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Digital Art and Design for a Sustainable Future: Innovation, Ethics, and Identity

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ABSTRACT:
Digital technologies have played a revolutionary role in design and art, operating innately within it, automating creative processes, and empowering artists and how they reply to the audience. Artificial intelligence, 3D modelling, and virtual and augmented reality open new possibilities for creativity, but such phenomena call into question whether such works are authentic and copyright exists. The study aims to examine the role played by digital technologies in the modernity of creative processes and the creative industries. This research methodology is related to the detailed analysis of scientific sources, comparative analysis of the historical and modern design ways, statistical research of digital art development and peculiarities of using the latest technologies in craftsmanship. It is shown that generative design, UX/UI, digital painting, automated animation, 3D modelling and virtual reality significantly reduce the time for creating and personalising the content, which is actively using artificial intelligence. Digitisation of art gives birth to challenges like copyright, authenticity preservation of art, and ethical application of AI and so forth at the same time. The relevance of the work is to i) generate key trends and opportunities to apply digital creativity, which is relevant for artists, designers and digital content creators, and ii) researchers in the creative economy. Further research is needed to develop ethical standards for generative art, the use of VR/AR in museum spaces, and the legislation of AI-generated works.

Keywords: digital design, artificial intelligence, 3D modelling, virtual reality, generative design, automation of the creative process, creative industries, digital art, UX/UI design, copyright in digital art.

1. Introduction

Computer and digital technologies are rapidly changing the situation for contemporary design and art. Art and design are being created, and projects are being designed in ways we have never seen before because of artificial intelligence, 3D modelling, virtual reality, and automated algorithms. Expanding digital capabilities optimises the

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creative process and expands new ways of interaction between artists, designers, and audiences. These same changes raise many questions for scientists about transforming traditional artistic practices to the digital era, the importance of AI in creative work, and the acceptable scope of copyright in computer-generated works.

Scientists are actively studying various aspects of this issue. Hutson et al. (2024) point to a fundamental change in the creative process under the influence of artificial intelligence, particularly in the automation of generative design. Liang (2024) examine the use of AI in cultural product creation and Wenjing & Cai (2023) the machine learning algorithms in artistic design. Yu & Zhu (2024) developed a study of the influence of digital technologies on virtual modelling, bringing new opportunities for designers. At the same time, Kim et al. (2024) point out that mechanised technologies in animatronics have been developed throughout the history of the arts and entertainment industry, indicating the broad implementation of digital solutions in the art and entertainment sector.

Active research activities have been performed across this topic yet several essential questions remain without answers. Differentiated practical training regarding the influence of digital technologies on artwork authenticity and the ethical boundaries of AI art creation should be included in the curriculum. The problem of copyright requires additional legal guidelines regarding AI-assisted artwork creation. The ethical obligations of persons using generative tools also need enhanced investigation. It is essential to understand various responsibilities through comprehensive evaluation to determine proper limitations for creative work under AI assistance. Technologists should use AI in ways which safeguard artistic quality together with human authorship value in digital spaces.

This study aims to explore the effects of digital technologies on contemporary design and art, analyse their importance to the creative process and the difficulties that, by their ubiquity, they evoke. To accomplish this purpose, the following were the objectives: to explain key technological alterations in the field of design, to investigate their results on artistic practice, to evaluate the possible negative consequences of the automation of creative processes, and to evaluate the prospects for development of creative industries in the digital era.

2. Analysis of the latest research and publications

Recently, digital technologies have had important repercussions on design, art, and education. In the context of creative disciplines, Hutson et al. (2024) encourage the development of artificial intelligence, whereas Liang (2024) depicts how artificial intelligence is applied to the production of cultural and creative products. In this way, Pang and Chen (2023) investigate the fashionability of AI in transforming the Art Deco style, whose design decisions, as we will see, can be automated. Similar to Sun, Zhang, and Guo (2024) also trace the evolution of graphical interfaces that show a different visual perception of information. Yu & Zhu (2024) prove the use of digital technologies in virtual clothing modelling in 3D modelling and virtual reality context, while Chen (2022) investigates their implications for modern art design. Ramzan et al. (2024) draw attention to the impact of digitalisation on the textile and fashion industries, which demonstrates the deep integration of technology into traditional artistic fields. Additionally, Papalambros

(2024) discusses design optimisation through digital solutions, emphasising the combination of science and art.

Studies also consider the impact of VR, computer graphics and gamification on design and education. Yu-Che & Ping-Hsien (2024) analyse the practical application of virtual reality and computer graphics in design teaching, contributing to expanding educational methods in creative industries. Cheng, He, and Jiang (2023) explore the role of user participation and gamification in media design, highlighting new approaches to audience interaction with digital content. Held (2024) examines the current state of video communication design, reflecting the evolution of visual interaction. Some studies focus on historical and theoretical aspects of design. Xiao'ou (2024) analyses discursive models in contemporary Chinese design, offering a new perspective on its conceptual foundations. Kim et al. (2024) trace the evolution of mechanised puppets in animatronics from the 1960s to the early 2000s, which allows us to understand the technical development of interactive visual environments. Billingsley (2024) explores the relationship between artificial intelligence and design epistemology, emphasising the role of AI in creative thinking processes.

Nevertheless, one or more studies in the review are controversial or suffer from methodological problems. For instance, the inaccuracy of research in the space instruments Zhao (2024) article on digital 3D tissue modelling study that was retracted indicates the need for thorough quality control of this research. In spite of the great development of technology in the area of design and art residual problems still remain. More specifically this research will be current on the impact of gamification on professional design and educational processes as well as how artificial intelligence can be integrated into creative disciplines whilst ensuring that the author's uniqueness is not lost. At the same time, there has also been a shift from being a passive spectator to the active process of co creation, especially in AR, VR and NFT platforms, which poses the important questions of who the author of that art will be, how it is seen and what the value in that art really is. At once, when audiences are involved in assisting creating the last form of the artwork or when they're in a position to change its presentation via interactive tools, the division between the creator and the viewer is blurred. It challenges the notion of ownership and authorship in traditional way, and leads to reevaluation of the property rights in the intellectual property and the cultural status of such works. It is necessary to engage in a more in depth research on how interactivity renews digital art value and the given meanings it conveys.

Learning technologies and their impact on design are also the subject of research. Chantanahom et al. (2025) analyse the effectiveness of computer-assisted learning in dental design, which may have broader application in the visual arts. Oliynyk et al. (2020) consider the role of STEM education in the training of future engineers, and Batsurovska et al. (2021) focus on the competence-based approach in the digital learning environment. Although the scientific research of these authors is not directly related to design, the provisions and conclusions of their research can help develop design education methods. Kumar et al. (2023) study machine learning in manufacturing, which demonstrates the possibilities of automation in design

Studies also confirm the impact of digital technologies on architecture and public space. Cai, Dong & Zhou (2024) use digital memes in contemporary architectural culture

to provide insight into an approach to urban design that is different from that exhibited up until now. Zhongshu and Huadong (2024) then look towards integrating digital innovations into public art and landscape design to analyse the rise of technological innovation in shaping urban space. Art and design use artificial intelligence outright these days. Wenjing & Cai (2023) examine how well an AI could design art, and Rani et al. (2024) look into the case of a painting of Edmond de Belamy made by a neural network, discussing questions about the aesthetic value and copyright in the digital era. Liu (2024) discusses deep neural networks' applications to design optimisation, which is the ability to automate visual content production. Moreover, technology also affects traditional art and culture. In their piece, Mefful et al. (2024) connect Ghanaian pottery and fashion trends, as the former is subject to modern technology, while digital solutions are applied to national artistic traditions. According to Velasco & Nieto (2024), the importance of doing art and science is in an interdisciplinary approach that combines or brings together art and science in innovative projects.

However, despite significant achievements in the field of digital art and design, problems remain. The issue of copyright regulation for AI-generated works still lacks explicit legal norms. The impact of digital technologies on the authenticity of art and its cultural heritage also requires further research. Further, copyright is raised but there is no substantive discussion of the legal regimes governing AI des belles determined works in other jurisdictions. The absence of harmonised international standards for which to standardise as generative design moves beyond national boundaries creates impediments in the areas of ownership, licensing and moral rights. The approaches countries take to AI authorship are radically different: while some of them do not even even recognize AI as the author at all, others are now proposing models of shared or shared authorship where the developer of the algorithm and the user would be considered together. Such a strong practical applicability and a development of robust regulatory mechanisms would be greatly strengthened through a comparative study of copyright legislation, for instance the EU's evolving Digital Single Market policies, the Copyright Office interpretations of the U.S., and in Asia.

3. Research methods

The study is based on a comprehensive approach that combines qualitative and quantitative analysis methods to assess computer technology's impact on contemporary design and art. A review of the scientific literature was conducted to identify the main trends in the digital transformation of creative industries, which allowed us to identify key technological changes and their impact on artistic practice. A comparative analysis of historical and contemporary design methods helped identify the specifics of using artificial intelligence, 3D modelling and virtual reality in art. Statistical analysis was used to assess the scale of the impact of digitalisation, including consideration of the dynamics of growth in the creative industries based on economic indicators, the share of people employed in this area, and the development of digital solutions in art. Given the rapidly changing technological landscape, the research methodology is focused on integrating the latest approaches and interdisciplinary analysis, which allows for a comprehensive assessment of the interconnection between digital technologies, the economy and artistic practice.

4. Research results

Analysing the main stages of design development under the influence of computer technology, we can identify several key periods that marked significant changes in approaches to the creation of design and artworks.

1. The initial stage: the emergence of digital tools (1960s-1980s). The first computers were used for computing, but eventually, they began to be used in design. In 1963, Ivan Sutherland created Sketchpad, the first interactive graphic editing system that became the basis for future computer programs for design (Hutson et al., 2024). In the 1980s, the first graphic editors appeared, such as Adobe Illustrator (1987) and Photoshop (1989), which significantly expanded the possibilities of designers in creating digital graphics (Chen, 2022).

2. Development of 3D modelling and animation (1990s—early 2000s). With the development of computer computing power, 3D modelling software such as AutoCAD, 3ds Max, and Maya began to be widely used. As a result, designers can generate realistic three-dimensional images and animations that can be used in the architecture, film, and gaming industries (Liang, 2024). Web design was one of the areas introduced during this period, which contributed to the creation of the first intuitive user interface (Sun, Zhang & Guo, 2024).

3. Digital revolution and interactive design (2000-2010s). With the development of the Internet and social networks, a significant part of design has gone digital. With the passage of time, designers started using UX/UI design to create several user-friendly and attractive interfaces (Papalambros, 2024). The same virtuality and augmented reality have also penetrated art and design, where they can make interactive projects and digital installations (Yu & Zhu, 2024).

4. The impact of artificial intelligence and automation (2020s - present). Design is a subsystem of modern technologies like artificial intelligence (AI) and machine learning. In that sense, neural networks enable the automation of creating artwork, posters, and interfaces (Wenjing & Cai, 2023). Generative design technologies also actively develop and enable programmes to generate a design on specified parameters (Rani et al., 2024). The Edmond de Belamy study (Rani et al., 2024) is the first painting produced by a neural network that used artificial intelligence to assess the work's aesthetic qualities.

The changing of computer technology in terms of design has been altered dramatically, creating new opportunities for artists and designers. Each stage of development – first the graphic editors, then artificial intelligence, automation – has contributed to improving quality, interactivity and design personalisation. While current technological developments have already integrated AI and augmented reality into creative processes, even further technological advancements will likely bring about greater integration of AI and augmented reality into creative processes.

With the rise of artificial intelligence and digital technologies, art created through algorithms and neural networks is the question of its aesthetic value. Some art critics believe AI-generated works do not have the same artistic depth as human-created works, as algorithms work based on analysing existing patterns rather than unique creative experiences. At the same time, other researchers argue that digital art is a new form of

aesthetic expression that changes traditional notions of authorship and artistic value (Goodfellow. 2024).

Another important issue is the copyright of works created with the help of AI. Since AI algorithms work by analysing and combining existing works, the problem of identifying the real author arises. Important questions arise: Is the author the developer of the algorithm, the user who enters a query into the generative system, or should copyright be collective? Currently, the laws of many countries do not provide explicit answers to these questions, which creates legal conflicts and potential conflicts between creators.

It is also worth noting the risk of losing art's uniqueness. Generative algorithms enable the production of thousands of variations on the same artistic style, emptying the digital space of such variations and leading to a lack of uniqueness in art objects. All of this can have a negative effect on the digital art market, decreasing the value of the work and its exclusivity later.

Think about the evolution of design and art this computer technology has had on it.

1. The impact of digital technologies on the design concept. Digital technologies have radically changed the approach to design, making it more dynamic, interactive, and personalised. While traditional design was based on manual techniques and analogue tools, modern concepts include algorithmic approaches, parametric modelling, and artificial intelligence. Digital design has become multi-disciplinary, integrating programming, virtual reality, and machine learning elements.

2. Approaches to creating design products and works of art. Digital technologies have made designing products much faster and more efficient. Generative design allows you to automatically create thousands of design options based on specified parameters, which was previously impossible. Also, digital art platforms such as Procreate, Photoshop, and Blender allow designers and artists to work without the constraints of physical materials, experimenting with shape, colour, and texture.

3. Emergence of new digital tools and their application. In recent decades, many digital tools have emerged to facilitate the work of designers. 3D modelling (Blender, ZBrush, Maya) allows you to create detailed objects and visualise them in real-time. VR and AR technologies have opened up new possibilities for interactive design, enabling the creation of full-fledged digital spaces. Neural networks (DALL-E, Midjourney) can generate unique images based on text queries, expanding the possibilities of artists.

4. The changing role of the client in design and art. Thanks to digital technologies, the client is no longer just a passive consumer but actively participates in creating the product. Customisation and personalisation have become key trends: Customers can use web interfaces to customise product design in real time. In addition, artificial intelligence technologies allow design to automatically adapt to users' needs based on their behaviour and preferences.

5. The emergence and development of the value co-creation paradigm. Value co-creation is a concept in which the end user becomes a design co-author. Social platforms, crowdsourcing projects, and interactive services (Behance, Dribbble) allow designers to collaborate with clients and adapt their solutions based on feedback. This significantly changes the traditional role of a designer, turning them into a facilitator of the creative process.

6. Transformation of the viewer in art. Viewers are no longer limited to passive perception of art. Interactive digital installations, NFT art, and metaverse allow them to interact with the artwork, change its appearance, and even create their versions. Thanks to VR and AR, people can explore digital exhibitions in a virtual space, making art more accessible.

7. The impact of digital technologies on design thinking. Design thinking is gradually adapting to the realities of the digital age. Previously, the emphasis was on the stages of research, idea generation and prototyping, but now the focus is on dynamic adaptation and interactivity. Data and analytics allow us to make design decisions based on real user scenarios, and artificial intelligence helps automate concept generation processes.

8. The future of design and art in the digital age. Artificial intelligence, blockchain, and metaverse will be further integrated into design and art in the coming decades. The development of generative design and algorithmic art will allow the creation of unique projects with minimal human intervention. In addition, augmented reality's growing role will change how people interact with art and design, making them part of everyday life.

Rapid development of digital technologies has resulted in a number of tools for creating projects in art and design. These tools help automate processes, improve graphics, and increase the interactivity of creative works. Artificial intelligence, 3D modelling, virtual reality, and specialised software solutions play important roles. Table 1 below shows the key digital tools and their applications in design and art.

Table 1. Modern digital tools in art and design

Tool	Application	Field of application
Adobe Creative Suite	Graphic design, image and video processing	Design, advertising, media
Blender, 3ds Max, Maya	3D modelling, animation, rendering	Architecture, gaming industry, cinema
Procreate, Corel Painter	Digital painting and illustration	Fine art, conceptual art
Unity, Unreal Engine	Development of interactive projects, VR/AR	Gaming industry, virtual spaces
Midjourney, DALL-E, Runway ML	Generative design, AI image creation	Design, art, multimedia
Figma, Sketch, Adobe XD	Interface design, UX/UI	Web design, mobile applications

Source: developed by the author based on Hutson et al. (2024), Liang, J. (2024), Wenjing & Cai (2023), and Sun et al. (2024).

Modern digital tools have greatly expanded the capabilities of designers and artists, allowing them to create high-quality graphic and interactive projects. Artificial intelligence and 3D modelling development have opened new horizons for automating creative processes. Virtual and augmented reality tools are changing the interactive art and design approach. Further development of technologies will contribute to even greater personalisation and optimisation of the creative process.

Technology development has significantly changed the approach to design, making it more interactive, personalised, and automated. Artificial intelligence, 3D

modelling, and virtual reality (VR) have become key drivers of these changes, affecting the creation, testing, and implementation of design solutions. Below are the main changes caused by these technologies (Table 2).

Table 2. The main changes caused by modern technologies in design and art

Technology	Main changes	Description
Artificial intelligence	Automation of routine processes	AI can significantly reduce the time spent on graphic content creation by automating routine tasks such as retouching, colour correction, and design adaptation to different platforms (Wenjing & Cai, 2023).
	Generative design	AI-based algorithms, such as Midjourney and DALL-E, allow the creation of unique designs that adapt to the given parameters (Liang, 2024).
	UX/UI optimisation	AI analyses user behaviour and offers personalised interfaces that increase the efficiency of interaction (Sun, Zhang, & Guo, 2024).
3D modelling	Realistic visualisations	Modern 3D tools (Blender, 3ds Max, Maya) allow the creation of extraordinarily detailed and realistic models actively used in architecture, cinema, and the gaming industry (Chen, 2022).
	Accelerated prototyping	3D design enables rapid prototyping for production and testing, reducing product development costs (Papalambros, 2024).
	Interactive experience	3D graphics allow the creation of interactive spaces, which is especially important for gaming and online environments (Yu & Zhu, 2024).
Virtual reality	Immersiveness in art and design	VR allows you to create full-fledged virtual spaces for exhibitions, interactive installations, and architectural presentations (Hutson et al., 2024).
	Designing in real-time	VR tools allow designers to work directly in a virtual environment, viewing designs at a 1:1 scale (Rani et al., 2024).
	Training and simulation	VR is actively used to train designers, allowing them to experiment with materials and environments in a safe digital space (Chantanahom et al., 2025).

Source**:** developed by the author based on Hutson et al. (2024), Liang (2024), Wenjing & Cai (2023), Sun, Zhang, & Guo (2024), Chen (2022), Papalambros (2024), Yu & Zhu (2024), Rani et al. (2024), Chantanahom et al. (2025).

The introduction of AI, 3D modelling and VR has transformed modern design, making it more adaptive, interactive and automated. Artificial intelligence allows us to quickly generate unique solutions, 3D modelling improves detail and realism, and VR opens up new opportunities for interaction and learning. In the future, these technologies will continue to push the boundaries of what is possible in design and art.

Traditional art has also been impacted by the ever-growing use of digital technologies in the creation, distribution, and perception of art. This changed role of the

designer is also having an impact on the modern world; the designer's role has become expanded, and his responsibilities have also increased. The impact of digital technologies on traditional art forms should be taken into consideration.

- *Transformation of techniques and materials.* Digital tools allow artists to explore existing forms or new ways of moving in combination with digital technologies. They help create new genres and styles in art.
- *Expanding the audience.* The Internet and digital platforms allow artists to share their work with a global audience without the limitations of physical exhibition spaces, such as galleries or museums. This helps attract more interaction between artists and audiences in the form of cultural exchange.
- *Preservation and restoration.* Artworks that are digitised and preserved using digital technologies can be restored and used by future generations.

This also helps us understand the designer's changing role in the modern world. In the context of museum and cultural heritage, virtual reality has great potential to become an area to explore in the future. VR in exhibitions provides transcendent, multisensory experiences which enhance learning to enable adhering security in delivering cultural content to all audiences, especially audiences with disabilities, or from the remote locations. Increasing public engagement and enhancing educational impact, interactive virtual tours, reconstructed historical environments, and gamified storytelling can be possible. At the same time, this innovation poses a number of crucial questions regarding the truthfulness of digitally fashioned exhibits and about what it means to bring cultural stories in the digital domains. Future research should look more broadly at how institutions negotiate immersion with accuracy and respect in virtual exhibition and what users do and perceive with respect to virtual exhibitions vs. physical exhibitions.

- *Integration of new technologies.* In the modern world, designers must be skilled enough to work with digital devices like 3D modelling, virtual and augmented reality, and artificial intelligence. This allows them to reach out to a wider range of personnel and capabilities.
- *Interdisciplinary approach.* Nowadays, designers increasingly work at the border of different fields of industry, combining art, tech, science, and business to generate new solutions. They need to be flexible and learn on their toes.
- *Increasing its role in business.* Today, design is a cornerstone element of the process of developing products and services, and therefore, it greatly impacts companies' competitiveness. Strategic planning and brand development are activities where designers are involved, which helps boost the designers' importance in the business environment.

This transformation of the designer's role—from a visual stylist to a strategic innovator—demands new educational approaches. Today as designers we are expected not only to contribute in being aesthetically beautiful but also in product innovation, great user experience, brand perspective, and fueling the business growth. Thus, design education should unravel itself into more interdisciplinarity with knowledge on marketing, psychology, data analysis, entrepreneurship, or human computer interaction. It is important that curricula stress systems thinking, collaborative problem solving and the capacity to design any product with market relevance as well as with cultural meaning. This shift in training would be more receptive to future designers to answer the call for the fast evolving professional creative economy.

Digital technologies have dramatically changed the creative industries, opening up new opportunities for artists, designers, and other creative professionals. Technology has advanced into the digital art and design market, and artists and designers have come to learn the new digital tools. Table 3 presents the leading indicators of the digital art and design market.

Table 3. Key indicators of the digital art and design market

Indicator	Meaning
Digital painting market size (2024)	USD 5.85 billion. USD
Forecasted digital painting market size (2031)	USD 18.48 billion. US $3.5BN
Compound annual growth rate (CAGR) of digital painting (2024-2031)	15,45%
Digital artwork market size (2023)	USD 4.85 billion. US $4.85 BILLION
The projected market size of digital artwork (2032)	USD 17.48 billion. US $ 17.7BN
Compound annual growth rate (CAGR) of digital artworks (2023-2032)	15,40%

Source**:** developed by the author based on Verified Market Research (2024, Polaris Market Research (2023)

According to Verified Market Research, the Digital Painting Market will be valued at US$5.85 billion in 2024. By 2031, the market size will be $18.48 billion, growing at a CAGR of 15.45 percent from 2024 to 2031. Such growth is stimulated by the growing use of digital tools in advertising, illustration, and game development.

As per Polaris Market Research (2023), the worldwide digital artwork market was valued at USD 4.85 billion in 2023. The market is anticipated to cross US$17.48 billion by 2032 at a CAGR of 15.40% during the forecast period. This growth is due to the rising demand for digital art and its integration into virtual reality and digital media.

Other growth factors of the market include technological progress (the development of software and hardware simplifies the process of creating digital art, making it more accessible to artists), the availability of online platforms (the growth of online platforms for displaying and selling digital works expands the audience and market opportunities for artists), integration with new media (digital art is increasingly used in virtual and augmented reality, which opens up new opportunities for In general, the digital art and design market is at a stage of active development, offering new opportunities for artists and designers in the digital age.

The table contains data on which the basis is the analytic reports and forecasts by the research agencies focusing on the digital art and design market. Also, the primary contributors are Verified Market Research (used for digital painting market research) and Polaris Market Research (researching digital art). More statistics are given from Statista (2023) to show the growth dynamics of the digital art and design industries in various countries. In addition, we also used OECD (2024), which provides an in-depth analysis of the development of D°CIs globally (see Table 4).

Table 4. Development dynamics of the digital painting and digital art market (2015-2032)

Year	Digital painting (USD billion)	Digital art (USD billion)	Sources
2015	2,75	2,30	Statista (2023)
2018	3,89	3,12	Statista (2023)
2021	5,24	4,57	Verified Market Research (2024)
2024	5,85	4,85	Verified Market Research (2024), Polaris Market Research (2024)
2027	9,02	7,45	Forecast based on CAGR
2030	14,27	12,38	Forecast based on CAGR
2032	18,48	17,48	Polaris Market Research (2024)

The study is based on the analysis of historical market data for the period 2015-2024 and forecasts for 2027-2032. To assess the dynamics of development, data from various research agencies and scientific publications were compared. Forecast calculations were made based on the compound annual growth rate (CAGR) method, which allows for assessing trends in the future development of digital art and design.

We also analysed secondary data from open sources, such as industry reports, research by consulting companies and international statistical databases. This ensures that the findings are representative and consistent.

The data presented in Fig. 1 is global, but the focus is on the most prominent markets where digital art and design have a significant impact.

- North America (USA, Canada) is the largest market for digital art, thanks to the high popularity of digital art platforms, a developed video game industry, and a large number of design studios.
- Europe (UK, Germany, France) - demonstrates rapid growth due to the active development of VR/AR technologies, the NFT market and digital exhibition spaces.
- Asia-Pacific (China, Japan, South Korea) is a leader in adopting digital technologies in the arts, thanks to a substantial market for mobile creative apps, the popularity of digital art platforms and significant investment in 3D modelling and animation.
- Latin America and the Middle East - this market is experiencing rapid growth as digital technologies open up new opportunities for artists working on online platforms.

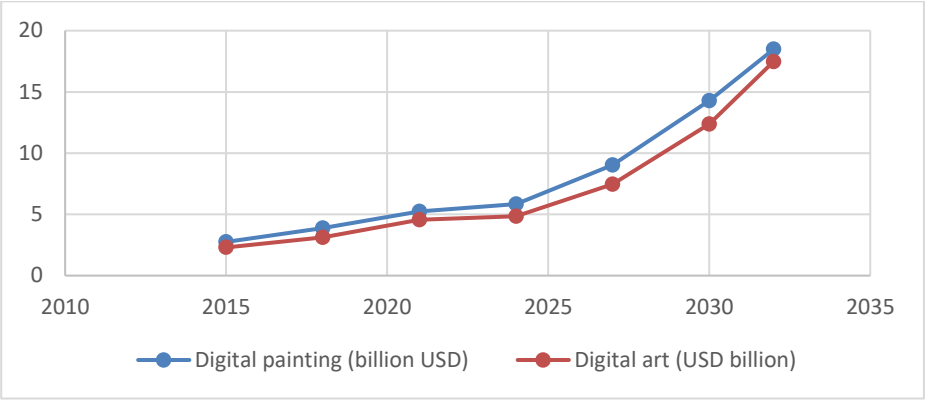

Figure 1. Dynamics of the digital painting and digital art market (2015-2032)
Source: developed by the author based on Verified Market Research (2024, Polaris Market Research (2023)

The digital painting and digital art market has been growing steadily since 2015. Volumes grew moderately in the early years and are expected to increase significantly after 2025. The reason for this is technology development, integration of artificial intelligence, VR/AR and the NFT market's expansion, which are the drivers of growth. The forecast for the digital painting market is above USD 14 billion by 2030. These figures prove that digital technologies are becoming increasingly the predominant tool for artists and designers. Around 2032, the digital painting market is forecasted to touch USD 18.48 billion, whereas the digital art market is expected to rake in USD 17.48 billion, demonstrating the momentum of the market expansion.

During 2024–2032, the growth rate of digital painting will be 15.45%, and that of digital art will be 15.40%. This indicates that a high demand for digital art tools, software, and interactive platforms drives the sector. The most dynamic growth is forecast for 2027-2032, driven by integrating new technologies and expanding digital market opportunities. The market growth in 2015-2018 was 41.5% for digital painting and 35.7% for digital art. From 2018 to 2021, digital painting grew 34.7% and digital art 46.6%. In 2021-2024, growth slowed slightly, but remained positive: 11.6% for digital painting and 6.1% for digital art. The most dynamic growth is expected in 2027-2030, when digital painting will grow by 58.2% and digital art by 66.2%. After 2030, the pace is expected to slow down somewhat, but it will remain high: the projected growth in digital painting in 2030-2032 is 29.5% and in digital art, 41.2%.

These data show that digital art and digital painting have a steady upward trend. The impact of new technologies, such as generative design and algorithmic art, is driving the market. The growing role of augmented and virtual reality is changing how people interact with art and design, making them part of everyday life. Global trends indicate that digital technologies open new opportunities for artists, designers and creative professionals. As the digital market becomes more extensive and interactive, software, online marketplaces, and artificial intelligence-based tools are increasingly used. Shortly, this further development of the meta-universe, blockchain and new digital platforms will also increase these processes.

5. Discussion

The study results are confirmed by the fact that computer technology has played a vital role in the development of contemporary art and design, changing both the way of their creation and perception. Thus, according to the research by Hutson et al. (2024), artificial intelligence plays a role in transforming the way of design and in line with Sun, Zhang, & Guo (2024), artificial technologies are now the most important factor in the change in this area. In contrast to Yu & Zhu (2024), which cover only the technical part, our paper also includes digital transformation's social and economic effects. For instance, the rise in the number of people exposed to the creative industries and their rising share in global GDP reveal the професії в обов'язковому порядку значение of this field.

However, Rani et al. find the potential loss of the authenticity of art when generative design becomes widely used. Onto this correlates with our conclusion that some of the digitalisation of art threatens the preservation of cultural heritage. However, although AI helps in creative processes, it quickly degrades the originality of the work and brings unity to artistic styles. Copyright issues are important also. Wenjing and Cai (2023) note that regulating rights to AI-generated works has not yet been sufficiently developed. This is another limitation of our study since the legal framework in this area is under formation and needs further analysis.

In sum, the conclusions are that computer technology indeed matters a lot to design and art and that other questions related to the transformation of design and art deserve study. Given this, it is advisable to delve deeper into the potential effects of digital technologies on artistic identity and find ways to implement regulatory measures surrounding the use of AI for creative processes. Furthermore, it is relevant to investigate how VR/AR has been integrated into museum practices and their role in cultural heritage.

6. Conclusion and prospects for further research

The study's results indicate a significant role played by computer technology in the changes that took place in the development of design and art, especially in reworking creative methods and automated processes. In this, artificial intelligence, 3D modelling, and virtual reality aid in developing new artistic activity forms while creating difficulties with the authenticity of such works and copyrights. The study's novelty lies in the comprehensive analysis of technological changes and their economic and socio-cultural impact on the creative industries. The practical significance of the work is to identify the prospects for using digital technologies in the arts, which can be helpful for designers, artists, digital content developers, and researchers in the creative economy. The main limitation is the lack of long-term forecasts for the further evolution of digital art and the legal uncertainty of using AI in creativity. Further research should focus on developing ethical standards for working with generative design, assessing the impact of VR/AR on traditional artistic practices, and integrating digital solutions into museum spaces. Another important aspect is the development of regulatory mechanisms for copyright regulation of AI-generated works, which will help maintain a balance between technological progress and artistic identity.

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