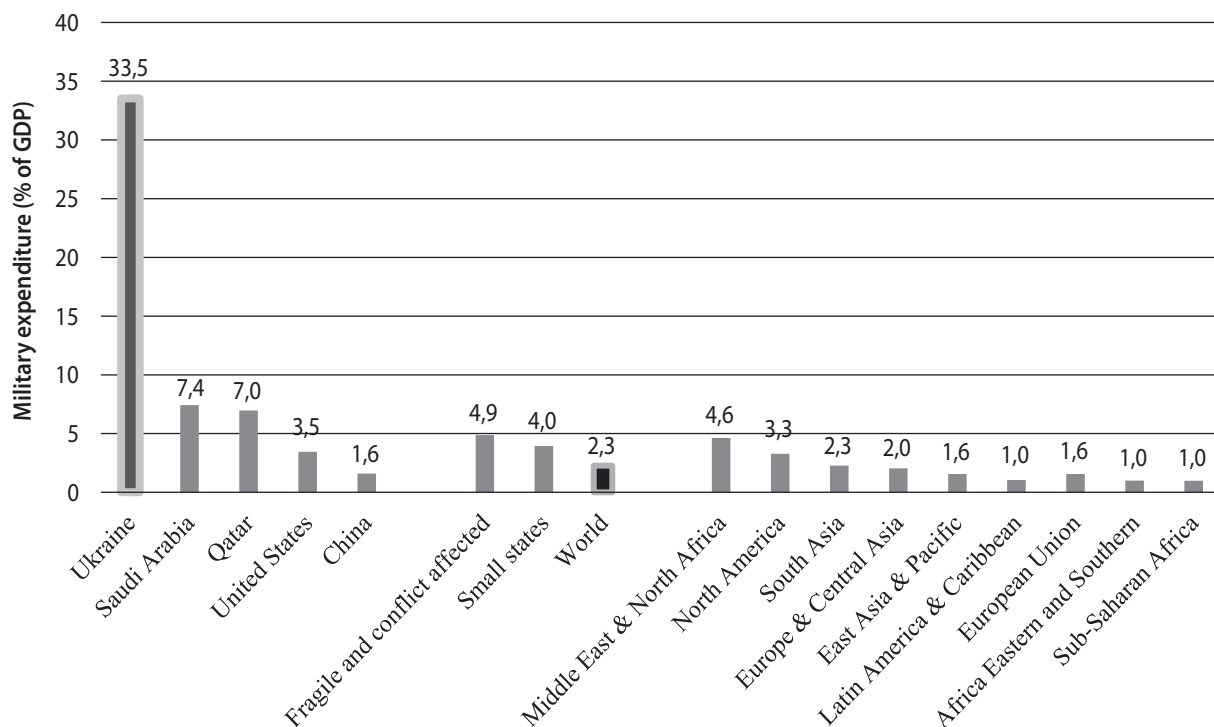
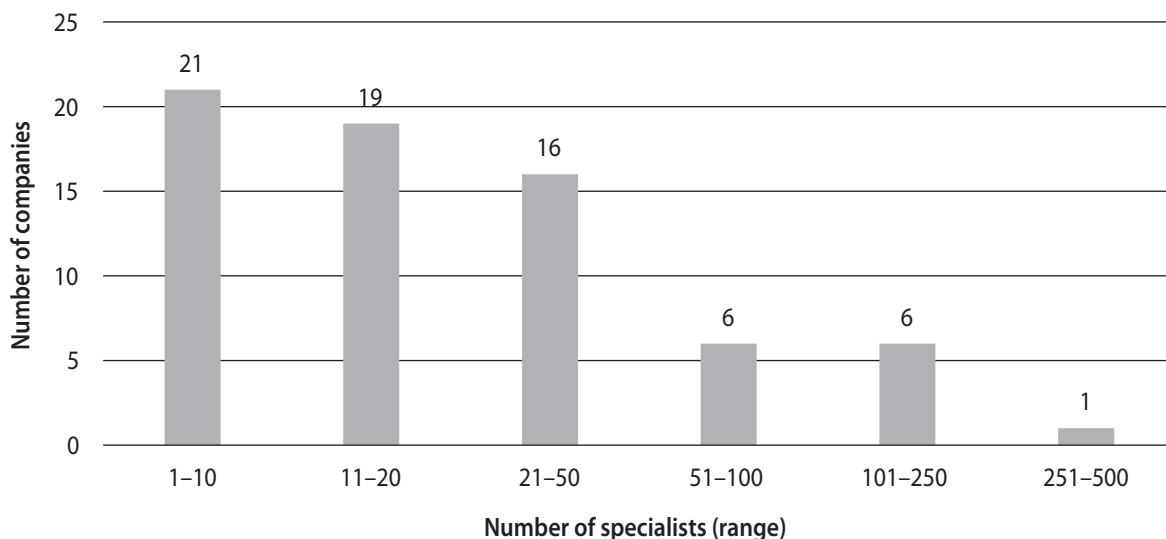


Fig. 3. Military expenditure (% of GDP) in Ukraine, other selected countries and regions

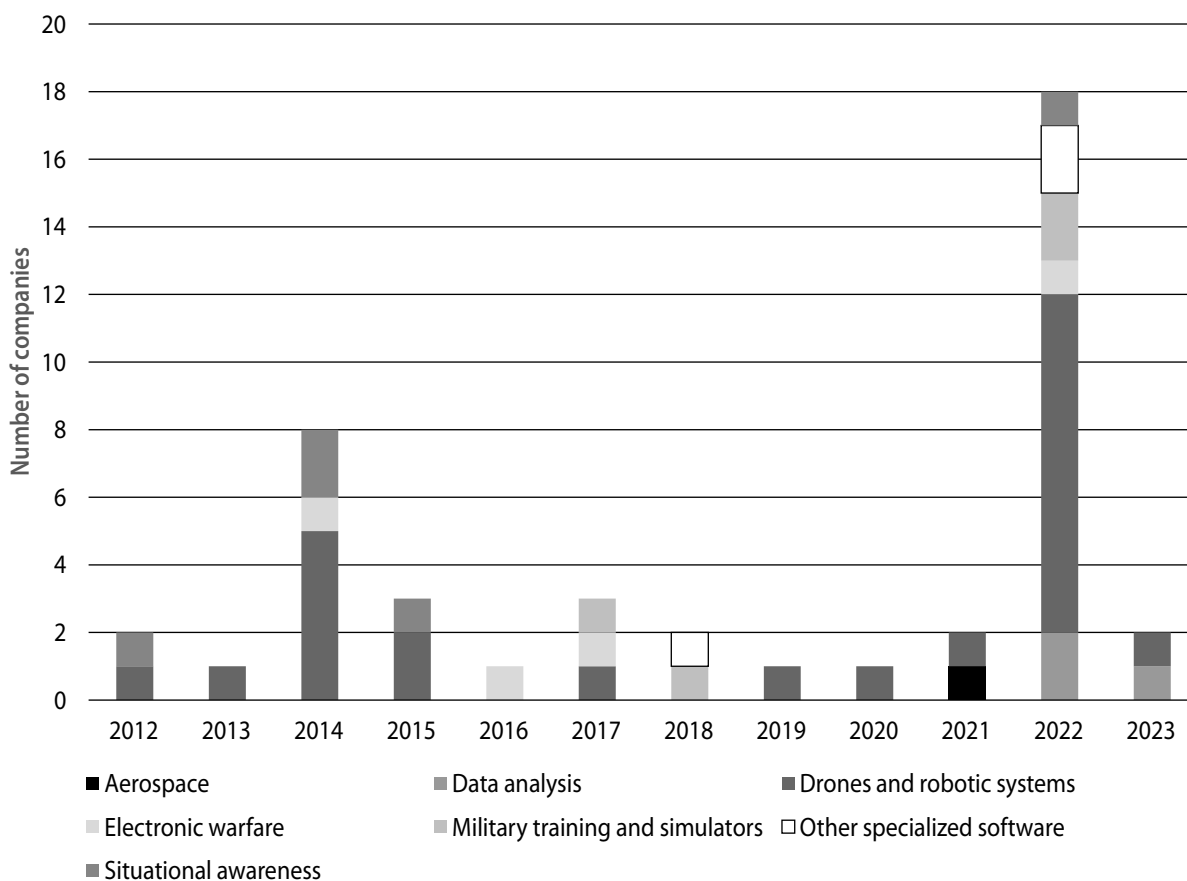
Source: prepared by authors using data from [19].



**Fig. 4. Ukrainian tech companies from the strategic sectors by size**

**Notes:** 1) the number of companies in each segment is presented for indicative purposes only, as (a) they are constantly evolving or closing and (b) there may be other startups which were not included into the database [20].

**Source:** prepared by authors using data from [20].



**Fig. 5. A sample of selected Defensetech Ukrainian companies by specialization and year of launch or the year of a business refocus towards Defensetech**

**Notes:** 1) information on the years of establishment was collected from open sources, hence, it may contain certain discrepancies; 2) there were companies that operated in other sectors but significantly transformed their product portfolio refocusing towards Defensetech; such companies are presented based on the year of their business refocus; 3) as some startups may be attributed to several specializations, the authors classified them to the most appropriate category to their best knowledge

**Source:** prepared by authors using data from [6].

al vehicles) production in 2022; AeroDrone, previously focused on civil aviation and agricultural drones, began producing logistics drones for military purposes in 2022. Please note that this sample demonstrates key trends in the Ukrainian Defensetech industry during the last decade rather than representing the whole industry. As mentioned by tech industry experts in [12], “there are more than 300 Defensetech startups, the majority of which were founded in 2022–2023”.

### RESILIENCE OF UKRAINIAN TECH SECTOR

Ukrainian startups operating in Defensetech and the tech sector as a whole have proved their resilience to unprecedented security and infrastructure challenges. Although 37.4% of the surveyed startups experienced a decrease in their teams' size in 2022, around 43.3% of companies managed to maintain their talent at the pre-2022 levels, whereas 19.4% reported an increase in workforce size [13]. This reflects a rather positive tendency considering that companies experienced a market pressure to adapt their business models and talent management to external conditions. To secure sales and attract funding from investors, many startups started targeting external markets outside Ukraine. In 2022, Ukraine remained a key market for 60%, followed by Europe (> 46% startups in the sample), the United States (> 34%), Global (20%) and other markets (not exceeding 10% each) [13]. Whereas most of startups continued to keep their talents in Ukraine either partially (95% of respondents) or exclusively (56% of respondents), many of tech companies started to relocate part of their teams to other countries, mostly EU (39%), the USA (10%) and the UK (3%) [13], which may be also driven by their international expansion strategies.

Despite war-related challenges, the Ukrainian startup ecosystem retained its position within top 50 of 100 best ecosystems globally. In 2023, Ukraine slightly improved its rank gaining 49<sup>th</sup> place, after a significant downgrade to 50<sup>th</sup> position in 2022 due to the war impact, as compared to 31<sup>st</sup> rank in 2019, 29<sup>th</sup> – in 2020, 34<sup>th</sup> – in 2021 [11]. As of 2023, Ukrainian startup ecosystem outperformed such European countries as, for example, Hungary (50<sup>th</sup>), Serbia (50<sup>th</sup>), Slovakia (65<sup>th</sup>). Moreover, there are five Ukrainian cities in the top 1,000 global ranking according to Startup Ecosystem Index: Kyiv – 77<sup>th</sup> improving by 16 spots in 2023 and outperforming, for example, such developed cities in terms of startups as Las Vegas, Prague, Manchester, Hamburg, Sacramento, Warsaw; Lviv – 491<sup>st</sup> improving by 258 spots; Odesa – 750<sup>th</sup>; Kharkiv – 762<sup>nd</sup>; Ternopil – 950<sup>th</sup> [11].

### COMMON APPROACHES TO STARTUP VALUATION

Estimating the value of a new business entity presents a considerable challenge, especially for startups in

emerging markets characterized by funding deficits, developing ecosystems and a high level of macroeconomic, regulatory and geopolitical uncertainty, as described above. The traditional valuation methods, such as the net assets, income, and market approaches, may not be easy to apply for valuing startups at early stages of their development (pre-revenue phase, or before they become profitable and progress to the sustainable growth phase) given the following considerations:

- ✦ high level of uncertainty – there may be significant risks regarding the marketability of a startup's product or services, particularly for evolving business niches; this makes it difficult to predict a startup's revenue potential, profitability, liquidity and, eventually, a probability of survival;
- ✦ no or limited historical financial data that could serve as a basis for projections;
- ✦ early-stage companies usually exhibit irregular and unpredictable revenue streams (may follow an exponential growth trajectory, or be very low for extended periods) or negative cash flows, while traditional income-based approaches typically rely on regular, predictable cash flows;
- ✦ due to unique characteristics of disruptive tech companies, it is very difficult to find comparable businesses with similar industry characteristics, market potential, stage of development, scaling strategy, etc.;
- ✦ a significant portion of a startup's value lies in its intangible assets such as (i.e. intellectual property and management team) and future growth potential rather than on current tangible assets.

Although there are a lot of approaches for startup valuation varying by the level of theoretical and practical sophistication, in *Fig. 6* we summarize the list of methods that, based on our analysis, are the most widely discussed in the relevant literature.

Below we present a brief description of each method's essence and application without a detailed discussion of technical details:

- ✦ *Cost-to-duplicate* method can be used for early-stage companies. Although it provides an estimate of a lower bound of a startup's value, it does not reflect the intrinsic value of the startup, including its intangible assets (e.g. technology and brand) and a future growth potential [17].
- ✦ *Scorecard* method is one of pre-revenue valuation techniques which consists of two basic steps: firstly, the average reference pre-money valuation is defined for a particular sample of startups operating in the same sector and geographical area; secondly, the reference value

Valuation approaches	Idea / Seed	Seed / Startup	Early growth	Expansion	Sustainable growth
1. Cost-to-duplicate					
2. Scorecard					
3. Berkus					
4. The Hypothesis Testing					
5. Venture Capital					
6. The First Chicago					
7. Real options					
8. Discounted cash flows					
9. Market multiples					

**Fig. 6. Startup valuation approaches and their applicability at each phase of a startup development**

**Note:** this is an indicative and non-exhaustive classification which is based on the authors' understanding and analysis of the subject literature; given unique characteristics of each startup, it may be relevant to apply different valuation methods or their combination.

**Source:** prepared by authors following the framework used by [8], and using [7; 10; 17].

is adjusted based on a set of scoring factors (e.g. strength of management team, scalability, technology, competition, marketing, investments, etc.) and the respective weight for each factor, as defined subjectively by an analyst [7].

- ✦ *Berkus* method uses five common factors that influence the valuation of a young company. Based on their expert judgement, investors may assign up to \$500,000 to each factor. In some cases, it is possible to allocate more than \$500,000 to a specific item if it is in line with the specifics of a particular sector. Similarly to scorecard method, this approach is also highly subjective in terms of factor scoring and weighting [7].
- ✦ *The Hypothesis Testing* method suggested by D. Shestakov [10] represents a flexible extension of real option theory by embedding the testing of the following five hypotheses into the evaluation process, namely: team competence, technological capability, customer value, business model and market depth. It is especially applicable for evaluating innovative companies accounting for uncertainty and risks at each stage of the project development from the first prototype to the scaling phase.
- ✦ *Venture Capital* method – the value of the target company is estimated based on its expected cash flows in two to five years when the investor plans to sell or make it public (usually, applying market multiples to expected earnings). This value is then discounted using a very high discount rate adjusted for additional risk factors such as potential failure, stage of a young

company's development, level of uncertainty, etc. [1; 7; 8].

- ✦ *The First Chicago* method represents an evolution of the venture capital method. It involves considering several scenarios (e. g. base, optimistic and pessimistic) weighted on subjectively determined probabilities. A startup's value in each scenario consists of the two components – the terminal value at the exit date (estimated based on market multiples) and its cash flows occurring prior to the investor's exit, which are discounted to the present value using lower rates, as compared to the venture capital method. The estimated startup's value represents a weighted average of its valuation in each of the analyzed scenarios [7].
- ✦ *Real options* method incorporates strategic flexibility into the valuation process by recognizing that decisions like R&D investments are usually staged and incremental in a highly uncertain environment. At each stage of a startup's development, management may decide whether to exercise, postpone or decline a strategic option depending on the current situation and level of uncertainty (e.g. to expand its operations, invest in the new technology, enter new markets). The value of a company's flexibility reflected in its options is added to the value of its existing operations before arriving at the final value of the startup [7; 17].
- ✦ *Discounted cash flows* and *Market multiples* methods, which are commonly used for more mature or public enterprises, can also be applied to valuing young companies either in



combination with other methods (with appropriate adjustments and reservations, as mentioned above) or after companies have successfully scaled their operations and achieved a sustainable growth.

In evaluating startups from strategic sectors such as Defensetech, Deep&Spacotech, and Cybertech, specific considerations should be thoroughly analyzed and incorporated:

- ✦ *Strategic focus*: in addition to financial value such projects may also have a critical strategic value for the country's national and economic security as well as a competitive position in the geopolitical environment, potentially adding a premium to their valuation.
- ✦ *High entry barriers*, as this segment is inherently technology- and investment-intensive.
- ✦ *Regulatory environment* may impose certain limitations to the production, export and import activities of such startups for the national security reasons, while also providing state financing programs, securing orders under government procurement programs and implementing protective measures that contribute to the overall stability of the startups' operations and financial standing.

The abovementioned considerations unique to the startups in strategic segments can lead to valuation premiums. Factoring such adjustments into financial models poses a complex challenge which requires further research and analysis. Our preliminary analysis suggests that methods such as Real Options Theory, the Hypothesis Testing Method, and scenario-based approaches (considering strategic scenarios as described above) may serve as a solid foundation for capturing the intrinsic value of strategic startups, addressing their inherent uncertainties and highlighting their strategic flexibility and innovative nature.

## CONCLUSIONS

In this study, we analyzed the general landscape of Ukrainian tech ecosystem in terms of geographic location of startups' offices, their specialization by market niche, peculiarities of strategic startups development in response to wartime challenges, typical team size of startups in strategic niches and other characteristics.

In addition, we identified major structural changes in Ukrainian startup ecosystem since the beginning of full-scale military actions. Compared to other sectors of economy, the Ukrainian startup ecosystem has maintained a considerable resilience since the onset of the full-scale invasion increasing its global presence through diversification of target markets, strategic international partnerships and partial reloca-

tion of personnel. Some tech sector niches, particularly those in strategic subsectors, were even expanding either by re-profiling of existing startups' activities or by the creation of new enterprises that are focused on serving defense needs of Ukraine. Despite negative war impact, the national startup ecosystem solidified its position within top 50 best ecosystems around the globe, while the Ukrainian capital was ranked 77th among 1,000 cities in 2023, as per the Global Startup Ecosystem Index [11].

We also noted that Ukraine's spending on defense as a percentage of GDP was the highest among many other countries in the world in the most recent period reaching record high of 33.5% in 2022. Priority funding of defense-related projects may further stimulate the development of strategic startups in the near future.

Finally, we summarized major approaches to startup valuation in terms of their principal ideas and applicability to young companies at different stages of their lifecycle. We concluded that scenario-based financial models, Real Options Theory, and the Hypothesis Testing Methods can be applied as a basis for the valuation of the startups from strategic sectors. However, there are still many areas for improvement of currently existing valuation techniques, specifically in how they incorporate the strategic value of defense-related startups and deal with high level of geopolitical and macroeconomic uncertainty. ■

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