

SUSTAINABLE DEVELOPMENT: MODERN THEORIES AND BEST PRACTICES



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FINANCIAL AND ECONOMIC ISSUES OF SUSTAINABLE DEVELOPMENT

OPPORTUNITIES FOR THE EXISTENCE AND FINANCING STARTUPS DURING THE REBUILDING OF UKRAINE

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Recently Ukrainian startups have been experiencing intense challenges due to the operation of their businesses during the COVID-19 pandemic and now during the active phase of a full-scale war. According to UNDP research every new day is a day away from the development of the socio-economic life of our country, and if the ongoing war continues 18 years of socio-economic achievements may be lost in Ukraine. The current environment requires businesses to function optimally contributing to the country's economic stability. In these conditions it is important for startups to make quick decisions and actively consider new investment opportunities in order to maintain their viability and support the economic development of the country.

Even as the country is recovering and despite all the risks and challenges, more than 51,000 brave entrepreneurs have bravely launched new projects since the Russian invasion in 2022. The IT industry and tech startups are acting as a key catalyst for economic development and stimulating investment activity.

Based on the information provided by the project of the Ministry of Digital Transformation and its partners as of 2022, analysis shows that 24.3% of existing startups continued their activities, 28% stopped them, 46.7% are only partially operational and 1% changed their main field of activity. These statistics demonstrate the dynamics of the entrepreneurial environment and its adaptation to the current conditions. Prior to the conflict, the startup AMW Labs planned to change the weather by trying to inject chemicals into the clouds using special devices to simulate precipitation or prevent hail. In their test case the developers used drones to inject chemicals into the cloud. After the outbreak of war, the company's founder together with the NGO Aerorazvedka, used the technology to locate Russian military forces using satellite radar. Later, the company adapted its drones for military use.

The location of startups shows that some Ukrainian companies (1%) have relocated, 28% have partially moved their activities abroad but the vast majority 71% are still doing business in Ukraine. It is important to note that the remaining startups have no plans to relocate and are actively helping to achieve victory in Ukraine.

In 2022, nearly every startup, around 90%, emphasized the crucial need for financial support to facilitate further development or expansion of their operations. Only 7.6% of them maintain sufficient financial reserves for more than six months of activity.

This challenging scenario places the majority of startups in a precarious position, compelling them to devise survival strategies. Consequently, the primary obstacle and simultaneously the key opportunity for sustaining the active operations of startups lie in securing investments. Despite the financial instability, this is what drives the potential development and growth of startups, motivating them to find innovative ways to attract investors and expand their business.

The Ukrainian startup ecosystem started developing approximately 10 years ago and is currently in its early stages. The primary source of funding is entrepreneurs' personal funds and the income they generate. In January 2022, 84% of the founders surveyed by the Polish-Ukrainian Startup Bridge project mentioned this. The disruption of logistics connections and the complexity of the economic and political situation have considerably decreased startup profits and owners' savings. As a result, entrepreneurs have been actively seeking alternative funding sources.

Public funding has consistently ranked as the second most crucial source of investment for Ukrainian startups. However, in the present circumstances, the government and the USF have redirected their support towards projects focused on enhancing the country's defense and reconstruction. Grants are now allocated to startups in the fields of defense, construction, cybersecurity, medicine, education, and mental health, recognizing these sectors as the most critical for the state in the current landscape.

Another option for Ukrainian startups to receive support is by engaging in diverse grant programs initiated by global IT companies. A multitude of international businesses has shown willingness to aid the Ukrainian people in the early stages of the war. In practice, this is manifested in the free use of these companies' services, although this may be limited in time and the number of startups that can participate.

Additionally, there are numerous alternatives available, including crowdfunding platforms, collaborations with companies, and other sources of support. As an example, the International Renaissance Foundation as part of the EU4USociety project in cooperation with the European Union, is holding a competition called Crowdfunding for Social Entrepreneurship. Within the framework of this competition, projects are funded jointly by the Foundation and crowdfunding platforms such as Spilnokosht. Such platforms also raise funds for many projects related to helping ATO soldiers, and are currently raising funds for volunteering for soldiers, which is important now (Ilchenko, 2023).

The challenges faced by Ukrainian startups present new opportunities for their survival and financing. Swift adaptation to changes and prioritizing profitable and crucial sectors for the country's reconstruction are crucial. Developing compelling projects has the potential to capture the interest of foreign investors, significantly impacting Ukraine's economic recovery. Startups that receive proper support can serve as catalysts for economic revitalization and innovation, making a significant contribution to shaping a financially resilient and technologically advanced new Ukraine.

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SOLAR ENERGY TECHNOLOGIES IN A WATER SUPPLY COMPANY: ECONOMIC EFFICIENCY SUBSTANTIATION

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Renewable energy has already become a global trend: in recent years, investments in it have consistently surpassed investments in traditional energy technologies [1, 2]. Many countries, particularly developed ones, are refraining from investing in new energy projects that involve fossil fuels. Progressive societies have come to realize that sustainable development is key to the stable future of national economies, and a just energy transition is one of the pathways to achieve it [3].

Mechanisms for a green energy transition require the active participation of all stakeholders in processes aimed at rationalizing and greening energy systems, introducing cutting-edge renewable energy technologies, and improving energy efficiency in production and consumption. Implementing such initiatives at the enterprise level is crucial, especially in the residential and municipal sectors. The latter represents a significant consumer of energy resources, where savings can have powerful positive economic effects (in terms of reducing costs for sector enterprises), social benefits (potentially lowering utility tariffs for the population while maintaining or even enhancing utility quality), and environmental advantages (reducing the environmental footprint and decreasing environmental pollution).

Alongside municipal energy companies, a substantial portion of production costs for water supply enterprises is allocated to electricity for water extraction, purification, transportation, and other associated processes. Therefore, optimizing energy

consumption for water supply enterprises through the application of innovative renewable energy technologies is a significant contribution to their stable operation and the development of their production capacities. For Ukraine, whose municipal and energy infrastructure is affected by Russian shelling, the issue of stable energy supply, its decentralization, and the reduction of energy consumption by economic entities are of critical importance. This is especially pertinent to water supply enterprises, for which power outages mean a complete halt in their activities.

To decentralize energy supply and optimize electricity expenses, a pilot project has been developed to implement solar power plants at the municipal water supply enterprise "Miskvodokanal" in Sumy, Ukraine [4]. The project involves the use of solar photovoltaic panels to generate electricity for self-consumption and the storage of the generated green energy, alongside maintaining diesel generators for emergency backup in case of power outages [4]. The project's implementation is expected to be funded through donor contributions and municipal council funds, aimed at supporting uninterrupted water supply to critical infrastructure in the event of emergencies. Under normal operating conditions, green electricity production by the new energy installations will lead to cost savings for the enterprise through the reduction of the need to purchase electricity from the local electric company. Let us delve into the details and provide substantiation for the economic feasibility of implementing a solar power station at one of the city's water intakes.

The annual electricity consumption for the water pumping stations at the considered water intake facility amounted to 1122.36 MWh in the pre-war period, with monthly fluctuations ranging from 88 MWh (June) to 102 MWh (August). To partially cover the electricity needs of the water intake through its self-generation, it is proposed the installation of a solar power station with a capacity of 120 kW, capable of generating 174.8 MWh annually. This would enable the substitution of purchased electricity with self-generated power, covering from 1.4% to 19.1% of the existing needs, depending on the month [4]. The relatively low percentage of substitution is influenced, firstly, by investment constraints, secondly, by the enterprise's focus on using generated energy exclusively for its own needs, and thirdly, by the requirement to establish an emergency reserve of stored electricity.

The operational lifetime of solar panels is set at 25 years. Taking into account the degradation of solar equipment technical characteristics over time due to physical depreciation, the estimated total electricity production over the entire lifecycle amounts to 3023.4 MWh [4]. The average economic indicators for the project's construction of a solar power plant, considering a 17%-discount rate, investment and operational costs over the entire lifecycle amounting to 7573 thousand UAH, and the current electricity tariff of 2.05 UAH/kWh, are as follows (Table 1).

Table 1

Table 1 - Average economic indicators for the solar power plant construction project (calculated based on [4])

Indicator of the project's economic efficiency	Unit of Measurement	Indicator's value
Net Present Value, NPV	thousand UAH	9206.8
Internal Rate of Return, IRR	%	35
Discounted Payback Period, DPP	years	4.65
Profitability Index, PI	fractional units	2.05
Levelized cost of electricity, LCOE	UAH/kWh	2.37

Based on the obtained project performance metrics, it can be noted that they are entirely acceptable in terms of investment, ensuring the profitability of the solar power plant, a relatively high internal rate of return for the project, and a short payback period. The levelized cost of electricity slightly exceeds the current electricity tariff, which is a common characteristic of renewable energy projects. However, in light of recent increases in electricity tariffs and their expected ongoing growth due to the reconstruction, repairs, and development of Ukraine's energy infrastructure, replacing a portion of purchased electricity with self-generated energy is unquestionably economically viable.

The primary economic risks that may arise during the implementation of the proposed project encompass the following:

- complicated logistics and increased logistical costs due to the war, resulting in delays in the supply of necessary equipment and higher equipment costs;
- increased investment costs for the construction of the solar power plant due to inflationary fluctuations of the hryvnia, as the main equipment for the power plant is purchased abroad.

However, there are factors that will strengthen the enterprise's interest in implementing the project, including the aforementioned consistent rise in electricity prices and corresponding gradual increases in energy expenses for water supply. Overall, the project's implementation will contribute to improving the quality and reliability of water supply to critical infrastructure in the city through energy decentralization and the rationalization of the enterprise's energy consumption.

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MANAGERIAL AND LEGAL ISSUES OF SUSTAINABLE DEVELOPMENT

AN ADAPTED BUSINESS GAME IN THE EDUCATION OF MANAGERS

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"Management" at the bachelor's level involves the study of general cultural and professional competencies, which should be formed during practical training, for this, it is advisable to use group games, which include wide use and interactive formation of practical training (computer simulations, business and role-playing games, specific situations, psychological trainings, etc.). Thanks to game methods and technologies, thanks to this, future managers will learn to model and manage various phenomena and processes in the economic sphere, develop knowledge skills and abilities. The use of adapted business games will contribute to the education of person-oriented managers.

The business game should be considered as one of the social games. Activities which reflect the practical and spiritual activity of a person in real situations of social and economic space.

As is known, social activity implies an active relationship between a person and his environment in a changing world, during which not only reality but also the subjective world of the person itself changes. In the game, as an activity process, the following coordinated elements should be distinguished:

- Ø requirements and interests that obliges participants to activities;
- Ø Tasks solved by the game. They can be practical, aimed at changing existing relationships and related to the acquisition of new knowledge;
- Ø implementation of activities (methods, actions that ensure solving problems);
- Ø An activity object that can satisfy the needs of the participants in the game;

A moderator-assisted participant engagement game situation aims to provide a meaningful individual and group game experience that allows a person to understand the problems of group interaction, predict the development of events, and purposefully influence the current situation. The peculiarity of using the method of business games in the educational process is the possibility of accumulating social experience, norms of behavior, ethics and transferring it to relationships, taking into account the specificity of the game situation.

During experiential learning, attention should be focused on the necessity of a step-by-step process of planning business games, evaluating the results of the game, and analyzing the main problems faced by game moderators and participants.

In the direction of undergraduate education "Management", it should be considered that gaming technologies will be effective only if the educational process itself is based on the unity of research and training, on the principles of self-development of future managers, on an intellectually oriented university educational environment.

The problems of game activity theory and methodology adapted using the example of a business game are interdisciplinary in nature and can be useful in the development of both activity-based dynamics.

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MEASURING COMPANY MANAGEMENT EFFICIENCY THE CASE OF REAL SECTOR OF THE ECONOMY

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Measuring management system efficiency is one of major problems in contemporary world. It's which importance came into focus once again in times of global economic crisis. At this period it was mentioned a lot of times that hired managers were leading their companies to short-term results (which usually were the basement for bonuses estimation) which in a few cases were actually adulterated. This behavior can lead to the following problems. First, pursuit for short-term results can lead to long-term losses which can not be foreseen at the point of first results estimation. Second, it leads to growth of mistrust on the market which in return is decreasing the desire of possible investors or entrepreneurs to risk - due to the fact they feel they can be cheated by management. Those problems can be partly solved in case there would be a reliable instrument for quantitative measurement of management system efficiency which would allow the owner to understand what kind of effect hired managers produce: positive or negative.

One can also figure out a few reasons why the described problem is not solved up to now. In the first place, there is a problem of measuring the results achieved by management system. Those results are not equal to financial results achieved by the organization (though some researches (for example, Ushvitsky, Parakhina and Vasilyev, 2007) suggest they can be considered equal for estimation of managerial efficiency), at least due to the fact there is empirical evidence when companies achieved better results because their employees were ignoring managers' instructions while obeying informal leaders. This means that in order to measure management system performance efficiency one has to somehow extract the results of management system performance from the results achieved by the company. Second, the results achieved by company's management are being measured only in monetary terms though most of contemporary management concepts suggest there are at least some non-financial results (for instance, balanced scorecard) which are influencing company's profits. This is most obvious in

real sector of the economy, so the one measuring management performance efficiency has to deal with a problem of monetary valuation of non-financial results achieved by the system of management. The third problem is the problem of estimating the customer interested in managerial efficiency measurement results. As it was mentioned, efficiency of management performance for managers themselves, investors and entrepreneurs or owners are quite different which should affect measuring instruments used by them. In this paper management efficiency measurement would be looked at from the owner's point of view. This means that maximum efficiency occur in case when company is achieving good results during a long period of time with minimum costs possible. Finally, the fourth problem with measuring managerial efficiency is that not only the results achieved by management system are unclear but the costs produced by management system are hard to be defined as well. Usually management costs are considered equal to cost of management system maintenance from accountant's point of view (Drury, 1997; Kerimov and Minina, 2002; Atkinson, Banker and Young, 2007). But this approach seems somewhat incorrect since there also are costs which occur due to mistakes of the company management which, in authors' opinion, should also be taken into consideration in order to define the level of management efficiency. All of the above means that management efficiency measuring instruments should be developed taking stated problems into account and allows to make main hypotheses:

Hypotheses 1. Efficiency of management system can be quantitatively measured.

Hypotheses 2. Measurement of the effect of management system performance requires estimation of management quality level and considering this level within valuation process.

Hypotheses 3. Management costs include not only explicit costs, but also hidden ones produced by managerial mistakes.

Framework for management system efficiency measuring.

Solution of the managerial efficiency management measuring problem concerning the need for multidimensional management requires a creation of closed list of such dimensions (which would become a framework for processing hypotheses 2). An attempt to develop such a list was made, for example, within balanced scorecard concept (Kaplan, Norton, 1996) or within cultural transformation tools methodology (Barrett, 1997). But the main problem with those concepts in terms of managerial efficiency measuring problem is that they are dealing with the costs and results of company performance rather than performance of management system. But in order to measure results and costs produced by the system of management in case of estimating management system efficiency it is preferable to use a closed list of dimensions focusing on management process and structure of management performance itself. Classical management theory suggests that system of management is operates by means of management functions performance (starting with Fayol, 1930) or as a number of interrelated processes (see for example ISO standards). For quantitative measurement of management performance one needs some rigid construction so a set (closed list) of management functions would be in that case preferable.

For the purpose of this research we had chosen to look at the process of management as a complex performance of management functions. In classical theory of management there are five general functions of management (planning, organization, motivation, coordination and control) (see for example Griffin, 2003; Robbins and Coulter, 2007) the contents of which were revised within post-industrial and

informational economy. For instance, management nowadays should consider dependence from other enterprises present in company's value chain, the situation of over-supply economy (which takes start in 1980 roughly), global focus on sustainable management and some other specific features which are influencing contemporary planning, organization, motivation, coordination and control. At the same time since Fayol the list of management functions itself had been revised and expanded. The following functions were considered as general functions of management by various authors: regulation and analysis (Smolkin, 1999), rationing, record keeping, regulation and stimulating (Paramonov, 1989), forecasting, regulation, record keeping, analysis, policy forming and responsibility (Goldstein, 2006), forecasting and goal setting (Popov, 1973). As we can see the amount of management functions is quite wide taking into consideration there are also special management functions such as logistics, marketing, production, supply etc. This means that in order to use a list of functions as a specification of actions on which management system spends resources the space of management functions should be somehow organized.

At first we need to mention that some functions that management system is performing in contemporary companies are missing from the list above. As it was pointed by Galbraith in "New Industrial Society" the companies are building technostructure; later the phenomena was studied thoroughly and named "development of organizational culture" – a set of informal contracts within the company which allow management achieve its goals using informal methods of management. Henceforth building organizational culture can be considered management function as well. Second, contemporary companies are putting a lot of effort into becoming society-friendly by means of being socially responsible. There is a lot of literature available on the issue of corporate social responsibility and the researches mainly agree that corporate social responsibility normally leads to increase in company performance. This means that forming the basement for corporate social responsibility can also be considered general management function, so the list of general functions should be expanded by those two.

The other thing that needs to be done in order to create a closed list framework for measuring management efficiency is to organize all mentioned by the authors general and special functions in some distinct order. Structuring the above stated functions one can focus on the following idea: some of the functions lead to achievement of management's main goals (planning, organization, motivation, coordination, control, informal organization – building organizational culture and developing corporate social responsibility) while other allow management to perform those general functions better (that is rationing, regulation, stimulation, record keeping, analysis, goal setting, forecasting etc.). The first set of functions henceforth can be addressed as basic general functions while the second set of functions can be named auxiliary general functions; it means, that management functions can be organized into three main dimensions.

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THE ROLE OF ORGANISATIONAL SUPPORT OF THE ENTERPRISE IN MODERN CONDITIONS

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Any business entity is a rather complex mechanism consisting of interconnected links: production, management, etc. Of course, the main aspects of this relationship depend on the chosen industry, specific type of activity, direction of development of the enterprise, goals set by the enterprise, and opportunities. One of the main aspects that every company should consider is organisational support.

Today's realities dictate rather harsh conditions for the existence and development of each business entity. The instability of the external environment and the consequences of the SARS-CoV-2 pandemic have had a significant impact on the functioning of entrepreneurs in all areas of activity. However, the greatest shock was caused by the full-scale invasion of the Russian Federation into the territory of our country. That is why domestic business entities are facing new challenges that require more prompt and modern management decisions. First and foremost, in order to run a successful business, it is necessary to constantly look for new ways to develop and improve the production sector, technological and technical base, organisational, etc. That is why more and more enterprises in our country are prioritising innovative development.

Organisational support of innovation activity is a set of structures and rules that create conditions for the normal course of innovation processes, implementation of plans, maintaining the system functioning at the required level by providing the necessary resources, organising the interrelationships between individual elements and eliminating deviations that may occur in the system. [1]

In the scientific literature, the term "organisational support" is not sufficiently analysed and disclosed. It is not considered as a separate component of development, but is more often equated with financial, information and other types of support. It should be borne in mind that, first and foremost, the organisation of the entire business process

determines its effectiveness.

Organisational support includes several key components. It is the organisation of a well-established management structure. The organisational structure should be properly built from the very beginning of the company's activity, in compliance with all rules and principles, which will help to achieve the goals and objectives in the future. When choosing the path of innovative development, it is necessary to create a separate organisational unit whose activities will be focused only on innovation. In this age of austerity or for small businesses, it does not always make sense to separate a separate department. It may be necessary to assign this function to an existing department or to hire freelancers. As for the former, it is most often created on the basis of the sales, marketing, or in some cases production department. If it is decided that this function will be performed by an individual, whether an employee or a freelancer, it is necessary to clearly define their responsibilities and show in the management structure to whom they should report on their performance.

The functions that can be outsourced include: accounting and tax calculation; marketing communications (online and offline); legal support; human resources management; information systems and database management; logistics and product delivery management. [2]

Organisational support also includes the creation of a regulatory framework for the enterprise. A fairly common problem is the obsolescence of regulations, instructions, and standards that have not been changed for a long time, do not correspond to the company's strategy, goals, objectives, and generally do not take into account the requirements of modern business. This is a rather unfortunate practice that needs to be eliminated. This is especially true for companies that are following an innovative path of development. Each regulatory document should be tailored to the current realities, specific industry and scope of the enterprise. At the same time, each company needs to have a structural unit, of course, depending on its size, it may be a separate department or a single person who will be responsible for this. Each employee should clearly know what their responsibilities and rights are, what sanctions they will face if they fail to comply with them, etc.

A particularly important component of organisational support is the provision of all the necessary material and technical facilities. Each employee should be able to perform all his or her functions without any obstacles, and this will be facilitated by the availability of all the necessary equipment and materials. In the era of the 21st century, with a sufficiently high level of technical development and a sufficiently diverse representation of its results in the domestic and global markets, ensuring these conditions should not be a problem for any enterprise.

The above-mentioned key components of organisational support are the basis for establishing the most efficient operation of an enterprise. At the same time, the insufficient disclosure of the importance of organisational support for the innovation activities of enterprises requires further analysis and deeper interpretation. The growing riskiness of the business environment and its turbulence require business entities to make more prompt and rational management decisions that take into account their capabilities and resource provision, on the one hand, and the achievement of their goals and objectives, on the other.

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SOCIAL AND CULTURAL ISSUES OF SUSTAINABLE DEVELOPMENT

USING VIRTUAL REALITY BUSINESS GAMES IN ENTREPRENEURSHIP EDUCATION: A CASE STUDY WITH VIRTONOMICA

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Current global financial crisis had revealed that one of the main problems with contemporary economic system is the fact that people are not interested in being entrepreneurs and even when they are these protoentrepreneurs are completely unaware of the problems appearing when they come out of an auditorium and walk in the real world. In terms of teaching entrepreneurship we have to take into consideration the following statements. First, entrepreneurship can not be taught only by lecturing but on the other hand future entrepreneur needs some theoretical knowledge which appears to be useful according to the research that was carried out already (see for example Cyert&Dill, 1964 or Alden, 200). Second, entrepreneurship cannot be taught only by using learning by example in terms of case study (Mintzberg, 2008). It should be mix of both theory and practice while one needs to remember that we can not make an entrepreneur out of everyone in the classroom. One of the main tools of providing every student a possibility of trying him or herself as an entrepreneur is using virtual simulation which are the most close imitation of reality a professor can reach within the auditorium.

Literature review.

The problems of entrepreneurial education within higher educational institutions is pretty high-developed within modern research and in order to move forward to our results we need to mention quite a few authors dealing with education for entrepreneurship. There is S.Aaronson who was looking at the contemporary contents of entrepreneurship education (Aaronson, 1992 and 1996); Chris Argyris studying limitations of case study method (Argyris, 1980), A. Bhide researching evolutionary issues of entrepreneurship and its application to education (Bhide, 2000), Chetkovich & Kirp with their study of novitative training in entrepreneurship (Chetkovich, Kirp, 2001), Ann Harrington researching issues of e-curriculum and its specific features in global economy education (Harrington, 2001) and so on. Between famous researches dealing with entrepreneurship education we can mention the following authors concerned with the said issue: Chelyshkova with the ideas of quality measurement in entrepreneurship education (Chelyshkova, Zvonnikov 2007), Zhiltsov as a researcher of short-term courses in entrepreneurial education (Zhiltsov, 2009) and many others. At the same time we do not have a certain idea about what one should teach within entrepreneurial education in terms of using virtual reality games which became the topic of research presented.

Research results.

The structure of national economics and management (including entrepreneurship education) includes lecturing (auditorium education which is part lectures and part seminars) and self-study that should take equal amount of time. At the same time entrepreneurship education in contemporary country is usually highly academician which means there is a lot of working with the lecturer. Recently case studying became the main pedagogical tool in entrepreneurship higher education but the problem of entrepreneurship self-studying for Management, Marketing and Commerce majors who are not dealing with family business is a big problem. Universities can not provide a place for entrepreneurship training for all those majors due to financial limitations while most of the students themselves have no place for entrepreneurial practice as well.

Due to the reasons mentioned above we have started using virtual economic simulators for entrepreneurial education. We are working with www.virtonomica.ru which is an online game where one can chose the field of entrepreneurial activity, a place for the business and of course the way of running it. The game provides a player with virtual money which is enough for start-up. The assignment which was given to students was to play the game during 2 or 3 month and than write a report analyzing achieved results which should include graphs and tables that can be printed from Virtonomica itself. We have got the whole range of results starting with huge losses which were explained by the following main reasons: did not pay enough attention to the business (41%), did not pay attention to staff quality while trying to cut costs (39%), chose a wrong place for business (37%), did not provide required quality for customers (38%) (there could have been more than one answer) (see figure 1).

As for good virtual entrepreneurs who achieved 5 maximum profits we have asked them to run a roundtable explaining their success where (which we considered very interesting) they could not actually explain the reasons. According to their explanations they were trying to grow gradually while keeping an eye on customer reaction. Most of them also mentioned that they did not really care about the profit they just liked the game.

The final report on the gameis including the following parts:

- tables (provided by Virtonomica game online portal itself);
- graphs (provided by Virtonomica game online portal itself);
- description of business opened (out of opportunities, provided by Virtonomica);
- concluding part which is the most essential and is the topic for final roundtable.

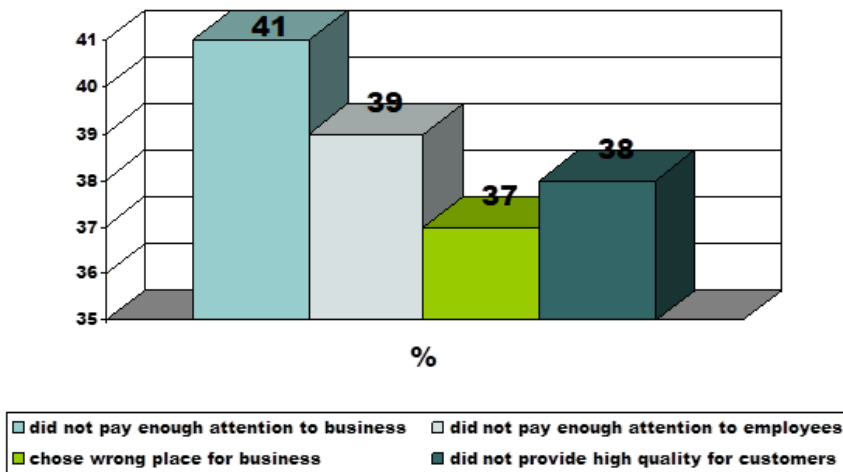


Fig. 1

This experience shared by students have allowed us to prove two main thesis of entrepreneurship:

(1) entrepreneur can achieve better results with the same resources and

(2) entrepreneur is usually concerned with the idea, not the profit. Students have also shown better results at the final test on entrepreneurship which makes us think we should continue this type of entrepreneurial education this year as well.

Conclusions.

The use of Virtonomica as a basement of self-study had revealed that this instrument allows students to have some feeling of real entrepreneurship environment. They had as well paid attention to the need of being in touch with business, got some sense of making a mistake. It was also very interesting to find out that students became more aware of the risks and therefore noticed that one should think twice before making a decision on becoming an entrepreneur. Those thinks turn us towards continuation of this research in the current academic year and father.

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ENVIRONMENTAL AND TECHNICAL ISSUES OF SUSTAINABLE DEVELOPMENT

PREDICTING TRENDS IN DIGITAL BUSINESS INNOVATION DEVELOPMENT

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Purpose/ Research Question: Existing research of digital startups is mainly focused on the issues of innovation development and market acquisition, which are being studied by a number of scholars (Bell et al., 2004; Ribai et al, 2018) as a platform for efficient internationalization. The other research direction in assessment of startup efficient international development lies in the field of evaluating their human workforce, which is being seen as the key resource of emerging digital sphere companies (Alvarez & Busenitz, 2001; Novak & Bojnev, 2005).

The mentioned and other relevant factors were proven to be an important driven of digital SME development, the evidence behind was coming mainly from the startup companies themselves rather than evaluating an outside estimation of companies' state of development. In this study we have acquired the original data from the experts of venture capital funds, whose job is to pre-assess startups prior to investment analytics. Thus we have acquired a different angle, which allowed to see the level of success of digital startups in their internationalization.

Design/ Methodology/ Approach:For the purposes of this study we have used the evaluation forms from a venture capital fund, filled by the experts that contact the companies on pre-assessment stage that is performed by investment analytics. The experts hold a 30-minutes long interview with the startup owners (digital startups only were involved) which has a brief script, and fill out the evaluation form afterwards; some information filled by the owners of digital companies is available to the experts prior to an interview. The interviewers were the people from industry with IT-relevant experience.

The interviews are being run in a form of unstructured interviews, when the interviewer has no specific guidelines, restrictions, predetermined questions, or list of options. The interviewer asks a few broad questions to engage the respondent in an open, informal, and spontaneous discussion. The interviewer also probes with further questions and/or explores inconsistencies to gather more in-depth information on the topic. Unstructured interviews are particularly useful for getting the stories behind respondents' experiences or when there is little information about a topic, and this is the reason why venture funds prefer this form of interaction with SMEs rather than giving a script to an interviewer – in about half of the cases significant information would have skipped the investment analytics if it was not for the interview. The interviews are being held in line with the instructions given, for instance, by Gubirum and Holstein (2001).

(Expected) Findings/Results: The analyzed sample included over 250 startups

with international operations, which were interviewed between 2017 and 2019; the results of the interviews were provided by the experts who disguised the companies which were being interviewed

Main findings

Mainstream internationalized solutions developed by the digital startups were focused on B2C, C2B2C, customer services and consumer behavior developments, while EdTech and HRTech solutions were rarely internationalized; this can be possibly explained by the fact that language issues play major role in both EdTech and Human resources Tech solutions, so they can not be easily transferred abroad.

At the next stage of the research we have assessed the level of profitability of the companies in question, relating the key market to the level of economic efficiency (positive means the startups on the zone are profitable, while the negative ones at the point of the interview produced losses).

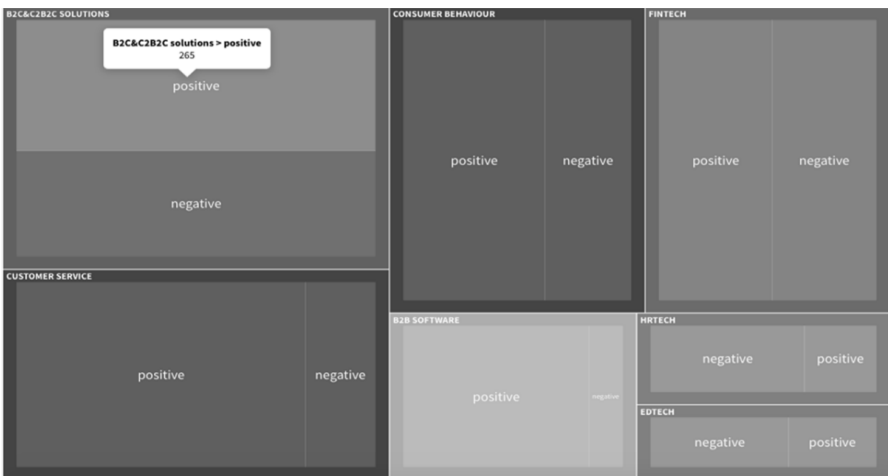


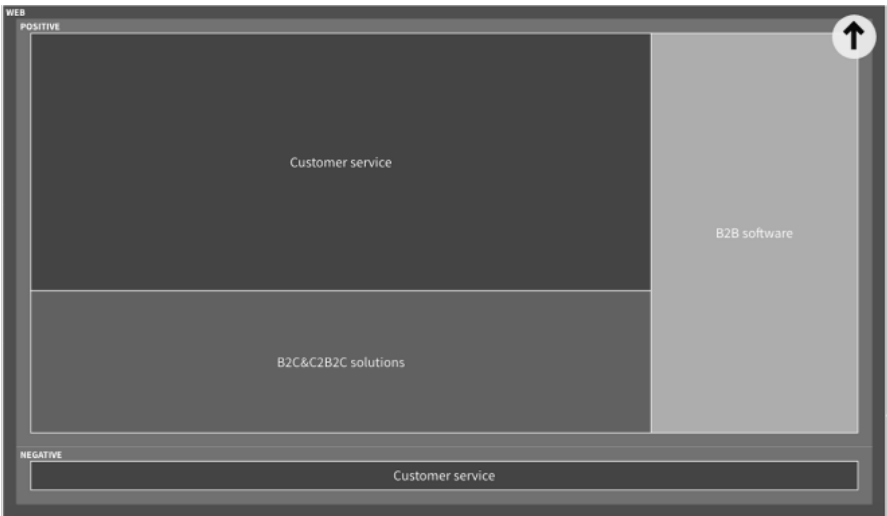
Fig. 1. Graphical analysis of profitability structure in relation to chosen international market

According to the indicated data, the profitability is more frequently found in B2B software systems, customer service solutions and consumer behavior online services, while again both EdTech and HRTech are mainly unprofitable if the company decides to internationalize. On the opposite side, FinTech solutions, which were not a mainstream type, appear to be of the same probable profitability as B2C, C2B2C products, indicating less significant limitations in this part of digital sector.

Further we have assessed the main technologies implemented by the digital startups, the results of which can be seen in Fig.2 a,b.



a)



b)

Fig. 2. Graphical analysis of profitability structure in relation to type of the basic implemented technology

The majority of analyzed startups appear to use either big data technology or artificial intelligence, why such technologies as blockchain or virtual reality appeared rarely in internationally oriented digital SMEs. For the technologies, the majority of companies analyzed by the venture fund experts, were profitable – which was the opposite for the blockchain or virtual reality technologies. Hence it can be stated,

that for the digital sphere it is more likely for a startup to succeed if it uses the wide spread and well-developed technology which features rapid growth on international markets rather than to focus on specific solutions that require additional equipment (the case of both blockchain and virtual reality).

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THE IMPORTANCE OF RENEWABLE ENERGY FOR SUSTAINABLE AGRICULTURE FOOD PRODUCTION

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The growing global population, coupled with the challenges posed by climate change and resource depletion, has made the pursuit of sustainable food production a critical imperative. Renewable energy sources play a pivotal role in achieving this sustainability goal by addressing energy-related concerns within the agricultural sector. The paper aims to highlight the significance of sustainable energy use in agriculture and food production. This energy is used for different farming activities, including land preparation, irrigation, harvesting, transportation, and more. Agriculture consumes significant fossil fuels to extract groundwater for irrigation, resulting in up to 30% of total GHG emissions, so this is why the introduction of renewable energy is extremely urgent to solve this issue [1]. For this purpose a variety of renewable energy technology and their applications can be used.

The most appropriate renewable energy resources can include solar, wind, hydro and biomass energy. The most appropriate applications of renewable energy systems are Solar Photovoltaic (PV) Systems, Wind Turbines, Biomass Energy and Agrivoltaics.

One of the most promising technologies that can be used for the sustainable food production is Agrivoltaics systems. It involves growing crops and producing solar electricity on the same land. This process offers various benefits, such as reducing water stress on plants, increasing crop yields, reducing heat stress on the land caused by solar panels, and improving water use efficiency by reducing evapotranspiration from crops. Agrivoltaics utilize solar radiation more efficiently than traditional mono-crop farming, which has the potential to increase food and energy output per unit of land. Furthermore, it is a climate-smart technology that enables to adapt to climate change while enhancing ecosystem services. Compared to growing crops or producing solar energy alone, Agrivoltaics offers a more sustainable and effective solution [1].

Nowadays a lot of countries around the world have experience using different renewable energy applications for sustainable food production. India is one of these countries to illustrate this. Due to its well-developed agriculture sector and specific climate conditions power irrigation has become increasingly popular. The use of solar pumps in agricultural fields not only reduces greenhouse gas emissions but also enhances farmers' livelihoods. Solar pumps are cost-effective, require minimal maintenance, and provide a reliable energy source for irrigation. As a result, crop yields and farmers' incomes increase. India has the most arable land worldwide available for cultivation. For irrigation, around 30 million groundwater pumps are utilized, with 20 million connected to the electricity grid, 10 million running on diesel, and 3.9 million pumps powered by solar energy. The adoption of solar-power irrigation has reduced the burden of over 150 million USD towards electricity subsidies for agriculture while also decreasing the oil import bill by reducing diesel consumption by 1.38 billion litres per year. Pumps consume about 5.52 billion liters of diesel per year, resulting in 15.4 million tonnes of CO₂ emissions.

Another country which is known for its innovative agriculture is the Netherlands. Wind-powered greenhouses, equipped with advanced ventilation systems and temperature control, have become common in this country. Wind turbines generate electricity to power these greenhouses, reducing their carbon footprint while ensuring optimal growing conditions year-round. According to preliminary figures from the Dutch Central Bureau of Statistics in 2022, the Netherlands generated 20% more electricity from renewable sources compared to the previous year. In contrast, energy production from fossil sources decreased by 11%. Overall, 40% of total electricity production in the country 2022 was derived from renewable sources. This technology has allowed the Netherlands to increase crop production efficiency and reduce reliance on fossil fuels [5].

Meanwhile, some countries have already used renewable energy technology in the agriculture sector, in other ones they are not widely spread. To accelerate their adoption for sustainable food production the following efforts are needed:

- expanding access to renewable energy technologies for smallholder farmers;
- fostering research and development in energy-efficient agricultural practices and technologies;
- promoting the integration of renewable energy sources into food processing and distribution;
- investing in energy storage solutions to ensure a continuous and reliable energy supply for agriculture;

According to the above we can conclude that renewable energy plays a pivotal role in promoting sustainable food production by reducing greenhouse gas emissions, increasing energy efficiency, and fostering sustainable farming practices. To foster the involvement of renewable energy technology in the process of growing of plants, food process and distribution, the above-proposed actions should be done.

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THE ELECTRICITY DEVELOPMENT IN THE ECONOMIC SECTOR OF HOUSEHOLDS WITH ACCOUNT THE PRINCIPLES OF SUSTAINABLE DEVELOPMENT

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Today's households face significant challenges in the field of energy, caused by the war in Ukraine and global trends in the reduction of reserves of fossil energy resources. In this context, the strengthening of energy and resource security, increasing the general level of energy efficiency and ensuring a stable and effective energy balance of the national economy are gaining special relevance.

The role of energy at the household level is to ensure the functioning of consumers by powering various devices, lighting, heating, cooling, etc. However, traditional energy generation (based on fossil fuels) has negative consequences, such as greenhouse gas emissions, monopoly energy infrastructure, and rising energy costs. However, until now, the speed of development of the renewable energy sector, both in terms of enterprises and households, is slow enough to meet the requirements of state plans and international obligations [1]

Identifying trends in household electricity consumption is an important aspect of energy industry research. Understanding and analyzing changes in electricity consumption allows us to determine the factors that affect energy efficiency and provide the basis for the development of effective energy-saving strategies [2].

Energy efficiency and the use of renewable energy sources is a factor that positively affects the change in electricity consumption. Indicators of the cost of renewable and non-renewable sources, volumes of generation, distribution, and transportation to end consumers are important factors in the formation of electricity prices. The use of renewable energy sources, such as solar and wind energy, helps to replace traditional energy sources and reduce the consumption of electricity with a harmful impact on the environment. Balancing the system of electricity production from traditional and renewable sources allows for to optimization of long-term electricity prices and the minimization of tariffs for the final consumer [3].

Identification and analysis of general and specific trends in electricity generation/consumption are important for developing effective energy-saving strategies and improving energy efficiency in households. The change in behavioral characteristics and habits of consumers is another significant factor affecting electricity consumption. Awareness of the importance of energy-efficient consumption and optimizing the use of electricity can lead to a reduction in consumption. For example, it is important to turn off the light when it is not needed, to turn off electrical appliances in standby mode, to optimally regulate the temperature in the room, to use washing machines and dishwashers at full load, to close the windows at night with curtains to reduce heat loss through the windows, etc. [4].

One of the important aspects is the structure of electricity production in Ukraine. During this period, the structure consisted of various energy sources such as thermal energy, nuclear energy, and renewable energy sources (RES). Thermal and nuclear power

continued to be the main source of electricity generation, generating about 90% of the total. However, to ensure energy independence, it is necessary to focus on individual renewable energy sources.

Forecasting electricity consumption in Ukrainian households after the end of the war is a difficult task, as there are many factors that can affect this process. After the end of the war, electricity consumption in Ukrainian households may change depending on several factors. A positive scenario is the recovery of the economy and an increase in the standard of living of the population. Provided that investments are attracted, a positive trend toward the growth of electricity consumption due to the growth of aggregate demand is predicted. The negative scenario is a long-term post-war recession, slow growth of population welfare, and restoration of generating capacities.

In order to create a reliable energy system built on the basis of households, it is recommended first of all to create a paying demand among the population and economically favorable conditions for the construction of private solar and wind energy sources.

This publication was prepared under the research project “Formation of economic mechanisms to increase energy efficiency and provide sustainable development of renewable energy in Ukraine’s households” (No. 0122U001233), funded by the National Research Foundation of Ukraine.

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REGIONAL FEATURES OF SUSTAINABLE DEVELOPMENT

CASE STUDIES OF DIFFERENT COUNTRIES ON THE DEVELOPMENT OF ENERGY EFFICIENCY AND RENEWABLE ENERGY IN HOUSEHOLDS: GUIDELINES FOR UKRAINE

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Studying different countries' cases is very important for the development of energy efficiency and renewable energy in households in Ukraine for several reasons (Schonhardt, 2023; Psaropoulos, 2022; Ukraine, 2020; Sustainable, 2023):

- It can help Ukraine to reduce its dependence on imported fossil fuels, especially natural gas from Russia, which has been a source of political and economic instability and conflict in the past.
- It can help Ukraine to diversify its energy mix and increase its energy security, resilience, and self-reliance, as well as reduce its greenhouse gas emissions and environmental impacts.
- It can help Ukraine to learn from the best practices and experiences of other countries that have successfully implemented renewable energy and energy efficiency projects in various sectors, including housing, and to identify the opportunities and challenges for scaling up such projects in the Ukrainian context.
- It can help Ukraine to attract more investments, create more jobs, and stimulate more innovation and competitiveness in the renewable energy and energy efficiency sectors, which can contribute to its economic growth and social development.

Let's consider such cases of some countries.

Australia: The Clean Energy Regulator, a government agency that administers the Renewable Energy Target scheme, showcases various examples of small-scale renewable generation projects in different sectors, including not-for-profit, education, housing, and community. Some of the benefits of these projects include reducing greenhouse gas emissions, saving on energy bills, increasing energy independence, and creating local jobs (Renewable, 2023).

South Africa: A study by researchers from the Durban University of Technology explores the sustainable energy transition strategies for renewable and low carbon grid electricity generation and supply in line with the Paris Agreement. The study reviews the current status of renewable energy sources in South Africa, such as solar, wind, hydro, biomass, and geothermal, and proposes a roadmap for achieving a sustainable energy mix that minimizes environmental and economic impacts while ensuring quality,

stability, and flexibility of the electricity system (Kabeyi & Olanrewaju, 2021).

United Kingdom: The Local Government Association provides a range of resources and guidance for local authorities to plan and implement climate action initiatives, including energy efficiency and renewable energy projects in housing and other sectors. Some of the examples include retrofitting existing buildings to improve insulation and ventilation, installing solar panels and heat pumps, promoting community-owned renewable energy schemes, and supporting low-carbon housing developments (Climate, 2023).

Scotland: The Energy Saving Trust, an independent organization that promotes energy efficiency and renewable energy solutions, features several case studies of households that have adopted sustainable energy measures to reduce their carbon footprint and save money. Some of the measures include installing smart meters and thermostats, switching to LED lighting and appliances, using biomass boilers and wood stoves, and joining green tariffs and schemes (Case, 2023).

Here are some conclusions for each of the cases about how the experience of the mentioned countries can be applied in Ukraine:

- **Australia:** Ukraine can learn from Australia's Renewable Energy Target scheme, which provides incentives and certificates for small-scale renewable generation projects in different sectors, including housing. This can help Ukraine to increase the share of renewable energy sources in its electricity mix and to reduce its carbon emissions. Ukraine can also benefit from the examples of successful projects that showcase the economic, social, and environmental benefits of renewable energy and energy efficiency measures.

- **South Africa:** Ukraine can learn from South Africa's sustainable energy transition strategies, which aim to achieve a low carbon and renewable energy mix that minimizes the impacts on the environment and the economy while ensuring the quality, stability, and flexibility of the electricity system. Ukraine can also adopt some of the recommendations from the study, such as increasing the investment and research in renewable energy sources, improving the grid infrastructure and integration, enhancing the policy and regulatory framework, and raising the public awareness and participation.

- **United Kingdom:** Ukraine can learn from the United Kingdom's local government initiatives, which provide guidance and support for local authorities to plan and implement climate action projects, including energy efficiency and renewable energy measures in housing and other sectors. Ukraine can also follow some of the best practices and examples from these initiatives, such as retrofitting existing buildings, installing solar panels and heat pumps, promoting community-owned renewable energy schemes, and supporting low-carbon housing developments.

- **Scotland:** Ukraine can learn from Scotland's Energy Saving Trust, which features several case studies of households that have adopted sustainable energy measures to reduce their carbon footprint and save money. Ukraine can also apply some of the tips and advice from these case studies, such as installing smart meters and thermostats, switching to LED lighting and appliances, using biomass boilers and wood stoves, and joining green tariffs and schemes.

This publication was prepared under the research project “Formation of economic mechanisms to increase energy efficiency and provide sustainable development of renewable energy in Ukraine’s households” (No. 0122U001233), funded by the National Research Foundation of Ukraine.

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INFORMATION SYSTEMS AND TECHNOLOGIES IN TOURISM: EXPERIENCE FROM THE EUROPEAN UNION

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Tourism is a linchpin of the European Union's economy, accounting for a substantial portion of its GDP and providing millions of jobs. In 2019 alone, the EU welcomed over 700 million international tourists, generating nearly €400 billion in revenue.

However, the COVID-19 pandemic has severely disrupted the tourism sector, causing a decline of 70% in international arrivals in 2020 and a loss of €172 billion in GDP.

To cope with this unprecedented crisis and prepare for recovery, the EU has been investing in digital transformation and innovation in tourism, leveraging the potential of

information systems and technologies.

Recent years have witnessed a remarkable transformation in the tourism sector, largely attributed to the integration of cutting-edge information systems and technologies. These innovations have fundamentally altered how tourists plan, experience, and share their journeys.

One of the most notable impacts has been on reservation and booking systems. Online platforms and mobile applications have streamlined this process, offering travelers an array of choices and real-time availability. Information systems now have the capability to provide tailored recommendations based on individual preferences, past travel history, and behavioral patterns. This not only enriches the overall travel experience but also fosters repeat visits.

Sophisticated Destination Management Systems (DMS) have been implemented across European destinations to efficiently allocate resources, monitor tourist flows, and analyze data for sustainable growth and development. The EU has harnessed the power of digital marketing and social media platforms to showcase its diverse tourism offerings. This has facilitated targeted marketing campaigns and heightened engagement with potential travelers worldwide.

Several EU cities and regions have embraced the concept of "Smart Tourism Destinations," integrating information technologies to enhance the quality of life for residents and the experience of visitors. Examples include Barcelona, Copenhagen, Helsinki, Lyon, and Malaga, which have been awarded as European Capitals of Smart Tourism for their achievements in accessibility, sustainability, digitalization, cultural heritage, and creativity.

While the integration of information systems has brought tremendous benefits, it is essential to address challenges such as data privacy, cybersecurity, and ensuring equitable access to technology to foster inclusive and sustainable tourism growth.

It can be assumed, that the European Union is poised to continue leading the way in leveraging cutting-edge technologies, including artificial intelligence, virtual reality, and blockchain, to further enhance the tourism experience.

In conclusion, the European Union's experience with information systems and technologies in tourism sets a precedent for the global community. By embracing innovation, confronting challenges, and prioritizing sustainable practices, we can ensure that the tourism industry continues to flourish and contribute to the prosperity of nations.

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EDUCATIONAL INSTITUTIONS AND PEDAGOGY FOR SUSTAINABLE DEVELOPMENT

MARITIME EDUCATION IN GEORGIA: CHALLENGES AND PROSPECTS

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Maritime education in Georgia has undergone significant developments in recent years, playing a crucial role in the country's economic growth and international trade.

In the course of analyzing the development of educational services at the Batumi Navigation Teaching University, the challenges faced by the maritime education sector and the promising prospects that lie ahead were identified.

Among the main challenges to the development of maritime education are the following.

1. The first challenge lies in the development of state-of-the-art infrastructure and facilities that are crucial for practical training in maritime education. This includes simulators, navigation equipment, and modern classrooms equipped with the latest technology.

2. Ensuring a highly qualified and experienced faculty remains a constant challenge. Recruiting and retaining experts in various maritime disciplines can be competitive, and requires continuous efforts to provide incentives for professional growth.

3. Adhering to international standards and regulations in maritime education is imperative. Keeping up with evolving global maritime policies and ensuring compliance can be demanding, requiring constant vigilance and adaptability.

4. English proficiency is vital in the maritime industry. Ensuring that students have a strong command of English is an ongoing challenge, as it directly impacts their ability to communicate effectively at sea and in international ports.

Among the main prospects for the development of maritime education, the following can be emphasized.

1. Collaborative partnerships with renowned maritime institutions worldwide present a tremendous opportunity for knowledge exchange and joint research initiatives. This can help elevate the quality of education and expose students to global best practices.

2. Embracing cutting-edge technologies such as virtual reality simulators and advanced navigation systems offers exciting prospects for enhancing practical training. This not only prepares students for real-world scenarios but also aligns with the industry's technological advancements.

3. Closer collaboration with the maritime industry is essential for tailoring education to industry needs. Internship programs, guest lectures, and joint projects can bridge the gap between academia and the practical demands of the field.

4. Encouraging diversity in enrollment and fostering an inclusive learning environment is a prospect that aligns with global trends. Embracing a diverse student

body can bring fresh perspectives and contribute to a richer educational experience.

While maritime education in Georgia faces its share of challenges, there are promising prospects on the horizon. With strategic investments in infrastructure, a focus on international collaboration, and a commitment to technological integration, Batumi Navigation Teaching University is poised to play a pivotal role in shaping the future of maritime education in the region. By addressing these challenges head-on and capitalizing on emerging opportunities, we aim to prepare our students for successful and fulfilling careers in the maritime industry.

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