

Article

Development and Support of Ukrainian Domestic Entrepreneurship in the Knowledge Economy

Maksym W. Sitnicki ^{1,*} , Iryna Horbas ¹ , Oksana Derkach ¹ , Alan Flowers ² , Izabela Wielewska ³ , Karol Tucki ^{4,*} , Dagmara K. Zuzek ⁵  and Serhii Pimenov ⁶ 

- ¹ Management of Innovation and Investment Activities Department, Faculty of Economics, Taras Shevchenko National University of Kyiv, 03022 Kyiv, Ukraine; gorbash@knu.ua (I.H.); oderkach1@knu.ua (O.D.)
 - ² Faculty of Engineering, Computing and the Environment, Kingston University London, London SW3 15DW, UK; a.flowers@kingston.ac.uk
 - ³ Department of Agronomy, Faculty of Agriculture and Biotechnology, Bydgoszcz University of Science and Technology, Al. Prof. S. Kaliskiego 7, 85-796 Bydgoszcz, Poland; wiewlewska@pbs.edu.pl
 - ⁴ Department of Production Engineering, Institute of Mechanical Engineering, Warsaw University of Life Sciences, Nowoursynowska Street 164, 02-787 Warsaw, Poland
 - ⁵ Department of Statistics and Social Policy, Faculty of Agriculture and Economics, University of Agriculture in Krakow, Mickiewicza Street 21, 31-120 Krakow, Poland; dagmara.zuzek@urk.edu.pl
 - ⁶ Independent Researcher, 02-495 Warsaw, Poland; sedj78@gmail.com
- * Correspondence: maksym.sitnicki@knu.ua (M.W.S.); karol_tucki@sggw.edu.pl (K.T.); Tel.: +48-593-45-78 (K.T.)

Abstract: This paper explores the elements of support and development of entrepreneurship in Ukraine. It suggests that digitalization is an important organizational component in the development of the business sector in the knowledge economy. The authors present a comprehensive study of the most advanced domestic business ecosystems (Diia, UNIT.CITY, Genesis) and highlight their key characteristics, i.e., type of ownership, structure, mission and vision, services for entrepreneurs, investment fund availability, and areas and types of investment. The paper concludes that support for entrepreneurship in Ukraine is based on the principles of efficiency, accessibility, social security, openness, and transparency. Entrepreneurship support is considered as a set of measures of the state-funded and private institutions and organizations aimed at ensuring the sustainable functioning of small and medium-sized business entities and stimulating their development by creating the following favorable conditions: building a competitive environment and increasing competitiveness; fostering investment and innovation efforts; promoting manufactured goods (works, services) or knowledge-based products in domestic and foreign markets; ensuring employment by supporting the citizens' entrepreneurial initiatives. Areas of public and private support of domestic entrepreneurship include provision of information, consultancy, and special services. Moreover, the paper pays special attention to the forms and methods of supporting businesses and entrepreneurship under martial law in Ukraine in 2022.

Keywords: entrepreneurship; start-up; digitalization; business ecosystem; investment fund; knowledge economy; martial law



Citation: Sitnicki, M.W.; Horbas, I.; Derkach, O.; Flowers, A.; Wielewska, I.; Tucki, K.; Zuzek, D.K.; Pimenov, S. Development and Support of Ukrainian Domestic Entrepreneurship in the Knowledge Economy. *Sustainability* **2024**, *16*, 5682. <https://doi.org/10.3390/su16135682>

Academic Editors: Ching-Hsin Wang, Kuo-Ping Lin and Mário José Baptista Franco

Received: 1 April 2024

Revised: 5 June 2024

Accepted: 2 July 2024

Published: 3 July 2024



Copyright: © 2024 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Introduction

In the present highly turbulent times of the year 2022, developed small and medium-sized businesses have become a backbone of the economic stability and development of states. In 2020, the contribution of small and medium-sized enterprises to the national economies reached 60% in China; 52% in Ukraine; 44% in the USA; 35% in Germany; 29% in the Czech Republic; 28% in Hungary; 26% in Poland; 25% in Slovakia; 23% in Moldova; 20% in Romania and Great Britain each; 17% in France; and 8% in Turkey [1].

The European Charter for Small Enterprises defines that small enterprises are the foundation of the European economy, and a key source of jobs and fertile ground for

business ideas [2]. Thus, the efforts of Ukraine (as an associated country of the European Union, recovering from war conditions, with martial law) to support and develop an effective economy in the post-war period will be successful only if entrepreneurship is seen among the most important strategic priorities in the coming years.

To support and foster development of entrepreneurship in Ukraine, it is essential to strengthen its organizational elements such as the appropriate infrastructure; training and improvement of entrepreneurs' business literacy and digital awareness; workforce support through training of qualified specialists; and to provide active financial support—primarily through public and private investment funds and programs. Thus, the goal of the research is to identify and generalize practical forms and methods of development and support of the Ukrainian entrepreneurial sector in the digitalized economy through existing business ecosystems. The introduction of digital technologies into the infrastructure for supporting entrepreneurship can help to gradually combat existing problems and difficulties present in this area in Ukraine, such as reducing bureaucracy and corruption in government agencies, speeding up and simplifying formal procedures, facilitating and expanding staff training, etc. In addition, the provisions of information, advisory and special services should be highlighted in the areas under consideration, e.g., simplified company registration procedure, accounting and taxation services, involvement of entrepreneurs in the implementation of research-intensive, technology-based and socio-economic programs, building extensive entrepreneurship support infrastructure (laboratories, hubs, support centers, working spaces), and funding opportunities of various types, such as special programs, grants, preferential lending, and equity participation.

Analyzing trends in the development of entrepreneurship in the digital society and the role of the knowledge economy in the modern world has gained popularity among Ukrainian and foreign scholars. In 2018, the Ukrainian government approved the Concept for the Development of the Digital Economy and Society of Ukraine for 2018–2020, the main goal of which was the implementation of the “Digital Agenda of Ukraine 2020” initiatives (digital strategy) to remove barriers to the digital transformation of Ukraine in the most promising areas.

Implementation of the Concept ensured the stimulation of the economy and attraction of domestic and foreign investments; deepening cooperation with the EU in the digital sphere; development of the country's innovative infrastructure and digital transformations; the basis for the transformation of domestic industries and the entrepreneurial sector into competitive and efficient ones due to their digitalization; development of innovative, creative and digital industries and business; development of the exporting of digital products and services (IT outsourcing); creation of new opportunities for the realization of human capital; and solving the problem of digital inequality and the digital gap, bringing digital technologies closer to citizens.

In 2019, the Ministry of Digital Transformation of Ukraine was identified as the main executor of the Concept. The Ministry is responsible for the formation and implementation of state policy in the field of digitalization, open data, national electronic information resources, and interoperability. The concept defines the following foundations, goals and principles of digitalization: formation and implementation of state policy in the field of digitalization, digital economy, digital innovations, electronic governance and electronic democracy; development of the information society; formation and implementation of state policy in the field of development of digital skills and digital rights of citizens; formation and implementation of state policy in the field of open data; development of national electronic information resources and interoperability, development of the infrastructure of broadband access to the Internet and telecommunications, e-commerce, and business; formation and implementation of state policy in the field of providing electronic and administrative services; formation and implementation of state policy in the field of electronic trust services; formation and implementation of state policy in the field of IT industry development. Digitalization is a prerequisite for transitioning to new business models and technologies which provide revolutionary changes. Such business models include digital ecosystems for managing small and medium-sized enterprises [3].

The development and improvement of digital infrastructure to support small businesses are carried out by state, public, private, and international organizations that seek to integrate numerous digital services into a single interoperable system [4]. The modern digital infrastructure for supporting entrepreneurship in Ukraine is represented by the following:

- Online platforms on which the interaction of “business–state”, “business–business”, and “business–society” is carried out. They provide state administrative services for registration, liquidation of businesses, issuance of permits, and support for domestic businesses, including abroad, and also form a global network that facilitates the establishment of business contacts;
- Digital consulting and business support services for the following typical business development issues: starting a new business, marketing, organizational design, personnel management, e-sales, tax payments, investments, and independent expertise services (Diia.Business, Merezha);
- Digital information services and access to data on sales statistics, taxation, accounting, and export regulations and rules;
- Online training for start-up entrepreneurs and on topical issues of further business development in the format of series, online lectures, and trainings [5].

The development of an efficient infrastructure relies on modern entrepreneurial attitudes that correlate with relevant macroenvironmental factors. Some of the most significant positive factors in the formation of a strong entrepreneurial infrastructure are external business support for checking the potential of business ideas, finding financial sources, business training, mentoring, consulting, and informational support. The main inhibitors for the development of entrepreneurship are inefficient government bureaucracy, tax rates and regulation, government and policy instability, inappropriately educated workforce, insufficient investment, insufficient infrastructure and facilities, corruption, insufficient capacity to innovate, and lack of ethics in the national labor force [6].

The impact of social networking on the development of start-ups and entrepreneurship is also decisive. In the context of digitalization, it is effective to use a variety of external relations when creating and developing a start-up business. More than 60% of start-ups use the help of business incubators and accelerators to support building networks and connections with the external environment. The key and most useful contact groups include friends (customer acquisition, product/service development, technology and legal advice), business angels (fundraising, technology advice, marketing advice), and business partners (customer acquisition, technology advice, and finding new opportunities) [4].

The concept of sustainability appears more and more frequently in the IT industry. Industry representatives believe that reducing environmental impact should be key to business strategies in their area of activity. Meeting the demands of sustainability and dynamically changing regulations and customer expectations remains a challenge. Sustainability practices have long ceased to be a trend and are becoming an obligation, regulated by a growing number of regulations and customer needs. Moreover, companies closely monitor the practices of suppliers of products and services. Therefore, moving toward sustainability can be a challenge, but at the same time it brings benefits in terms of increased customer confidence. Big Data and Machine Learning are the most popular tools used by the IT industry for more sustainable practices. These technologies allow for a better understanding of sustainability data and provide valuable information to make more informed decisions. Data centers play an important role in reducing emissions. The modern solutions used here allow to reduce energy consumption and reduce the negative impact on the environment. This enables IT companies to support sustainable practices while remaining efficient and competitive.

The article’s focus is on exploring and highlighting various (state and non-state) ways to support and promote domestic entrepreneurship through digital infrastructure. It does not delve into analyzing the efficiency of the domestic business sector or its participation in digitization programs. We aim to illustrate how, even in challenging circumstances such as military aggression from the Russian Federation, Ukraine manages to allocate sufficient attention and support for the development of entrepreneurship in various ways.

2. Materials and Methods

This study was conducted by analyzing scholarly sources dedicated to the issues of domestic Ukrainian entrepreneurship development using digital technologies in the knowledge economy. In this research, authors studied the official websites of business ecosystems, scrutinized the acceleration program of the Ukrainian Startup Fund, and focused on investment funds as a tool for the development of small and medium-sized businesses in the knowledge economy. The methodological basis of this study consists of using research methods such as the following: critical analysis for a detailed study of laws and regulations that set out norms in the sphere of entrepreneurship; structural analysis and comparison for the study of domestic ecosystems, online platforms, and portals (Diia, Genesis, UNIT.CITY) that provide support and development for the entrepreneurial sector; systematic approach for studying the character of the development of domestic entrepreneurship in the conditions of digital transformation of the economy; logical generalization for organizing the obtained results, formulating conclusions, and determining further scope of research; formulating recommendations and outlining directions for the development of entrepreneurship in the knowledge economy.

The main goal of its implementation of Diia was to provide 100% public services online. Since December 2022, almost 18.5 million Ukrainians have uploaded the Diia application. Diia is now used by more than 21.7 million users and more than 70 government services are available online. The Diia mobile application allows Ukrainians to access 14 digital documents (ID card, foreign biometric passport, student ID card, driver's license, vehicle registration certificate, vehicle insurance policy, tax number, birth certificate, IDP certificate) and a total of 21 services.

The Diia portal includes more than 70 digital services. According to the assumptions made through this portal, you can make a quick registration of a company in the world – 2 s to become an entrepreneur in Ukraine, and it takes 30 min to set up a limited liability company. The service has already been used by 1,000,000 private entrepreneurs and more than 14,000 companies.

3. Results

Presently, the domestic infrastructure for supporting entrepreneurship in Ukraine is represented by various ecosystems that use digital technologies and help the country's small and medium-sized businesses to operate effectively, grow, and improve. Comparative characteristics of three of the most advanced and popular ecosystems that actively engage in supporting entrepreneurship in Ukraine—Diia, UNIT.CITY, and Genesis—are given in Table 1.

Diia Ecosystem is a digital state brand of 'state in a smartphone' that embraces e-government, cyber security, e-democracy, e-business, e-court, e-health, e-education, e-transportation, smart cities, citizens' digital skills, and ubiquitous Internet. The Diia online portal can access over 70 government services and a whole system of national sub-brand projects, including Diia mobile application with electronic documents and personal data from the registers; e-Maliatko, which is a comprehensive service for parents and their new-born children; Diia.Digital education portal with online courses on basics of digital literacy; Diia.Business portal for development and assistance to small and medium-sized businesses; Diia.City with a special legal regime for the IT industry; and Diia.Centres, a new generation of offices for the provision of administrative services [7].

One of the sub-brands of the Diia ecosystem is a large-scale national project on the development of entrepreneurship, initiated by the Ministry of Digital Transformation of Ukraine together with the Office for the Development of Entrepreneurship and Export in 2020 called Diia.Business [8].

On 17 May 2022, the Ministry of Digital Transformation, with the support of the Ministry of Economic Development and Technology of Poland, the Polish Investment and Trade Agency, together with Mastercard, opened the first Diia.Business office abroad—Diia.Business Warsaw [9], where one can get advice for small and medium-sized businesses on legal issues, accounting, taxation, auditing, recruitment of qualified personnel, and other issues related

to conducting business activities on the territory of Poland under martial law in Ukraine. It is planned that Diia.Business support offices for entrepreneurs will be appearing in various formats in every Ukrainian city with a population of more than 50,000 people.

Table 1. Comparative characteristics of three entrepreneurship support ecosystems in Ukraine.

Criterion	Diia	UNIT.CITY	Genesis
Year of foundation	2019	2017	2009
Type of ownership	State-owned	Private	Private
Structure of ecosystem	Multi-service online portal for government services, Diia mobile application, e-Maliatko, Diia.City Diia centers, Diia.Business, Diia. Digital Education	Accelerators, laboratories, working spaces, Networking and Lifestyle, investment fund specialized services, educational platform	IT development and maintenance, media services, advertising, consultancy services, educational services
Number of users/members	17+ mln Diia app users, 1+ mln Diia. Education users, 10,000+ Diia.Business users, 200+ companies in Diia.City	200+ mln monthly users	300+ mln digital products downloads
Number of employees	No data	1150 employees	2000 employees
Vision, mission, values	To inspire to set up businesses in Ukraine; to teach entrepreneurship throughout life; help with starting your own business; to protect Ukrainian entrepreneurs; to promote the development, scaling, and internationalization of Ukrainian business	To promote the development of Ukrainian technological start-ups at the early stages of development, with the aim of increasing their global competitiveness; to build a new metacommunity and grow it together with UNIT.City through openness, mutual trust, and a shared culture of creativity	Together with outstanding entrepreneurs of Ukraine, to build high-tech products that change the lives of millions of people around the world while providing fast moving service, getting things done, and setting a high bar for talent and never surrendering
Specialization (services for entrepreneurs)	- consulting - organizational support and paper flow management - data and administrative services - idea bank for businesses - education - fundraising	- entrepreneurship - IT - consulting, multi-level services - accelerators - Networking and Lifestyle - working spaces, laboratories, tech, and R&D infrastructure - education - fundraising	- entrepreneurship - IT - consulting, analytics - construction - software and product development - strategizing, brand-strategies, PR - digital-marketing - recruiting - education - fundraising
Investment funds	State-owned (Ukrainian Startup Fund)	State-owned (Ukrainian Startup Fund) and venture (QP Digital)	Venture (Genesis Investment)
Investment areas	Setting up own business, education, gardening, berry growing and viticulture, greenhouse farming, processing business	Setting up own business, education, IT, tech sector, design, renovation, construction, innovative technologies, artificial intelligence, blockchain, GameDev, IT logistics, digital healthcare	Education, innovation and high technology, IT and web projects, art, entertainment, sports and recreation
Investment types	USF (non-equity grants, convertible loans) Investments at various stages of implementation in the amount from UAH 750,000 to UAH 3.5 mln; - convertible loans from 750,000 to 8 mln UAH; - grants for a start-up and/or own business up to UAH 250,000; - targeted grants for gardening, berry growing viticulture (of up to UAH 400,000 per hectare); - development of greenhouse farming (up to UAH 7 mln); - development of a processing business (up to UAH 8 mln); - grants for dual purpose projects up to USD 35,000	USF (grants, accelerators) Early-stage investments: - acceleration program - grants for start-up development of up to USD 10,000; - grants for dual purpose projects of up to USD 35,000; QP Digital (grants, equity participation): - targeted grants of up to USD 5 million	Genesis Investment (grants, loans, equity participation, accelerators): Early stage investments: - targeted grants and loans in the range of USD 300,000–700,000; - a minority package (10–49%) or cooperation in the amount of up to USD 10 million per year
Cost of services	Free	Free and paid options	Free and paid options

Key services of the Diia. Business platform for entrepreneurs include the following [7,8]:

- Educational services (national school of entrepreneurship; online school; self-assessment);

- Information services and analytics for Ukrainian businesses (document templates; action maps; a bank of 150+ business ideas; trademarks and patents; case studies; directories; list of exhibitions);
- Consultancy services at local and regional levels in the fields of taxation, marketing, team building, and legislation;
- Financial support and a marketplace of funding opportunities; attraction of impact investments; grants; investments; financial support programs; loans;
- Business in wartime section (helping Ukrainians in Poland, Great Britain, Moldova, Romania; ‘DO NOT sponsor murder’ information campaign; communications in wartime; franchising in wartime; digitalization of business in wartime);
- Business development services; agricultural business; women’s entrepreneurship; export development; EU program ‘Creative Europe’; and partnerships.

A powerful tool for the development and support of entrepreneurship is provision of funding for operational activity, and this takes place together with the Ukrainian Startup Fund (USF) investment fund that provides grants or convertible loans [10,11].

Financial support may be provided to start-ups at various stages of their development—from an idea to a minimum viable product and a finished product—with grant amounts from USD 20,500 to USD 95,000. The following expenses may be covered by the grant: wages of employees and/or remuneration of gig specialists; payment of taxes and fees; fees for consultancy services; costs of equipment and/or equipment for production purposes, R&D; cost of product promotion, marketing, and subscriptions [12–14].

Another important initiative is the Grant Support Program for dual-purpose projects [15], which provides financial assistance for the needs of project development. The program is designed to promote entrepreneurship under martial law and foster the creation and development of innovative dual-purpose products to increase the country’s defense capabilities and contribute to its rapid post-war recovery. The program supports projects that operate in the following industries: defense sector, cyber security, infrastructure reconstruction, healthcare, and education.

On 24 June 2022, a government grant program for investments in start-ups [13] was initiated through the USF—it provides financial support to entrepreneurs under martial law and is administered by the “National Investment Fund of Ukraine” [14].

The UNIT.CITY ecosystem [16] is the first innovation park in Ukraine which operates according to the “win-win” principle (decision-making in joint activities, when all participants in the process benefit), promoting the development of entrepreneurship and founding companies successful on the global market. The innovation park has 100+ resident companies, including three laboratories, five business campuses and co-working spaces, four accelerators, and three investment funds for the support and development of Ukrainian start-ups.

The UNIT.CITY metacommunity creates new companies and products; it shapes and develops infrastructure for the development of entrepreneurship, offering 25 programs for start-ups.

UNIT.CITY comprises the following:

- Investment funds that provide financing options for Ukrainian technology start-ups.
- Services: provision of multi-level services; events with world-class speakers; consulting; tours of UNIT.CITY to get familiar with its innovative infrastructure and technologies; VideoHub; recruiting at national and international levels.
- Networking and Lifestyle with events and initiatives aimed at developing a unique culture and building strong business and friendly ties between residents, ambassadors, and guests of the park.
- Laboratories and technological infrastructure for conducting research and creating new products: DTEK Academy; Immersive technologies lab; R&D 5G lab supported by the Ministry of Digital Transformation, Huawei, and Vodafone; working spaces for events, club offices, individual offices, and turnkey building.

- Accelerators—a platform for the development of small and medium-sized enterprises (3-month workshop studio, corporate accelerator, and production accelerator); programs for intensive development of start-ups under guidance of experienced mentors from around the world; expert support, training, financial consulting, and preparation for attracting investment rounds.
- Educational programs for the development of soft and hard skills, professional competencies, and business expertise, including an innovative educational platform, IT education, CONSTRUCTION project management school, Web Academy, Lean Institute Ukraine, and innovative business school.

The UNIT.CITY website links to two possible sources of financial support for entrepreneurs: the state-operated start-up investment fund (USF) and the QP Digital venture fund [16,17].

USF [10] focuses on the creation and development of Ukrainian technological start-ups at the early stages and aims at increasing their global competitiveness. The emphasis is on supporting early-stage start-ups with non-equity grants, funding training in national and international accelerators, and offering new financial and non-financial opportunities for entrepreneurs. The program of grant support for dual purpose projects is also offered [15]. The USF acceleration program [12] has nine accredited accelerators and provides new opportunities for the development of start-ups. The purpose of the program is to help Ukrainian entrepreneurs become successful global companies. This includes training, mentoring, exchange of experience, and high-quality networking with the strongest players in the international start-up ecosystem.

QP Digital [17] is a fund with a target size of USD 100 million which, as of 2022, has received over USD 5 million in investments. It was founded in 2020 and focuses on early investments, helping start-ups improve their marketing strategy and business model, find new customers, streamline technology, select suppliers, seek investment, and raise capital.

Genesis ecosystem is a co-founding company that has been building global tech businesses based on the experience of outstanding entrepreneurs in Europe since 2000 [18]. Genesis employs 2000+ professionals in five countries, owns 15+ product businesses, including online media, non-gaming applications, and R&D, and has 200 million monthly unique users. Genesis' main services include advertising activities, development and maintenance of websites and applications, consulting, and education in the fields of business and IT.

Genesis has more than 15 large and growing companies (partners, co-developers, co-owners) and a dedicated investment fund. The company has extensive resources for education, trainings and workshops with access to professional and field-specific literature, and facilitates various professional communities where experts can share knowledge and professionals find support.

Product development takes place in four key areas: mobile applications (health and fitness books, entertainment, business, etc.); online classifieds (OLX, Jiji); GameDev; and media products (news and entertainment content in more than 10 countries with 85 million users).

Entrepreneurship is financed through its own venture fund, Genesis Investment (GI) [19]—an evergreen fund created in 2018 that specializes in B2C and B2B Software-as-a-Service “SaaS” based start-ups in Eastern Europe at the early stages of development.

In total, the fund has invested over USD 10 million, with a return of 600%, in 15 start-ups from Ukraine and Eastern Europe. The main areas of GI investments include art, entertainment, sports and recreation, information technologies and Internet projects, education, innovation, and high-tech products [20].

The fund works with early-stage start-ups. In addition to financial support, the fund helps with business process optimization and marketing thanks to Genesis' strong expertise in product development. The main services offered to entrepreneurs include strategizing, digital marketing, analytics, fundraising, recruiting, PR, brand strategies, and software development [21,22].

The main functional features of Diia are consistent file structure, customizable tagging and naming rules, availability across platforms and devices, a simple and intelligent search engine, version management of downloaded files, file collaboration and editing, integration with third-party software and services, scalable file storage, security and privacy settings, automatic file generation, optical character reader, document archiving, file type conversion, electronic signature, and offline access. Software usage statistics for companies with 101 to 1000 employees are presented in [23]. The trust of the users of the proposed IT solution is the result of efficient IT solutions based on many years of experience [24].

Ukrainian Diya is a government application and web portal that makes its services available to users free of charge. This does not mean that everything on the site is free. There are paid services; for example, the restoration or replacement of a driving license in Diya costs 219 UAH (about 6 USD), but by default this is the cost of the service and its amount does not depend on whether you use Diya or not.

The technical architecture of the project is presented in Figure 1.

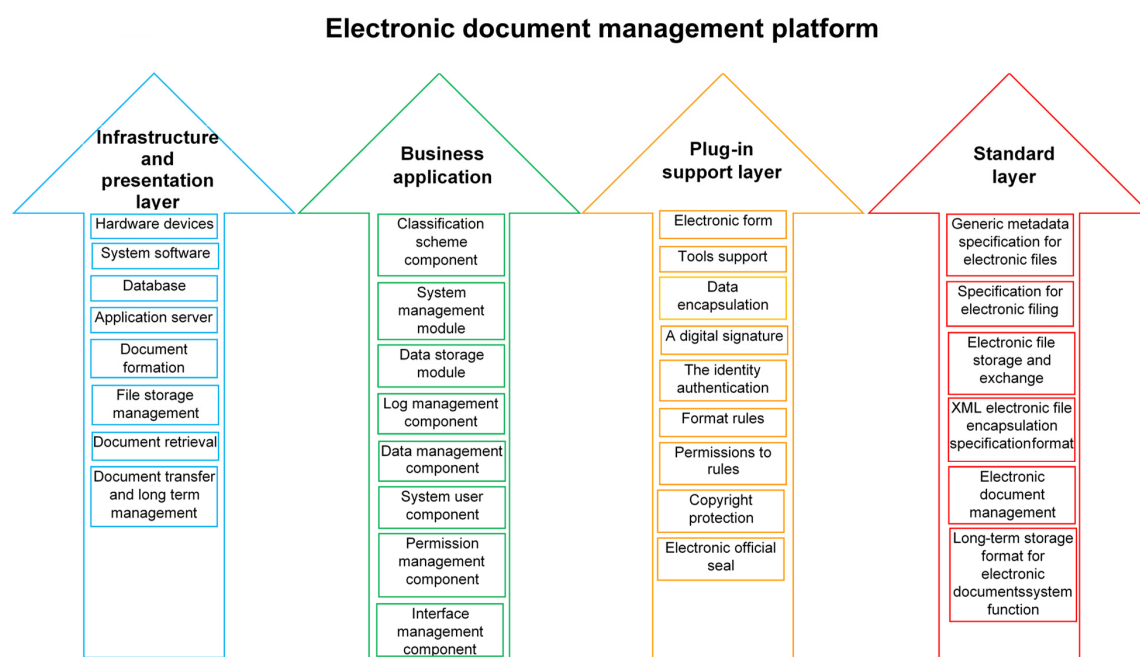


Figure 1. Technical architecture of the electronic document management platform.

The cost of introducing the Diia/Diya analogue to the market is shown in Table 2.

Remuneration depends on the employee's experience. In addition, the form of employment is important. IT specialists are employed in the form of B2B (business-to-business) and on an employment contract.

Table 2. The average cost of such mobile electronic document management application depending on its complexity and developer's location [25,26].

	Level		
	Simple	Moderate	Complicated
Description	The simplest functions, template design, no API integrations	Custom design, additional functions, integration with payment systems and social networks, comments	Personalized design, maximum functions, artificial intelligence, integration with other services
Development time	400 h	500–800 h	800–1500 h
Eastern Europe (32 USD/h)	From 12,800 USD	From 16,000 to 25,500 USD	From 25,600 to 48,000 USD
EU (70 USD/h)	From 26,000 USD	From 34,000 to 54,000 USD	From 54,000 to 100,000 USD
USA (95 USD/h)	From 38,000 USD	From 47,500 to 76,000 USD	From 76,000 to 165,000 USD

4. Discussion

Recent years have seen active involvement of the educational and scientific sectors in the development of entrepreneurship and start-ups, including Igor Sikorsky Kyiv Polytechnic Institute (ecosystem ‘Sikorsky Challenge’ ecosystem, ‘Kyiv Polytechnic’ Science Park, Faculty of Informatics and Computer Engineering), Taras Shevchenko National University of Kyiv (‘Startup Business Incubator’, Diia.Business.KNU), National Centre for Creative Entrepreneurship Development (NCCE)), Ukrainian Catholic University (UCU Entrepreneurship Center), Lviv Polytechnic National university (‘Tech StartUp School’), and Ivan Franko National University of Lviv (partnership of universities of Ukraine and of Germany in technology transfer ‘Startup Battle LNU’).

All ecosystems presented in this study implement their own educational programs (Diia: educational platform; UNIT.CITY: WEB Academy, Lean Institute Ukraine, PRO PM Construction, UNIT School of Business, Ucode; Genesis: IT School, Analytics School, Media School). They also partner with higher education institutions such as Taras Shevchenko National University of Kyiv, Igor Sikorsky Kyiv Polytechnic Institute, and Kyiv National University of Economics, named after Vadym Hetman to establish new areas of support for entrepreneurs and to engage practitioners in university education. Strong cooperation with educational institutions in the field of entrepreneurship development has been established with the support of the British Council within the “Creative Spark: Higher Education Enterprise Programme”. This is how the International “Big Idea Challenge”, in which talented and enterprising students from different universities participate, was initiated in 2018.

Cooperation of higher education institutions with the business sector focuses on stimulating the development of start-ups and entrepreneurship, establishing collaborations and interactions between already-existing start-ups and state agencies, and between educational and commercial environments. Yet, further study is needed to explore all the elements of the support and development of domestic entrepreneurship through the educational component in the knowledge economy and information society.

The recovery of the post-war economy in Ukraine and its consequent growth should be based on the development of the business sector and its increased competitiveness in domestic and foreign markets. The priorities in the development of this area should include promoting innovative potential among entrepreneurs, securing an appropriate legal and regulatory environment, fostering innovation and investment climate, ensuring the implementation of international business standards, and building up a strong infrastructure.

5. Conclusions

Presently, business ecosystems that actively use digital tools are setting a new trajectory for the development of entrepreneurship in Ukraine. Thus, as of the beginning of 2022, the infrastructure of numerous ecosystems supporting entrepreneurship in Ukraine includes over 70 business incubators, more than 400 business centers, almost 250 entrepreneurship support funds, 659 credit unions, 457 insurance organizations, 760 leasing centers, 2254 audit firms and private auditors, and 2988 investment and innovation funds and companies. This indicates a growing interest in fostering entrepreneurial efforts not only on behalf of the state and big business, but also among entrepreneurs themselves. At the same time, a favorable environment for doing business and developing entrepreneurship is created by providing financial, informational, and consulting support, as well as training, retraining, and professional development of managerial staff and workforce for conducting business (educational activities).

The research aimed to identify the prevalent mechanisms that utilize digital technologies to support entrepreneurship in Ukraine. However, this study did not evaluate their effectiveness. The authors intend to address this issue in their future research work.

The digitization of public services is even more important than it was a few years ago [27–29]. This can be confirmed by the example of Ukraine, which after the outbreak of the war, for security reasons and in order to ensure the continuity of the country’s

operations, transferred key data and services to Amazon processing centers located outside the country. Thanks to this, in the face of unprecedented acts of terrorism by Russia, the Ukrainian state is able to function.

The economy of Ukraine is slowly recovering, although since the beginning of the war it has been very dependent on financial aid from the West [28,30]. In 2023, the real gross domestic product (GDP) of Ukraine increased by 5.3 percent. According to the Ukrainian State Statistical Service (NBU), inflation in January 2024 amounted to 0.4% compared to December 2023 and 4.7% compared to January 2023. The estimates of the National Bank of Ukraine are also quite optimistic about the future, assuming that GDP will grow by 3.6% this year, and by 5.8% and 4.5% in the following years [31].

Ukraine's digital transformation has been the subject of intensified activities for many months, and its vision has been presented in the "State in a Smartphone" project [32,33]. The project assumes that by the end of 2024, 75% of the population of Ukraine will have access to and the ability to use digital tools, and 90% of public services will be provided electronically. Given the pace of implementation of digital change, the potential of the IT industry, and the global trends accelerated by the COVID-19 pandemic, the project objectives are likely to be realized. There is no alternative to systemic digital transformation; its course and results determine the position of a country in the region and internationally. The state of the IT industry, available cloud tools, infrastructure environment, cybersecurity, and the EU Digital Single Market are taken into account. On the Ukrainian IT market operates approx. 4000 companies and about 200,000 employees, and its potential is the greatest in Eastern Europe. Ukraine is the first country in the world to have a digital passport (Diiia application). The main objective of the project was to shorten and facilitate relations between citizens and the state as far as administrative and public services are concerned.

Digitization is of great importance for Ukraine from the point of view of war activities [34,35]. We are in the midst of a technology war and are witnessing the development of drone warfare. Many times, the situation on the battlefield has depended on the number of drones. Reconnaissance drones can help shape an attack or counter an attack. The situation on the battlefield and the outcome of this war depend on technological development. Most of the drones used by Ukraine have a range of 700 to 1000 km, but there are now models that can fly over 1000 km. The use of Starlink satellites from SpaceX and Elon Musk has long given the Ukrainian army an operational advantage in this war. Research in eastern Ukraine shows that Russian units are increasingly using the terminals of the American company SpaceX on the front line.

In May 2024, a memorandum on cooperation in the field of digitization of Poland and Ukraine was signed. The main goal of the partnership between Poland and Ukraine is cooperation in the field of digital technologies and innovation, development of the IT industry, artificial intelligence, and e-government, as well as development of the mObywatel and Diiia applications.

In the context of the damage caused during the war in Ukraine, measures related to the reconstruction of the country are being considered [36–38].

In fact, reconstruction will involve adapting to the current reality in many aspects: demographic, technological, legal, and environmental. One of the characteristics of this war is very large population displacements. A total of 7 million Ukrainians have left Ukraine, and another few million have moved inland. There is a parallel process of integration with the European Union, which will also impose changes in every area.

Author Contributions: Conceptualization, M.W.S., I.H. and O.D.; methodology, M.W.S., I.H. and O.D.; validation, M.W.S. and I.H.; formal analysis, O.D., I.W., K.T., D.K.Z. and S.P.; investigation, M.W.S., I.H. and O.D.; resources, O.D.; data curation, O.D.; writing—original draft preparation, M.W.S., I.H. and O.D.; writing—review and editing, I.H. and M.W.S.; visualization, I.H., I.W., K.T., D.K.Z. and S.P.; supervision, M.W.S. and A.F.; project administration, M.W.S. and A.F.; funding acquisition, M.W.S., A.F. and K.T. All authors have read and agreed to the published version of the manuscript.

Funding: This study was financed by the Institute of Mechanical Engineering, Warsaw University of Life Sciences. This research was also funded by the Faculty of Agriculture and Economics, University of Agriculture in Krakow.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: No new data were created or analyzed in this study. Data sharing is not applicable to this article.

Acknowledgments: This scientific paper was published with support by the British Council's "Creative Spark: Higher Education Enterprise Programme", project № 5742783597—the "National Centre for Creative Entrepreneurship Development" (NCCE).

Conflicts of Interest: The authors declare no conflicts of interest.

References

- Uhniva, S. The Backbone of the National Economy. What Is the Life of Small and Medium-Sized Businesses in Ukraine and How Does It Win Back Its Share in the National GDP. Available online: <https://biz.nv.ua/ukr/economics/maliy-biznes-v-ukrajini-umovi-roboti-perspektivi-chim-zaroblyaye-novini-ukrajini-50203466.html> (accessed on 15 May 2024).
- European Small Business Charter: Document № 994_860. Dated 19.06.2000. Available online: https://zakon.rada.gov.ua/laws/show/994_860#Text (accessed on 15 May 2024).
- Savytska, O.; Salabai, V. Digital transformations in the conditions of industry 4.0 development. *Financ. Credit. Act. Probl. Theory Pract.* **2021**, *3*, 420–426. Available online: <https://fkd.net.ua/index.php/fkd/article/view/3333/3236> (accessed on 15 May 2024).
- Durda, L.; Ključnikov, A. Social networks in entrepreneurial startups development. *Econ. Sociol.* **2019**, *12*, 192–208. [CrossRef]
- Ovsienko, O.V. Digital infrastructure of small business support in Ukraine. *Ef. Ekon.* **2021**, *2*, 1–6. [CrossRef]
- Carvalho, L.; Mavlutova, I.; Lesinskas, K.; Dias, R. Entrepreneurial perceptions of students regarding business professional career: The study on gender differences in Latvia. *Econ. Sociol.* **2021**, *14*, 220–241. [CrossRef]
- Digital Transformation Projects Diia. Available online: <https://diia.gov.ua/> (accessed on 15 May 2024).
- About the National Project Diia. Business. Available online: <https://business.diia.gov.ua/> (accessed on 15 May 2024).
- Consultation Center for Ukrainians Diia. Business in Warsaw. Available online: <https://business.diia.gov.ua/warsaw> (accessed on 15 May 2024).
- Ukrainian Startup Fund. Available online: <https://usf.com.ua/about-usf/> (accessed on 15 May 2024).
- Ukrainian Startup Fond: Strategic Vision 2020–2025. Available online: https://usf.com.ua/wp-content/uploads/2020/09/strategy_usf_2020-2025.pdf (accessed on 15 May 2024).
- The Acceleration Program of the Ukrainian Fund for Startups Is a New Opportunity for the Development of Startups Provided by the Fund. Available online: <https://usf.com.ua/akseleracijna-programma> (accessed on 15 May 2024).
- USF Grant Programme. Available online: <https://usf.com.ua/en/programs/grant-support/> (accessed on 15 May 2024).
- Decree of the Cabinet of Ministers of Ukraine № 736 of 24.06.2022. Procedure for the Implementation of the Experimental Project on the Provision of Competitive Financial Support to Startups in Ukraine, Including in the Field of Information Technologies. Available online: <https://drive.google.com/file/d/1c9wjs8b74hFO2JcRvgiVFTTIZcGKgD70/view> (accessed on 15 May 2024).
- Ukrainian Startup Fund Launches New Grant Support Program for Dual-Use Projects. Available online: <https://usf.com.ua/ukrainskij-fond-startapiv-zapuskaie-novu-programu-grantovoi-pidtrimki-proiektiv-podvijnogo-priznachennya/> (accessed on 15 May 2024).
- UNIT.City. Available online: <https://unit.city/en/about/> (accessed on 15 May 2024).
- QPDIGITAL. Available online: <https://qp.digital/about> (accessed on 15 May 2024).
- Genesis. Available online: <https://www.gen.tech/> (accessed on 15 May 2024).
- Genesis Investments Is a New Venture Fund under Genesis Tech. Available online: <https://inventure.com.ua/tools/investors/genesis-investments> (accessed on 15 May 2024).
- How to Implement Incremental Rollouts and Rollbacks with Control of Business Metrics at Each Stage. Available online: <https://www.gen.tech/blog> (accessed on 15 May 2024).
- How a Startup Can Work Effectively Despite the Crisis. Available online: <https://www.gen.tech/post/yak-startapu-efektivno-pitchiti-poradi> (accessed on 15 May 2024).
- Mador, M. Strategic Decision Making Process Research: Are Entrepreneur and Owner Managed Firms Different? *J. Res. Mark. Entrep.* **2000**, *2*, 215–234. [CrossRef]
- Report. SaaS Trends. Available online: <https://cdn2.hubspot.net/hubfs/2093754/eBooks/2020%20SaaS%20Trends%20Report.pdf> (accessed on 4 June 2024).
- Han, J.; Wang, C.; Miao, J.; Lu, L.; Wang, Y.; Shi, J. Research on Electronic Document Management System Based on Cloud Computing. *Comput. Mater. Contin.* **2021**, *66*, 2645–2654. [CrossRef]

25. Diia Mobile Application. Evaluation Report. Available online: <https://eu4digitalua.eu/wp-content/uploads/2021/12/diia-evaluation-report.pdf> (accessed on 4 June 2024).
26. IT in the USA. Available online: <https://crn.pl/aktualnosci/zarobki-it-w-usa-do-165-tys-dol/> (accessed on 4 June 2024).
27. Aviv, I.; Ferri, U. Russian-Ukraine armed conflict: Lessons learned on the digital ecosystem. *Int. J. Crit. Infrastruct. Prot.* **2023**, *43*, 100637. [[CrossRef](#)]
28. Goodell, J.W.; Yadav, M.P.; Ruan, J.; Abedin, M.Z.; Malhotra, N. Traditional assets, digital assets and renewable energy: Investigating connectedness during COVID-19 and the Russia-Ukraine war. *Financ. Res. Lett.* **2023**, *58*, 104323. [[CrossRef](#)]
29. Kuzmina, S.L.; Popova, O.; Bachurina, L. Contemporary crisis management in Ukraine's higher education system: A case study from the crises of the pandemic and the invasion. *Int. J. Educ. Manag.* **2024**, *38*, 413–428. [[CrossRef](#)]
30. Rubbaniy, G.; Maghyreh, A.; Cheffi, W.; Khalid, A.A. Dynamic connectedness, portfolio performance, and hedging effectiveness of the hydrogen economy, renewable energy, equity, and commodity markets: Insights from the COVID-19 pandemic and the Russia-Ukraine war. *J. Clean. Prod.* **2024**, *452*, 142217. [[CrossRef](#)]
31. Grebe, M.; Kandemir, S.; Tillmann, P. Uncertainty about the war in Ukraine: Measurement and effects on the German economy. *J. Econ. Behav. Organ.* **2024**, *217*, 493–506. [[CrossRef](#)]
32. Serafin, T. Ukraine's President Zelensky Takes the Russia/Ukraine War Viral. *Orbis* **2022**, *66*, 460–476. [[CrossRef](#)]
33. Cifuentes-Faura, J. Ukraine's post-war reconstruction: Building smart cities and governments through a sustainability-based reconstruction plan. *J. Clean. Prod.* **2023**, *419*, 138323. [[CrossRef](#)]
34. Deininger, K.W.; Ali, D.A.; Neyter, R. Impacts of a mandatory shift to decentralized online auctions on revenue from public land leases in Ukraine. *J. Econ. Behav. Organ.* **2023**, *213*, 432–450. [[CrossRef](#)]
35. Urak, F.; Bilgic, A.; Florkowski, W.J.; Bozma, G. Confluence of COVID-19 and the Russia-Ukraine conflict: Effects on agricultural commodity prices and food security. *Borsa Istanbul. Rev.* **2024**, *24*, 506–519. [[CrossRef](#)]
36. Lacan, I.; Dronova, I.; McBride, J. Social impact of destruction of urban forests in Ukraine and considerations for their future reconstruction. *Urban For. Urban Green.* **2024**, *94*, 128269. [[CrossRef](#)]
37. Kostruba, A. Managing foreign business operations in Ukraine in the context of war. *Bus. Horiz.* **2024**, *in press*. [[CrossRef](#)]
38. Esonye, C.; Esonye, C.O.; Agha, E.O.; Ume, C.S.; Njemanze, C.V.; Eyisi, C.E.; Adepoju, T.F. The 2022 Russia invasion on Ukraine: The biofuel energy security challenge on Ukraine and some related countries. *Heliyon* **2023**, *9*, e21483. [[CrossRef](#)] [[PubMed](#)]

Disclaimer/Publisher's Note: The statements, opinions and data contained in all publications are solely those of the individual author(s) and contributor(s) and not of MDPI and/or the editor(s). MDPI and/or the editor(s) disclaim responsibility for any injury to people or property resulting from any ideas, methods, instructions or products referred to in the content.