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## Strategic perspectives of design development in Ukraine: theory, practice and development innovations

### Perspectivas estratégicas del desarrollo del diseño en Ucrania: teoría, práctica e innovaciones de desarrollo

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#### Abstract

The modern development of the information and globalized society causes new requirements for design. The purpose of the article is to analyze the strategic perspectives of design in modern Ukraine, to investigate certain theoretical and practical aspects of its development, the possibility of introducing innovations. General scientific methods were used. The forecasting method also made it possible to highlight the problem of the further transformation of design in the world and in Ukraine. In the results, new ideas and prospects for the development of design, caused by the restructuring of its concept from the classical to the neoclassical stage, innovative solutions in the development of the design environment are traced. The prospect of further harmonization of EN, ISO, IEC standards with Ukrainian samples has also been proven. The further development of design as an educational specialty is a promising direction, the effectiveness of which can be controlled thanks to the mechanism of accreditation of

#### Resumen

El desarrollo moderno de la sociedad de la información y globalizada provoca nuevos requisitos para el diseño. El propósito del artículo es analizar las perspectivas estratégicas del diseño en la Ucrania moderna, investigar ciertos aspectos teóricos y prácticos de su desarrollo, la posibilidad de introducir innovaciones. Se utilizaron métodos científicos generales. El método de previsión también permitió poner de relieve el problema de la transformación ulterior del diseño en el mundo y en Ucrania. En los resultados se trazan nuevas ideas y perspectivas para el desarrollo del diseño, causadas por la reestructuración de su concepto de la etapa clásica a la neoclásica, soluciones innovadoras en el desarrollo del entorno del diseño. También se ha demostrado la perspectiva de una mayor armonización de las normas EN, ISO, IEC con muestras ucranianas. El desarrollo ulterior del diseño como especialidad educativa es una dirección prometedora, cuya eficacia puede controlarse gracias al mecanismo de acreditación de los programas educativos. Se sugiere recurrir a

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educational programs. It is suggested to turn to informal education, which is more dynamic than classical university education, and allows you to acquire not only professional, but also business skills. The conclusions showed that further transformations of design will influence the creative development of designers.

**Keywords:** design, Ukraine, digitalization, innovation, higher education.

## Introduction

Modern social development, the widespread integration of digital technology in everyday life bring major changes in the functioning of all spheres of human activity. In particular, it also refers to the new horizons of the use of design, because modern consumers need not only the functionality of products (performance of direct duties) but also in the aesthetic appearance and compliance with a certain style. Thanks to this, some world-famous corporations have now earned themselves a certain image, which acts as an advertising business card, as the quality of their products. Similar processes are also characteristic of architecture, industrial production, services (including digital and the Internet).

Accordingly, the modern attention of scientists to the field of design, its likely ways of development, and the prospects for integration with the digitalization of society are relevant vectors for research. Equally important are the scientific aspects of design studies, their disclosure using pedagogical methods, the introduction of updated national standards that meet the requirements of modernity, etc. All this only adds to the interest of design problematics, which is especially important in Ukraine under specific circumstances. Russian aggression of 2022 has paid attention to problematic moments of design functioning as separate directions of the educational, business community of Ukrainians' everyday life. Along with the demand for everything Ukrainian, it causes the necessity of the development of different spheres of design, at least allocation of ways for further development and improvement of this sphere.

The aim of the article is to analyze the strategic prospects of design in contemporary Ukraine, to explore some of the theoretical and practical aspects of its development, the possibility of innovation. Accordingly, the main objectives of the study are as follows:

la educación informal, que es más dinámica que la educación universitaria clásica y permite adquirir no sólo competencias profesionales, sino también empresariales. Las conclusiones muestran que las nuevas transformaciones del diseño influirán en el desarrollo creativo de los diseñadores.

**Palabras clave:** diseño, Ucrania, digitalización, innovación, enseñanza superior.

1. To trace new ideas and competencies that are used in the restructuring of the design concept at the current stage of development.
2. To characterize the administrative and legal aspect of design development in Ukraine.
3. To explore the possibilities of design as an element of the creative economy for Ukraine.
4. Analyze innovative solutions in the development of design environment.

## Theoretical Framework or Literature Review

Given the comprehensive digitalization and globalization, the question of strategic development of design activities is relevant and of interest to many European and American scholars. Calabretta & Kleinsmann (2017) through the lens of the technological revolution investigated the main changes taking place in the field of design. The researchers note that the active development of digital technology has influenced changes in the way companies to innovate and create new products: "as a key function of innovation, design has also evolved to better support companies in dealing with the speed and complexity of technological, economic, and societal change" (Calabretta & Kleinsmann, 2017, p. 292). Camburn et al., (2017), through the lens of integrated analysis, highlighted the major ongoing innovative changes taking place in today's design environment. Gemser & Barczak (2020) explored features of future design development through an analysis of the likely design trajectories of the field. Hay, Cash & McKilligan (2020) characterized the problem of cognitive design analysis. The researchers note that current environmental trends in the use of artificial intelligence constitute major long-term challenges to the development of cognitive design systems. Magistretti, Dell'Era & Verganti (2020) provide a detailed review of the technology development literature to demonstrate how companies can develop technology to promote innovation. Verganti,

Vendraminelli & Iansiti (2020) outlined key innovations in the era of artificial intelligence. Meanwhile, May et al., (2021) characterized the importance of design in shaping social innovation. Micheli et al., (2018) investigated the problem of design thinking formation. Syomka (2017) analyzed the specifics of the use of bionics in the design environment of Ukraine. The researcher notes that this style is predominantly characterized by the use of light colors, atypical zoning techniques, structural system of construction, modular principle. Varyvonchyk & Kulyk (2022) described the current innovative design trends in Ukraine. Researchers note that the widespread use of modern innovative methods of modeling and design, the use of unique techniques of non-traditional materials provide unlimited opportunities for the designer's activity. Despite this, the problem of the modern and economic potential of design in Ukraine and its improvement remains understudied. Also debatable is the problem of legislative regulation of design in Ukraine, its standardization. This aspect requires further analysis. In addition, the problem of the development of non-classical design and coverage of new competencies of designers in connection with the digitalization and globalization of society is understudied.

### Methodology

The study is formed based on general scientific and specifically scientific research methods. In particular, among the general scientific methods used analysis, synthesis, concretization, forecasting. By means of the analysis, the main subject of the research (design development strategy) is divided into smaller parts (research of the administrative and legal aspect of design development in Ukraine, analysis of innovative creative economy through the prism of design, etc.). Based on synthesis the above-mentioned elements are united and own hypotheses concerning strategic development of design in Ukraine are formed. The problem of further transformation of design in the world and Ukraine is reflected through the use of forecasting.

The main method of the study was the method of content analysis of scientific literature. The use of this research approach made it possible to systematically review scientific texts on the subject, identify current expert assessments of the state of development of the design field in Ukraine, and identify and compare it with the capabilities of modern European countries and the United States. Thanks to the systematic

description and categorization of scientific literature, it was also possible to realize the purpose and objectives of the study in accordance with various aspects of evaluative judgments and research hypotheses.

Between specially scientific methods the legal and historical principles of research are allocated. In work legal methods are applied through a prism of use of a dogmatic approach for an explanation of reality. Of separate importance was the use of the historical method by which the development of design from the classical to the non-classical period is reflected.

### Results and Discussion

#### **Restructuring of the design concept from classical to the non-classical stage of development: new ideas, new competencies**

Nowadays design is recognized as an integral part of the innovative activity of most modern organizations and enterprises. Newly established organizations and companies recognize that in the conditions of global competition in Ukraine and internationally they must constantly innovate, develop, shape new products and services, and focus on the differences of their work from their competitors, winning new customers and retaining old ones. At the same time, in order to remain competitive, today's design institutions must keep up with innovative changes (Borgianni et al., 2020). Calabretta & Kleinsmann, 2017).

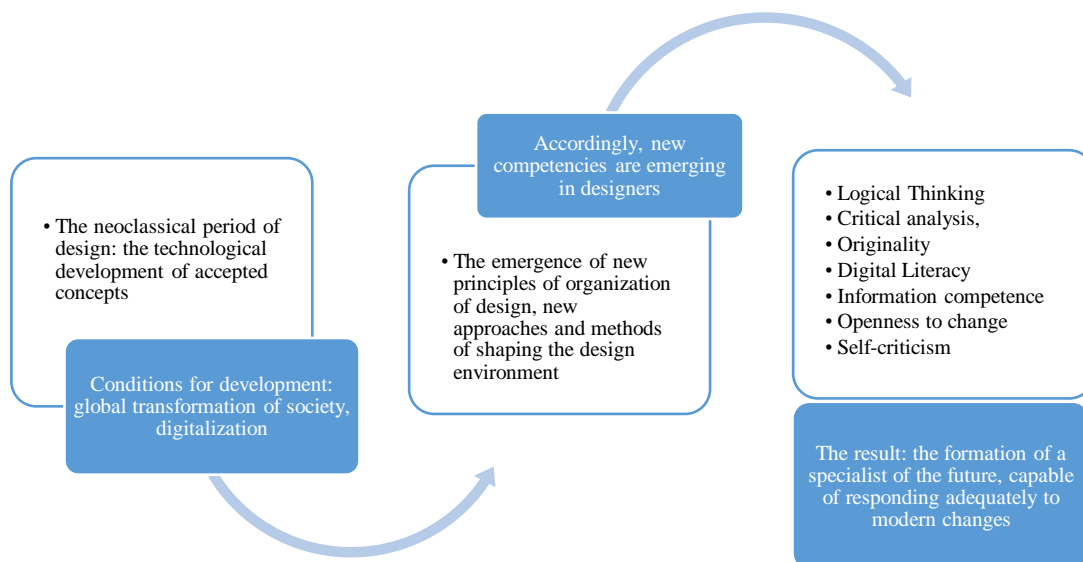
Contemporary researchers have noted that among the significant qualities of "classic" design are dominated by the principles of economic manufacturability, engineering functionality, financial pragmatism, sales growth trends, and gross margin (Camburn et al., 2017). For this reason, the competence of designers is measured by the depth of their practical mastery of these categories and the skill of being able to find an organic combination of often conflicting requirements. However, according to Plantec et al., (2019), an unplanned reliance on industrial mechanisms of mass production has entailed a crisis of competence for designers. At the same time, the loss of a human reference point during the design and moral relativism in design goals have influenced conformism to become almost the only means of professional communication and human socialization through the lens of design activity. Modern transformational changes require original solutions from designers, while at the same time, the universal set of humanitarian guidelines has led to the fact

that “classical” design as the highest form of theory and practice has receded to second place (Dell’Era et al., 2020). For this reason, non-classical design is relevant in the world. Note that the term non-classical period of design development refers to this type of design activity caused by the expansion of new rationalities in the context of social and cultural crises (Gemser & Barczak, 2020). The neoclassical stage of design is effective in the rapid and global transformation of the new economy because that

is when both the rational and emotional part of human nature influences customer and consumer choices. (Gemser & Barczak, 2020). For this reason, in order to ensure cultural connotation, it is necessary to rethink the content of design: from functional modernism to non-utilitarian transmodernism. We predict that processes of such refinement should contribute to the emergence of new principles of design organization, new approaches, and competencies. (See Figure 1).

**Figure 1.**

*Schematic model of the relationship between non-classical design and new competencies of designers*



*Article authors' development*

Among the key advantages of a professional designer in Ukraine, the logical ability to comprehensively solve complex problems traditionally plays an important role. Separately, given modern transformations, critical thinking, innate creativity, originality, empirical actualization, digital competence, and information literacy play an important place.

The restructuring of the design concept entails the designer's personal creative mobility and his/her ability to switch to different types of design activities, the development of heuristic and critical thinking, and integration (Liedtka, 2014). The mentioned skills and beliefs should influence the professional activity of the designer in Ukraine. We believe that such qualities as flexibility of thinking, openness to changes, readiness for new situations will become important for the non-classical Ukrainian designer because the competence of the latter will become aimed at mastering the qualities necessary for professional development:

mobility, mastering the fundamental and practical knowledge of technique and art. Also important will be self-critical thinking, that is, the ability to choose among the many author's solutions the best and successful (Hay et al., 2020). In addition, the skill to refute typical models and optimal innovations will be important. At the same time, digital competence occupies almost the main role in the sphere of innovative designer skills (Magistretti et al., 2020). Now in Ukraine in the conditions of large-scale digitalization, it is especially relevant for all specialists. The ability to understand digital technologies, critically perceive digital information - all this will be required from the designer of the future. In general, the designer's awareness of their professional uniqueness will influence the formation of a new active unit of design activity, as delineated personal branding today is the foundation for the formation of working and competent tactics of personal leadership (Dell’Era et al., 2020). Contemporary researchers also argue that the skills of

organizing authorial individualization of a design product through inclusive ergonomic empowerment should be among the important new competencies of the contemporary designer (Verganti et al., 2020). The skills of organizing radicalization of a design product through the formation of symbolic product imagery, active participation in the deindustrialization of product manufacturing processes using 3D printing, application of automated devices, outsourcing, etc. are also becoming important.

### **Design in Ukraine: the administrative and legal aspect**

Extremely relevant direction of design development is the formation of an appropriate regulatory framework, development, and implementation of certain provisions regarding regional and industry design-ergonomic services, relevant departments that functioned in enterprises, in scientific and production institutions, etc. (May et al., 2021). For this reason, there is a need, first of all, for appropriate accreditation of design structures, as well as - the development of national standards and other legal documentation that would define the design quality of products and ways to comply with the control of them. In fact, in the context of the creation of design centers that would develop appropriate design projects and perform an examination of the consumer quality of industrial products, advising producers of goods and services on design issues (Shkitsa et al., 2020). The development of such activities would allow a direct impact on improving product quality, the introduction of appropriate accreditation would actualize the influence of the centers on the relevant processes.

Regulatory support of the functioning of the design sphere, obviously, should create and develop an appropriate legal basis for its work, the bases of harmonization with the developed directives of the European Union member states, other interstate standards. It also refers to the prospects of creating their own Ukrainian legislation, which would optimize the living environment of people, improve the quality and competitiveness of manufactured physical and digital products. It is important that with Ukraine's accession to the World Trade Organization (hereinafter - the WTO) intensified work to address problems of harmonization of the adopted national standards with interstate, established information interaction with the WTO member countries.

It is also important to note that the fundamental difference from the old, previously adopted system of State Standards of Ukraine (hereinafter DSTU) from other international systems of standardization is the status of standards. Interstate standards are implemented voluntarily, while the requirements of DSTU, which are still partially in force in Ukraine in some areas, sometimes have mandatory requirements. The updated national standards of Ukraine already have a voluntary status. Appeal to ISO and EN standards in the field of design is to update certain provisions of current DSTU norms. In particular, we are talking about reformatting the principles and methods of design and its use, the terms and definitions of the main concepts, a new understanding of the principles and methodology of design to formulate and create comfortable and safe working conditions and leisure for a better performance of mental or physical loads, the use of design industry safety during manufacturing operations at various stages (creating designs, testing, and commissioning).

Compliance with European and international standards EN, ISO, IES is also aimed at guaranteeing greater competitiveness of Ukrainian products and generally increasing the quality of life of the population. However, such a global goal requires further improvement of the quality of human life (Shkitsa et al., 2020). It should be taken into account that the level of requirements of international standards in foreign practice is generally used as a baseline. Other national standards in European countries and the United States are much higher than this simple baseline. It is also important that in the leading countries of the world, the standards of special associations are actively used - in the work of organizations of scientific, technical, and professional direction, which are characterized by even higher requirements.

Separate mention should be made of standardization in the educational sphere. Prospective development of design is a further evolution of the control of higher education in Ukraine, in particular the specialty 022 Design. According to this document (for the training of bachelors in higher education - from December 13, 2018) determine the basic and special competencies that a design specialist must master during training. Since the development of the specialty does not stand still, here is the corresponding codification of the rules of training in universities will have a constant update and focus on the latest patterns used in the leading universities of the world. The introduction of appropriate accreditation

schemes conducted by the National Agency for Educational Quality Assurance will have a positive effect, as this body will have the power to monitor the implementation of updating educational programs, links with other disciplines and programs of study, quality control of teaching, etc. (Micheli et al., 2018). This experience for the Ukrainian realities is quite innovative, so its development in the future will have a positive impact on the development of design, in particular the theoretical and practical aspects of implementation.

**Design as an Element of Creative Economy: Experience for Ukraine**

The legal transformation for the design field is relevant because of its economic potential. Researchers point out that design services in general are valuable and represent significant financial resources in Europe and America. As an example, cite indicators of GDP, which brings to the national treasury in the UK and Ireland - 71 billion pounds and 38 billion euros, respectively. for the Ukrainian reality, such figures are exorbitant, but design services are still little appreciated by entrepreneurs. Even the existing statistics about the workers and entrepreneurs involved in the industry is rather arbitrary.

It was found that most companies working in the market and individuals entrepreneurs are registered in Kyiv. This corresponds to global tendencies to concentrate production, intellectual and economic flows in the capitals of states. On

the other hand, the probable reason for this situation is the lack of educational facilities in other regions, as they have few registered university training programs. Often regions simply do not have master's programs for relevant training, and even existing ones may have outdated content or teaching methods (Shkitsa et al., 2020). Obviously, the introduction of permanent accreditation of educational programs can improve this situation. The design industry is focused on the use of qualified personnel - creative professionals because the success of entrepreneurship will depend on their level of work (Plantec et al., 2019).

An important aspect was that the growth of the design services market in Ukraine is extensive. It occurs at the expense of the growth of the number of orders, rather than the added value of the work of specialists. For the market itself, the opposite scenario would be much more effective - growth at the expense of increasing the cost of projects. In the future, if such trends persist, the services of designers may turn into secondary work - the gross execution of low-cost and template orders that compete little with other, more experienced designers (Shkitsa et al., 2020). An innovative way to address this prospective development problem was to form individual designers' associations into larger organizations. It would also become more realistic to execute more complex and more valuable projects, which would accelerate qualitative development(See Table 1).

**Table 1.**  
*The main problems of design development in Ukraine and their solutions*

Problems of design development in Ukraine	Proposed solutions
Growth of the design services market in Ukraine - extensive	Encourage individual designers to organize themselves into larger organizations. This would allow them to exchange creative ideas (develop) and be much more stable in the service market.
Lack of business competence	Introduction of additional informal education - special courses introducing designers to the basics of entrepreneurship outside of working hours
Low level of innovativeness in design solutions	Acquaintance with the modern innovative trends, improvement of designers' qualifications, and the introduction of additional non-formal education.
Little attention to the education of designers at the regional level	The system of introducing permanent accreditation of educational programs should improve the situation.

*Article authors' development*

A tangible problem in the designer market is the lack of business competence. Typically, business owners or independent designers have a poor understanding of the business model for their entrepreneurial activities. For this reason, they are also poorly aware of the potential threats that

will arise during development. Because employees and executives have a poor understanding of the economics of how their business functions, the percentage of bankruptcies can increase. An effective way to get out of this situation and further develop

design would be to introduce additional informal education - special courses that introduce designers to the basics of entrepreneurship outside of working hours (Mosely et al., 2018). This pathway is quite innovative - it involves building relevant business competencies, self-directed education, and practical skills. While non-formal education does not provide formal and nationally recognized qualifications, it can also accelerate the acquisition of certain professional qualifications that will be useful in project implementation. Flexibility is a tangible advantage of non-formal education. In addition, the formal decisions and regulations for higher education take a long time, whereas with non-formal education teachers independently formulate the goals and content of their courses, focusing on modern challenges. Also, non-formal education is quite dynamic (Bystryakova et al., 2017). Instead of a long university education, a few months of classes are offered, which already allow you to do your work more effectively. For this reason, the use of non-formal education in design in Ukraine is a quite promising area of development.

#### **Innovative solutions in the development of the design environment**

An important circumstance of increasing interest in design is the globalization of the economy, at the same time an important reason for the interest in design is the proliferation of design because there are still a significant number of separate forms and dimensions of design activity. English-language sources name more than fifty types of design activities, in particular: animation design, applied design, architectural design, biological design, business design, co-design, communication design, configuration design, convergent design, design activism, design cultures, design management, empathic design, experimental design, fashion design, game design, graphic design, interior design, market design, modular design, service design, social design, spatial design, strategic design, universal design, visual communication design, etc. Consequently, innovative trends in these types of design may vary, but there are some that apply to all areas of design activity.

The term innovation process in design should be understood as creative thinking, influencing the formation of innovations to improve the quality of the public and cultural environment. At the same time, innovations arising in design are realized by special technologies or gradual innovations that the market demands (Varyvonchik & Kulyk, 2022). Also, this term

should be understood as innovations that have a direct impact on the transformation of new markets, contributing to the emergence of new technologies.

Today's innovative design environment concepts require addressing different principles and aspects of human activity (Camburn et al., 2017). In particular, Plantec et al., (2019) note that new design trends should be borrowed from other industries, so neuroimaging techniques have emerged in design, and the issue of design neurocognition has become particularly debated and relevant. Neuroimaging techniques "contribute to connecting the neurophysiological and neuropsychological aspects of design creativity" (Plantec et al., 2019, p. 160). At the same time, Hay et al., (2020) note that neurocognitive research has enabled the emergence of new methods and tools to transform design shaped by current neurotechnologies.

The use of interactive technologies is a common innovation because an interactive environment can simplify people's lives and improve their comfort. A separate innovation is following the worldview of ecological design (Varyvonchik & Kulyk, 2022). Although it has not yet completed its final formation, it is becoming increasingly popular among designers in Ukraine. For example, in the context of ecological architecture there is an emphasis on the use of local ecological data, the adoption of green original solutions, etc. The use of the principles of biomorphism contributes to the likening of design structures to natural objects, the use of various dynamic structures (Syomka, 2017).

Separately, we should mention light design, which can be used to implement original lighting solutions in order to give the space the necessary shapes, to improve it from a visual point of view (Borgianni et al., 2020). At the same time, the key tools of light design are categories such as space, shape, color, texture of things. Note that the use of modern innovative methods of modeling and design, the use of unique and non-traditional materials provide unlimited opportunities for the activities of the modern designer (Varyvonchik & Kulyk, 2022). In particular, carbon fiber is now actively used in world design. This material came to interior and object design from the aviation and automobile industry, it is ultralight, rigid, and megastrength - such set of qualities gives designers new opportunities. Another innovative material is methacrylic, a type of plastic that has more machining possibilities. On the other hand,

innovative designers are using plexiglass (acrylic glass), which is a textbook example for “space” design (Camburn et al., 2017). Cocoon polymer was not created for design intentions but was used in construction as an insulating material, but it is one of the most popular materials today. Another innovative design trend is the use of synthetic resin. It all started when the designer Gaetano Pesce found an alternative use for synthetic materials - the result was the Tavolone table. To create the tabletop, the designer poured cutting color resins into a mold, where they were able to mix with each other. Another famous experiment with synthetic resins is a product (sculptural table Pangea) of Italian designers Renzo Martini and Andrea Cedri, reminiscent of natural phenomena - stalactite outgrowths. In addition, the masters used futuristic configurations. These trends are among the most common in Europe.

### Conclusions

1. So, at the present stage of design development, there are two periods: classical and non-classical. The neoclassical stage of design will become effective in the context of rapid digital transformation. Consequently, a rethinking of the content of design, from functional modernism to non-utilitarian transmodernism, is especially important to ensure cultural connotation. We predict that processes of such improvement will influence the emergence of new principles of design organization and new competencies of designers. The restructuring of design will affect the need for personal creative mobility of the designer, the development of heuristic, critical thinking, socialization, digital literacy, self-criticism, skills of organizing authorial individualization of the design product, etc. It will also be important to master the variation methodology, that is, the use of the design method most appropriate to the situation and type of design.
2. The administrative and legal aspect is important for the development of design in Ukraine, and it needs to be further improved. In particular, the current regulatory documents in place in Ukraine must comply with the directives of the European Union member states and other international standards. A separate area is the development of Ukrainian legislation that will optimize the human environment, improve the quality and competitiveness of physical and digital products.
3. It has been proven that the development of the creative economy has an impact on the further development of design. At the same time, this process is accompanied by considerable difficulties: a low level of innovation in design solutions, a lack of powerful players in the design market, and little attention is paid to the education of designers at the regional level. These problems are important vectors for further modernization. The above-mentioned vectors of modernization of design thinking and the professional values of designers will contribute to a new understanding of design in Ukraine as a transversal intercultural competence that develops philosophical, artistic, and personal-emotional understanding. At the same time, the powerful digitalization of society will influence the transformation of design in Ukraine as a whole: new forms and principles of work organization will appear.
4. Important aspects of the problem are standardization of designers' work and turning to European models. Thanks to Ukraine's membership in the WTO and other world organizations, there is a gradual adaptation and harmonization of design requirements to EU standards. An important direction of further work, for this reason, will be the adaptation of existing educational programs to the requirements of modern education, which can be carried out through a system of accreditation, which is periodically carried out by special state bodies. At the same time, the reality requires turning to non-formal education as a cheap, dynamic alternative to higher education (there are few master's programs in the specialty 022 Design in Ukraine). This is important not only to obtain the relevant professional competencies but also to obtain additional business competencies, important for the further development of this business within the state borders.

### Bibliographic references

- Borgianni, Y., Maccioni, L., Fiorineschi, L., & Rotini, F. (2020). Forms of stimuli and their effects on idea generation in terms of creativity metrics and non-obviousness. *International Journal of Design Creativity and Innovation*, 8(3), 147–164. doi: <https://doi.org/10.1080/21650349.2020.1766379>
- Bystryakova, V., Osadcha, A., & Pilhuk, O. (2017). Innovations and technologies in



- contemporary art. *Bulletin of the Lviv National Academy of Arts*, 32, 189–199. (In Ukrainian)
- Calabretta, G., & Kleinsmann, M. (2017). Technology-driven evolution of design practices: Envisioning the role of design in the digital era. *Journal of Marketing Management*, 33(3-4), 292–304. doi: <https://doi.org/10.1080/0267257x.2017.1284436>
- Camburn, B. A., Auernhammer, J. M., Sng, K. H. E., Mignone, P. J., Arlitt, R. M., Perez, K. B., . . . Wood, K. L. (2017). Design innovation: A study of integrated practice. In ASME 2017 international design engineering technical conferences and computers and information in engineering conference. American Society of Mechanical Engineers. doi: <https://doi.org/10.1115/detc2017-68382>
- Dell’Era, C., Magistretti, S., Cautela, C., Verganti, R., & Zurlo, F. (2020). Four kinds of design thinking: From ideating to making, engaging, and criticizing. *Creativity and Innovation Management*, 29(2), 324–344. doi: <https://doi.org/10.1111/caim.12353>
- Gemser, G., & Barczak, G. (2020). Designing the future: Past and future trajectories for design innovation research. *Journal of Product Innovation Management*, 37(5), 454–471. doi: <https://doi.org/10.1111/jpim.12543>
- Hay, L., Cash, P., & McKilligan, S. (2020). The future of design cognition analysis. *Design Science*, 6, 55–68. doi: <https://doi.org/10.1017/dsj.2020.20>
- Liedtka, J. (2014). Perspective: Linking design thinking with innovation outcomes through cognitive bias reduction. *Journal of Product Innovation Management*, 32(6), 925–938. doi: <https://doi.org/10.1111/jpim.12163>
- Magistretti, S., Dell’Era, C., & Verganti, R. (2020). Searching for the right application: A technology development review and research agenda. *Technological Forecasting and Social Change*, 151, 119879. doi: <https://doi.org/10.1016/j.techfore.2019.119879>
- May, J., Shea, A., Amatullo, M., & Boyer, B. (2021). Design for social innovation: Case studies from around the world. Taylor & Francis Group. (In Ukrainian)
- Micheli, P. G., Bhatti, S., Wilner, S., & Beverland, M. (2018). Doing design thinking: Conceptual review, synthesis, and research agenda. *Academy of Management Proceedings*, 2018(1), 16071. doi: <https://doi.org/10.5465/ambpp.2018.16071abstract>
- Mosely, G., Wright, N., & Wrigley, C. (2018). Facilitating design thinking: A comparison of design expertise. *Thinking Skills and Creativity*, 27, 177–189. <https://doi.org/10.1016/j.tsc.2018.02.004>
- Plantec, Q., Le Masson, P., & Weil, B. (2019). Inventions and scientific discoveries: Impact of designers’ collaborations on creativity. an analysis towards fixation effects. *Proceedings of the Design Society: International Conference on Engineering Design*, 1(1), 159–168. doi: <https://doi.org/10.1017/dsi.2019.19>
- Shkitsa, L., Kornuta, V., Kornuta, O., Bekish, I., & Bui, V. (2020). Information support of design innovation activity of the technical university. *Management Systems in Production Engineering*, 28(2), 127–132. doi: <https://doi.org/10.2478/mspe-2020-0019>
- Syomka, S. (2017) *Bionics in Environmental Design*. Kyiv: Publishing House Lira-K. Retrieved from: <http://elib.nakkim.edu.ua/handle/123456789/2519?show=full&locale-attribute=en>
- Varyvonchuk, A., & Kulyk, A. (2022). Modern innovative trends in the development of environment design. *Current issues of humanitarian sciences*, 52(1), 85–90. Retrieved from: [https://aphn-journal.in.ua/archive/52\\_2022/part\\_1/11.pdf](https://aphn-journal.in.ua/archive/52_2022/part_1/11.pdf)
- Verganti, R., Vendraminelli, L., & Iansiti, M. (2020). Innovation and design in the age of artificial intelligence. *Journal of Product Innovation Management*, 37(3), 212–227. doi: <https://doi.org/10.1111/jpim.12523>