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UKRAINE STARTUP PROFILES: RISING AND RAISING

The purpose of this article is to highlight and analyze how Ukraine's startup ecosystem has demonstrated extraordinary resilience and innovation in the face of war. What began as a fast-growing tech sector driven by talent and investment has evolved into a powerful example of how entrepreneurship can adapt under pressure. By examining the Ukrainian ecosystem's transformation, from early digital success and rapid post-invasion pivots to its emergence as a global leader in defense and dual-use technologies, this piece aims to highlight not only the strength of Ukrainian startups, but also the importance of sustained international support and the ability to continue receiving investments and raising capital. Through real-world examples and recent investment trends, the goal is to show that Ukraine's innovators are not just surviving conflict, they are redrawing the boundaries of innovation in wartime contexts. The Ukrainian startup ecosystem, once a burgeoning tech sector fueled by a deep pool of talent and significant investment, has undergone a remarkable transformation in the face of ongoing conflict. This article delves into the extraordinary resilience and adaptive capacity demonstrated by Ukrainian entrepreneurs, illustrating how a vibrant peacetime economy has pivoted to become a powerful force in wartime innovation, particularly within the defense and dual-use technology sectors. Prior to the full-scale invasion, Ukraine's tech scene was characterized by rapid growth and the emergence of promising startups across various domains, with a few notable unicorns, including GitLab, Grammarly, Genesis, People.ai, Firefly Aerospace. This foundation of digital expertise and entrepreneurial spirit proved crucial in the subsequent crisis. The initial shock of the invasion necessitated swift and decisive action from the startup community. Many companies underwent rapid pivots, adapting their technologies and business models to address the urgent needs arising from the conflict. This agility allowed them not only to survive but also to identify new opportunities for innovation. This article will examine the key stages of this transformation. We will explore how the early successes of Ukraine's digital economy provided a bedrock for its wartime adaptation. Furthermore, we will detail the remarkable pivots undertaken by startups in the immediate aftermath of the invasion, showcasing their ability to reorient their focus and resources under immense pressure. A significant focus will be placed on Ukraine's emergence as a global leader in defense and dual-use technologies. This sector has witnessed an explosion of innovation, with startups developing critical solutions for the military, humanitarian efforts, and civilian resilience. Through the analysis of real-world examples of Ukrainian startups and an examination of recent investment trends, this piece aims to demonstrate that Ukrainian innovators are not merely enduring the hardships of war; they are actively reshaping the landscape of innovation within wartime contexts. Their ability to adapt, innovate, and contribute meaningfully to the war effort highlights their inherent strength and the enduring spirit of Ukrainian entrepreneurship. Ultimately, this article underscores the vital role of sustained international support in enabling the continued growth and impact of Ukraine's startup ecosystem, recognizing its significance not only for Ukraine's future but also for the global landscape of technological advancement and resilience.

Keywords. Innovation under pressure, war and entrepreneurship, resilience, venture capital, digital transformation, technology adaptation, startup funding, patents, Ukraine.

Problem statement. By nearly every logistical and economic measure, Ukraine remains one of the most challenging environments in the world to launch and sustain a startup. The ongoing war has disrupted infrastructure, strained supply chains, and displaced talent. Yet, despite these enormous challenges brought on by the war, Ukraine's startup ecosystem hasn't just survived, it's adapted, grown, and in many ways redefined what innovation looks like under pressure. What was once a rapidly growing tech landscape fueled by digital talent and investment has become a story of resilience, reinvention, and global relevance. Ukraine's ability to raise capital and produce functional, scalable technologies in the midst

of war challenges conventional assumptions about what innovation ecosystems need in order to thrive. As global attention turns towards models of resilience in conflict-affected regions, Ukraine offers a compelling case for how entrepreneurship can persist, rise, and even accelerate, under immense pressure.

The assertion that Ukraine presents an exceptionally difficult environment for startup creation and growth is unequivocally supported by the multifaceted logistical and economic repercussions of the ongoing war. The conflict has inflicted significant damage on critical infrastructure, leading to widespread disruptions in supply chains and the tragic displacement of a substantial portion of the nation's

skilled workforce. These immense challenges would seemingly cripple any nascent entrepreneurial ecosystem.

However, the reality of Ukraine's startup landscape stands in stark contrast to these expectations. Rather than succumbing to the pressures of war, the ecosystem has demonstrated remarkable resilience, undergoing a profound adaptation and achieving notable growth. In many respects, Ukrainian entrepreneurs are actively redefining the very concept of innovation in a high-pressure environment. The pre-war narrative of a burgeoning tech sector, driven by a deep pool of digital talent and increasing investment, has now evolved into a powerful testament to resilience, reinvention, and an unexpected degree of global relevance.

Ukraine's continued ability to attract capital and, more impressively, to develop and deploy functional and scalable technologies despite the ongoing hostilities, directly challenges long-held assumptions regarding the fundamental requirements for a thriving innovation ecosystem. The conventional wisdom often emphasizes stability, robust infrastructure, and predictable economic conditions as prerequisites for entrepreneurial success. Ukraine's experience suggests that necessity, coupled with ingenuity and unwavering determination, can serve as powerful catalysts for innovation even in the face of extreme adversity.

As the global community increasingly focuses on understanding and fostering resilience in regions affected by conflict, Ukraine presents a compelling and instructive case study. It offers tangible evidence of how entrepreneurial spirit can not only endure but potentially accelerate under conditions of intense pressure. This resilience holds valuable lessons for understanding how innovation ecosystems can be sustained and even flourish in the most challenging of circumstances, offering a new perspective on the dynamics of entrepreneurship in a world facing increasing instability. The Ukrainian experience underscores the profound adaptability of human ingenuity and the potential for innovation to emerge and thrive even in the shadow of war.

Analysis. Prior to the seismic events of 2022, Ukraine stood as a burgeoning force in the global technology landscape. Its tech sector was not merely growing; it was experiencing a robust boom, marked by consistent year-over-year expansion. Several key factors fueled this impressive trajectory. The nation boasted a deep and continually expanding pool of highly skilled IT professionals, recognized for their technical prowess and adaptability. Furthermore, the Ukrainian government actively championed digital transformation through various initiatives, fostering an environment conducive to technological advancement. This fertile ground gave rise to a dynamic wave of innovative startups that were not confined by national borders, making significant contributions and garnering recognition throughout Europe and on a global scale.

The year 2022 proved to be a landmark year for Ukraine's IT exports, demonstrating the sector's underlying strength. Despite the looming shadows of geopolitical instability in the early months, IT exports surged from approximately \$5 billion to an impressive \$6.8 billion. [1] Cities like Kyiv and Lviv emerged as key hubs, spearheading this export growth and solidifying Ukraine's position as a significant player in the international tech market. The country had already cultivated global success stories, with Grammarly

serving as a prime example of Ukrainian ingenuity achieving worldwide recognition. Moreover, a vibrant ecosystem of women-led startups was gaining considerable momentum, introducing fresh perspectives and playing an increasingly vital role in reshaping the technological landscape in meaningful and impactful ways.

However, the trajectory of Ukraine's tech sector, and indeed the entire nation, was irrevocably altered by the onset of the full-scale invasion. The outbreak of war in 2022 triggered a profound economic contraction, with the national economy shrinking by an estimated third. [2] For the burgeoning startup ecosystem, the immediate impact was severe and multifaceted. Many startups faced the abrupt cancellation of crucial contracts as international partners grew apprehensive and re-evaluated their commitments. The digital realm also became a battleground, with Ukrainian tech companies experiencing a surge in sophisticated cybersecurity threats, demanding constant vigilance and resource allocation towards defense. Compounding these challenges was a palpable increase in hesitation among international clients, understandably wary of engaging with businesses operating in a war zone.

Despite the formidable obstacles presented by the invasion, Ukraine's tech sector demonstrated remarkable resilience and adaptability. Rather than succumbing to the immense pressures, Ukrainian tech companies acted swiftly and decisively to mitigate the immediate risks and ensure business continuity. A primary focus was the safety and well-being of their teams, leading to widespread relocation efforts both within Ukraine and to neighboring countries. The adoption of remote and hybrid work models accelerated dramatically, allowing operations to continue despite displacement and disruption. Furthermore, in a testament to their agility and commitment to their nation, many tech companies and startups proactively pivoted their technological capabilities and expertise to address the urgent needs of both the civilian population and the military effort. [3] This adaptability showcased not only the sector's technical prowess but also its deep-seated patriotism and commitment to contributing to the nation's defense and resilience. The story of Ukraine's tech sector in the face of war is a compelling narrative of innovation, perseverance, and an unwavering spirit in the face of adversity.

The war also sparked an unexpected wave of innovation, especially in defense tech. Ukraine quickly became what some now call the world's leading defense tech testing ground. Startups took existing tools, like scooters, logistic apps, and VR platforms, and repurposed them for wartime use. Others built entirely new technologies in drones, artificial intelligence, and secure communication systems. These weren't just improvisation measures, they were thoughtful, effective innovations created in real time to respond to real needs. [4]

The conflict in Ukraine has acted as a significant catalyst for rapid growth across several sectors. One notable area is drone production, which has experienced a dramatic surge in scale. Numerous startups have emerged and quickly expanded their operations, focusing on the development and supply of Unmanned Aerial Vehicles (UAVs). These drones serve critical functions, providing essential capabilities for both surveillance and logistical operations in the ongoing conflict. The urgency of the situation has likely accelerated innovation and production within these startups, allowing them to quickly adapt to the demands

of the evolving battlefield. This rapid scaling highlights the critical role that indigenous technological development and entrepreneurial agility play in responding to pressing national security needs during times of crisis. [5]

Following the full-scale invasion, cybersecurity teams in Ukraine rapidly adapted their strategies. Their focus shifted dramatically from traditional corporate security concerns to the urgent and critical task of defending the nation's vital infrastructure. This included, but was not limited to, energy grids, telecommunications networks, financial systems, and governmental digital assets. Simultaneously, these teams became integral to supporting offensive and defensive cyber operations, working in close coordination with military and intelligence agencies to counter Russian aggression in the digital realm. This dual emphasis on robust defense and strategic cyber warfare became a defining characteristic of Ukraine's cybersecurity response. [6]

Ukrainian AI companies, known for their innovative spirit, swiftly pivoted their focus in response to the conflict. Their advanced technological expertise, previously applied to diverse commercial sectors, was redirected towards the critical needs of battlefield analytics and surveillance. This strategic shift allowed them to leverage their deep understanding of artificial intelligence to develop sophisticated tools for real-time data interpretation, predictive modeling, and enhanced situational awareness. These solutions became instrumental in providing vital intelligence and contributing to the defense efforts.

The resilience and ingenuity of Ukrainian startups have been profoundly showcased through their rapid adaptation to wartime exigencies. Logistics startups, for instance, swiftly reconfigured their advanced delivery technologies, originally designed for commercial efficiency, to navigate the complexities of combat zones. This involved not only optimizing routes to deliver essential supplies under extreme conditions but also integrating real-time threat assessments and adapting vehicle fleets for diverse terrain and cargo, ranging from humanitarian aid to critical military provisions. Their innovative approach has been instrumental in maintaining crucial supply lines, ensuring that communities and front-line forces receive necessary resources despite active hostilities.

Concurrently, the medtech sector has demonstrated remarkable innovation under pressure. Ukrainian medtech innovators have developed cutting-edge tools, such as sophisticated VR medical simulators. These simulators are not merely theoretical training aids; they are highly realistic, interactive platforms designed to provide immersive training for medical personnel in battlefield trauma care, surgical procedures, and emergency response. The effectiveness and advanced nature of these tools are evidenced by their adoption by both NATO and Ukrainian forces, highlighting their critical role in enhancing the preparedness and skill sets of medical professionals operating in high-stakes environments. This integration of technology into military medical training underscores a significant leap forward in preparing for and responding to complex medical emergencies.

Even in regions hit hardest by the war, the startup ecosystem showed impressive strength. In Kharkiv, for example, 97.8% of tech companies remained operational after the invasion. [7] It's a staggering figure, and a reminder that resilience in this space isn't just theoretical.

It's happening every day, often under incredibly difficult circumstances.

The Ukrainian startup ecosystem, a vibrant and promising sector before the full-scale invasion, faced significant headwinds in attracting capital investment in the conflict's immediate aftermath. As international attention turned to the unfolding crisis, venture capital investment naturally experienced a sharp decline. In 2021, Ukrainian startups had successfully attracted a substantial \$832 million in funding, demonstrating the burgeoning potential of the nation's innovation landscape. However, the subsequent years witnessed a contraction in investment, with funding dropping to \$236 million in 2022 and further decreasing to \$209 million in 2023. This period reflected the immense challenges and uncertainties brought about by the war.

Despite the initial shock and disruption, the Ukrainian entrepreneurial spirit proved resilient. By 2024, the ecosystem began to demonstrate a remarkable capacity for recovery and adaptation. Total investment surged to \$462 million, marking an impressive 120% increase compared to the previous year. [8] This significant rebound signals a renewed confidence in the potential of Ukrainian innovation and the ability of its startups to navigate and even thrive amidst adversity. Based on anecdotal evidence gathered from the Ukrainian Startup Fund interviews for the first half of 2025, it is conservatively estimated that the Ukrainian startup ecosystem should surpass \$500 million in investments for the current calendar year.

A crucial aspect of this resurgence is the strategic alignment of investor interest with Ukraine's emerging strengths. A significant portion of the renewed investment is directed towards sectors where Ukraine has demonstrated notable expertise and potential for growth. These key areas include defense technology, dual-use innovations (technologies with both civilian and military applications), and deep tech ventures pushing the boundaries of scientific and engineering advancements. This focus not only reflects the immediate needs and strategic priorities of the nation but also highlights the long-term potential of Ukrainian technological prowess in critical global sectors. The ability of Ukrainian startups to attract substantial investment in these specialized fields underscores their adaptability, innovation, and relevance in the evolving geopolitical landscape.

International partners have stepped in to help, too. USAID launched programs like the Fundraising Lab and the Competitive Economy of Ukraine initiative, which provided grants of up to \$500,000 to support business continuity. The European Union created a €300 million export credit guarantee facility [9] and launched the EU for Ukraine Fund, pledging over €400 million for Ukrainian businesses [10]. In addition to institutional support, global diaspora networks and private foundations have been instrumental in connecting founders with resources, capital, and mentorship.

One especially inspiring example is Mosquitter, a woman-led Ukrainian startup based in Poltava. Founded by Anastasiia Romanova, Mosquitter developed an eco-friendly, AI-driven device to protect people from mosquito-borne diseases. The product is safe for humans and the environment and has already expanded to seven countries across four continents. Even during the war, the company thrived, and Mosquitter was selected to protect

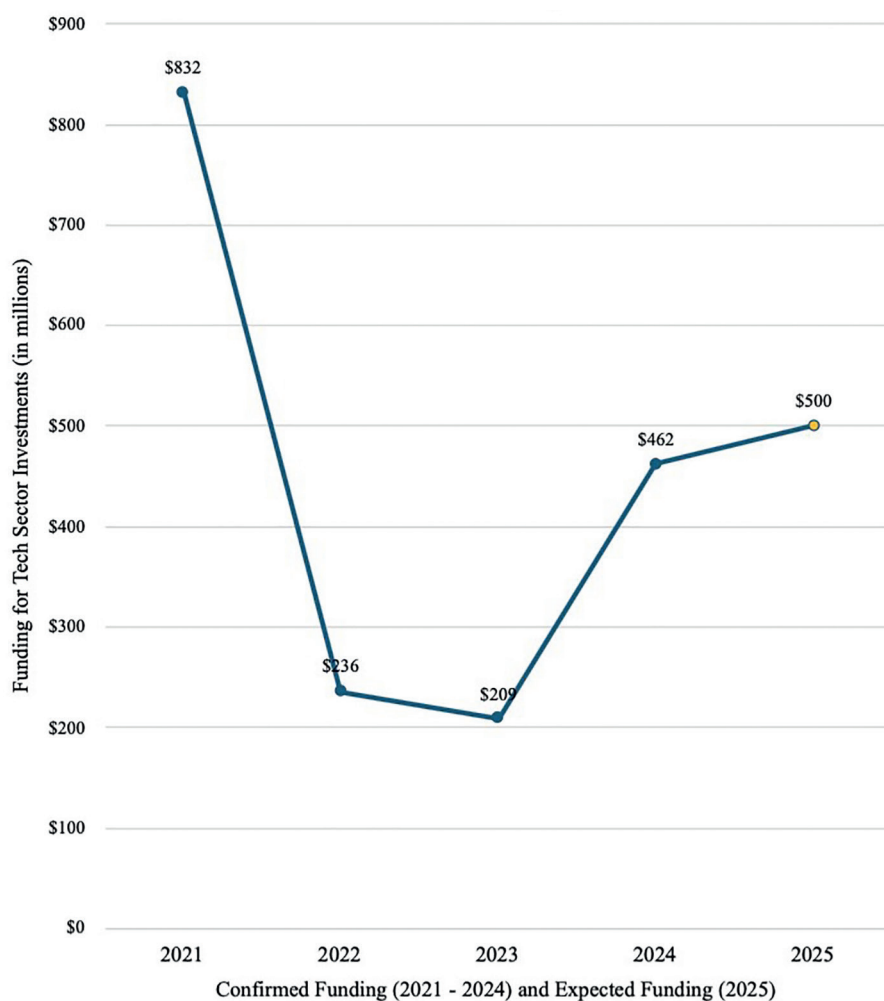


Figure 1. Ukrainian tech sector fundraising trend 2021–2025

world leaders at the 2022 G20 Summit in India, recognized at CES 2022, and joined Techstars in 2023. [11] The international law firm, Lloyd & Mousilli [12] worked with and supported the growth of Mosquitter since its early days, supporting its international growth with legal and corporate guidance. Mosquitter has expanded to distributions across multiple continents.

Another exceptional Ukrainian startup that demonstrates resilience in the face of incredible challenges is IOON. During the global pandemic, IOON developed a revolutionary technology to turn ordinary water into a sanitizer based on the combination of electrochemical principles of water saturation with silver ions and active forms of oxygen. At the recommendation of the Ukrainian Startup Fund, the founders of IOON, Andrew Manuilov, sought out Lloyd & Mousilli, an intellectual property law firm from Silicon Valley specializing in patent law, to help secure a patent on their groundbreaking device.

But the war would make it nearly impossible for the startup, based in the Eastern city of Kharkiv to survive the bombardment and shelling, as the lines of communications were cut during Russian occupation and the founders needed to evacuate. Lloyd & Mousilli was able to ultimately connect over the Telegram messaging app to get the information needed from the IOON team and succeeded in securing the patent grant from the USPTO for the fledg-

ling startup. [13] While the startup still faces a number of challenges, the ability to secure international intellectual property registrations that will allow IOON to continue to build and develop potentially license generating intellectual property is a prime example of a Ukrainian startup continuing to rise and raise despite the impossible circumstances.

Conclusion. Ukraine's startup ecosystem presents a compelling testament to resilience and innovation, thriving amidst conditions that would typically stifle entrepreneurial endeavors, such as active conflict and severe economic contraction. This remarkable adaptability has seen Ukrainian startups not merely survive but flourish with surprising speed and effectiveness. Instead of succumbing to adversity, many have strategically pivoted their technological solutions to address the critical and immediate needs of both civilian populations and military efforts. They have demonstrated an extraordinary capacity to scale operations under immense pressure, concurrently attracting renewed attention and investment from a diverse array of international investors and institutions. Key sectors, including but not limited to defense technology, cybersecurity, and artificial intelligence, have not only weathered the disruptions of war but, in numerous instances, have experienced significant growth and advancement, directly spurred by the unique pressures and

demands generated by the conflict. This organic evolution highlights a profound ability to innovate under duress, transforming challenges into catalysts for progress.

These unprecedented developments offer profound and meaningful insights that could reshape our understanding of global innovation. Ukraine is actively redefining the parameters for establishing and sustaining a vibrant tech ecosystem within a crisis environment, fundamentally challenging long-held assumptions about the geographical and contextual prerequisites for innovation. The ongoing and sustained international engagement – encompassing crucial funding, invaluable mentorship, and strategic

policy support – will be absolutely critical in ensuring that this powerful momentum translates into a robust, long-term economic recovery and deeper global integration. As Ukraine continues its journey forward, its burgeoning startup sector emerges not only as a poignant symbol of national resilience and an unwavering spirit but also as a potential blueprint. This blueprint offers a practical and inspiring model for how entrepreneurial ecosystems can not only operate but also thrive and innovate under the most extreme constraints, providing invaluable lessons for nations and industries worldwide grappling with complex challenges.

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