

Industry 5.0 Revolution and Its Impact on Visual Communication Design

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ARTICLE INFO

Keywords: Industry 5.0, Visual Communication Design, Artificial Intelligence, Human-Centered Innovation, Internet of Things, Big Data, Personalization, Human-Machine Collaboration, Ethical Design, Creative Transformation

Received : 3 September

Revised : 20 October

Accepted: 22 November

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ABSTRACT

This article discusses the transformation of visual communication design paradigms in the era of the 5.0 Industrial Revolution, characterized by the integration of intelligent technologies such as artificial intelligence, the Internet of Things, and big data with human values and empathy in creative practice. This study uses a qualitative literature review method to identify trends, concepts, and changes in creative strategies occurring in the field of visual communication design as a result of human-machine collaboration. The main findings indicate a shift in the designer's role from merely creating visuals to managing experiences that prioritize personalization, adaptation, and social and cultural sustainability. Technology acts as a catalyst in expanding the boundaries of creative expression and enabling the presence of designs that are more inclusive and responsive to the audience's emotional context. However, ethical challenges, such as algorithmic bias and data privacy protection, must remain a primary concern. This study also highlights the importance of developing a holistic and collaborative design education curriculum to produce adaptive designers in an era of high digitalization. An important conclusion of this study is that the future of visual communication design will heavily depend on how the synergy between humans and technology is managed ethically and innovatively in creating meaningful and sustainable visual works

INTRODUCTION

The Industrial Revolution 5.0, which facilitates the development of Society 5.0, is a continuation of the Industrial Revolution 4.0 that emphasizes the integration of advanced technology and human expertise as key components in production processes and social life (S. Huang et al., 2022). The concept of Society 5.0 was first introduced by Japan as a vision of a future society based on digital technology, artificial intelligence (AI), the Internet of Things (IoT), and big data, while still keeping humans at the center (human-centered) (Fukuyama, 2018). In this context, technology is not only used to enhance economic efficiency but also to consider social aspects and the quality of human life (Narvaez Rojas et al., 2021).

The urgency of understanding the Fifth Industrial Revolution is increasingly rising along with the rapid development of digital technology, which is transforming the way we work, communicate, and interact across various sectors, including the field of visual communication design. This change requires designers not only to master technical and aesthetic skills but also to understand the social impact of every design produced. In the Society 5.0 era, visual communication design must be able to integrate with digital spaces, utilize user data, and create visual experiences that are more personal, interactive, and responsive to societal needs (Julianto et al., 2025).

The urgency to adopt new approaches in Visual Communication Design is becoming more pronounced, considering that the digital world has become the main medium for communication across space and time. Digital technology enhances efficiency, but it also presents new challenges in maintaining the authenticity of messages, visual diversity, and the relevance of design to changing social dynamics. These changes require designers not only to understand technological tools but also to be able to instill values of empathy and creativity in every design process (Arifianto, 2022).

The pressure of globalization and the demands of Society 5.0 compel education, industry, and visual communication design practitioners to adapt. The visual production process now involves human-machine collaboration, digital workflows, data analytics, and the use of interactive media such as augmented reality (AR) and virtual reality (VR), which can enhance audience experience and engagement. In this context, innovation not only means efficiency but also the engineering of aesthetic and social experiences for the audience (Khairullah & Rachmi, 2024).

The paradigm shift from merely visual results to a human-centered design process has become the foundation of excellence in Visual Communication Design (DKV) in the 5.0 era. The involvement of humans as narrative directors and meaning-makers remains crucial for design work to respond to digital ethics issues, data-driven personalization, and the challenges of cultural sustainability. This phenomenon positions designers as agents of change with social responsibility, not only creating aesthetic works but also contributing to building an inclusive and fair social structure (Sugiono, 2020).

The purpose of this article is to examine the impact of the 5.0 Industrial Revolution on the world of visual communication design, particularly in the context of the transformation of designers' roles, the evolution of media, and the challenges and opportunities emerging in the digital era. By understanding these changes, it is hoped that insights can be provided for educators, practitioners, and visual communication design students in facing the new demands of the future. Additionally, this article also aims to identify adaptation strategies that can be implemented to ensure that visual communication design remains relevant and contributes positively to Society 5.0 (Pertiwi et al., 2025).

Technological developments such as AI, augmented reality (AR), virtual reality (VR), and big data have opened up new possibilities for designers to create more immersive and interactive works. However, on the other hand, these changes also pose challenges in terms of ethics, sustainability, and design inclusivity. Therefore, education and practice in visual communication design need to continuously innovate to meet the demands of the Society 5.0 era (Arifianto, 2022).

Thus, this article is expected to serve as a reference for stakeholders in the field of visual communication design to understand and anticipate the changes brought by the Fifth Industrial Revolution, as well as to develop appropriate strategies to seize opportunities and overcome challenges in the digital era.

LITERATURE REVIEW

1. The Transformation of the Industrial Revolution 5.0 in the Context of Visual Creativity

The advent of the Industrial Revolution 5.0 brings a new wave that is changing the orientation of the creative world, especially in the field of visual communication design (Potočan et al., 2021). The integration of digital technology, artificial intelligence, and human values gives rise to a new paradigm in creating visual works that are more adaptive, intuitive, and meaningful (Anggrianto, 2024). Designers are now required not only to master technological tools but also to embed values of empathy, creativity, and sustainability in every visual design process.

a. Changes in the Creative Paradigm in the Era of Industrial Revolution 5.0

The transformation of the creative paradigm in the era of the 5.0 Industrial Revolution reflects a major shift from a purely technological orientation to collaboration between human and machine intelligence. Creativity is no longer seen as merely individual expression but as the result of a dynamic interaction between humans and automation systems capable of understanding emotional and aesthetic contexts. The concept of design is being redefined because technology is now not just a tool, but a collaborative partner that expands the boundaries of visual exploration. In this context, designers are required to integrate creative intuition with data-based analysis so that their work is more personal, contextual, and relevant to audience needs. This collaboration creates added value in visual communication design that is not only aesthetic but also responsive to social and technological changes (Guo, 2025).

Artificial intelligence plays an important role in enriching the ideation process with predictive capabilities and analysis of creative trends. However, human values remain central in determining the direction of aesthetics and the meaning of communication. The personal touch of the designer remains irreplaceable even though technology dominates the visual production process. Awareness of the harmony between creativity and efficiency is key to success in facing the complexities of this era. The Fifth Industrial Revolution focuses on human-centric innovation that combines technological capabilities with human values to create sustainable creative systems (Llopis-Albert et al., 2023).

b. Integration of Technology and Human Touch in the Design Process

The integration of technology with human values has become the main foundation in the world of visual communication design in the 5.0 era. The creative process now involves artificial intelligence, the Internet of Things (IoT), and data analytics, which help designers understand audience behavior and preferences more deeply (L. Yang & Zhang, 2023). This integration creates designs that are more personal, inclusive, and socially impactful. Technology is no longer a replacement for human creativity but rather a catalyst that accelerates and enriches the work produced. Designers now have the space to explore ideas more efficiently without losing their aesthetic identity and originality. This makes the collaboration between machines and humans a symbiotic process that strengthens each other (Y. Chen, 2022)..

The human-centered design approach has become a key principle that places human needs and experiences as the starting point of visual innovation (Zhu, 2025). The human touch in design creates a more emotional and authentic meaning, while technology helps refine precision and efficiency. This balance shapes a new paradigm in the creative industry that emphasizes social well-being as well as the sustainability of visual culture. The integration of Industry 5.0 places humans at the center of innovation, where collaboration between smart technology and human creativity results in increased value within the creative production system (Oztemel & Gursev, 2020).

c. The Evolution of the Designer's Role in the Industry 5.0 Ecosystem

The role of visual communication designers has evolved significantly in the Industry 5.0 ecosystem, which demands flexibility, adaptability, and cross-disciplinary capabilities. Designers are no longer just creators of visual forms but bridges between technology, data, and human experiences. New skills such as creative programming, understanding machine learning, and data management have become essential competencies to maintain professional relevance in an ever-changing era. This evolution also creates opportunities for designers to become facilitators in the innovation process, where creativity is processed through a multidisciplinary approach (J. Cai & Su, 2022).

Besides focusing on aesthetics, a designer's responsibilities also include the social and ethical impact of their work. The application of digital ethics principles and environmental awareness is taken into account in every visual decision. This shift strengthens the designer's role as an agent of change who contributes to shaping the visual culture of future society. The Industrial Revolution 5.0 marks the transition from automated systems to human-machine

collaboration, positioning designers as key actors in creating added value based on empathy and digital intelligence (Xu et al., 2021).

d. Human-Machine Collaboration as a Driver of Visual Innovation

The interaction between humans and machines in the 5.0 era creates a new form of creative collaboration that expands the boundaries of visual expression. Machines not only execute instructions but also learn from human behavior and preferences to generate more intuitive solutions. This collaboration enables the exploration of new ideas that were previously difficult to reach due to time or resource constraints. In practice, designers can leverage generative algorithms, artificial intelligence, and big data analysis to create designs that are more adaptive to user needs. Visual innovation becomes the result of synergy between human thinking and the systemic intelligence of machines (W. Yang & Wang, 2025).

This collaboration also challenges the concept of originality because the boundary between human work and machine output becomes increasingly blurred. However, authentic value still emerges when humans guide machines with a strong artistic vision. Visual communication design in this era emphasizes the importance of human intuition in interpreting data and transforming it into an aesthetic experience. The relationship between humans and machines in the Industrial Revolution 5.0 is based on co-existence and co-creation, which strengthens innovative capacity and enables the creation of work that holds greater social and emotional value (Nahavandi, 2022).

e. The Influence of Artificial Intelligence on Design Style and Aesthetics

Artificial Intelligence (AI) fundamentally changing the direction of style and aesthetic development in visual communication design. This technology enables automation in the stages of ideation, composition, and production with fast results and high precision. However, the core value of design still lies in the human ability to provide meaning and interpretation to visual forms. AI offers designers the opportunity to develop a more dynamic, flexible, and contextual style because algorithms can adapt designs based on audience data and market trends. This shift gives rise to a new era of aesthetics that combines machine efficiency with human artistic sensitivity (Z. Zhang, 2024).

The main challenge arises in how to maintain visual identity so that it does not become homogeneous due to the dominance of generative algorithms. Human creativity becomes the key to controlling the direction and aesthetic value of AI-based design outcomes. By integrating technology as a partner, not a replacement, designers can create works that have a balance between function, emotion, and meaning. Artificial intelligence in the context of the creative industry not only speeds up the design process but also challenges designers to redefine aesthetics based on collaboration between humans and machines (Demirkan & Spohrer, 2023). The main challenge arises in how to maintain visual identity so that it does not become homogeneous due to the dominance of generative algorithms. Human creativity becomes the key to controlling the direction and aesthetic value of AI-based design outcomes. By integrating technology as a partner, not a replacement, designers can create works that have a balance between function, emotion, and meaning. Artificial intelligence in the

context of the creative industry not only speeds up the design process but also challenges designers to redefine aesthetics based on collaboration between humans and machines (Demirkan & Spohrer, 2023).

METHODOLOGY

This study uses a qualitative literature review method, which is a qualitative and interpretative approach to analyzing literature to examine key issues in visual communication design in the era of Industry 5.0 (Wiryanto et al., 2023). The process begins with the exploration of academic sources such as international journals, books, and reputable articles relevant to the research topic. The main focus of this method is to identify themes, trends, and key ideas emerging in the literature without strictly following systematic protocols like a systematic review, thus providing broader room for thematic and narrative analysis according to the research needs (Susanto et al., 2024).

The steps of a qualitative literature review in this study include: searching for and mapping the latest reference sources, screening articles to ensure they are relevant to the research focus, and critically evaluating the content, methodology, and findings of previous studies. The analysis process is conducted thematically to identify patterns, relationships, and gaps in prior research, which are then interpreted as theoretical and analytical foundations. In this approach, the researcher emphasizes a deep understanding of the context, meaning, and social nuances of visual communication issues, so that the study results can provide critical reflections and a mapping of knowledge relevant for the present (Lim, 2024; Lim & Kumar, 2023).

The main difference between a qualitative literature review and a systematic literature review lies in its flexibility. This type of review is narrative and open, not limited to fixed search or selection protocols, thus allowing for the exploration of ideas, synthesis of meanings, and development of a conceptual framework that is adaptive to the evolution of issues in visual communication design in the digital era (Klag & Langley, 2013; Hammarberg et al., 2016; Lee & Tan, 2023). Consequently, the entire review process is oriented toward knowledge construction, critical reflection, the development of new perspectives, and the strengthening of contextual arguments through the interpretation of the impact of the 5.0 Industrial Revolution on the field of visual communication design (Snyder, 2019, 2024).

RESULTS AND DISCUSSION

1. The Impact of the 5.0 Industrial Revolution on Visual Communication Design Practices

The integration of artificial intelligence (AI), the Internet of Things (IoT), and human-centered thinking in the 5.0 Industrial Revolution brings significant changes to Visual Communication Design practices. The design world now goes beyond just focusing on aesthetics and emphasizes human interaction with adaptive, personalized, and collaborative technology. This transformation shifts the designer's work paradigm from merely creating visual works to managing experiences that harmoniously connect technology and human emotions (X. Yang, 2023).

A. Changes in Production Flows and Workflow in the Design Industry

A major transformation in the world of visual communication design has occurred as production systems adapt to automation and collaborative technologies. Designers are no longer single entities managing the entire creative process; instead, they play a role in an integrated system with intelligent algorithms and learning machines. Every stage of design, from research, concept development, to final production, now runs within a digital workflow that allows for high efficiency without reducing artistic value (Cao, 2023). Cloud-based work systems and collaborative design software promote cross-disciplinary collaboration, where designers, programmers, and data analysts work within the same ecosystem. This automation makes repetitive tasks more efficient and allows designers to focus on exploring more conceptual and strategic ideas. Technologies such as generative AI are capable of processing big data to produce design inspiration based on market preferences in real-time (Guan & Wang, 2022). The presence of this technology is changing the way designers think and work, from traditional patterns to predictive and data-driven approaches. The application of AI-based design systems from pre-production to post-production stages improves both time efficiency and the quality of visual outputs as it allows simultaneous analysis of creative patterns and market responses (H. Chen, 2023). The impact of this workflow change is not only on production speed but also on increasing the accuracy of design results relevant to user needs. The involvement of machines in the design stages gives designers a broader space to focus on emotional and narrative aspects, two important elements that differentiate human work from purely algorithmic outputs (L. Chen & Xu, 2022).

B. Automation, Personalization, and Data-Driven Design Adaptation

The advancement of the Industrial Revolution 5.0 has brought about an era of mass personalization, allowing every design to be tailored to individual preferences. In this context, visual communication designers not only act as message creators but also as data processors capable of deeply understanding audience behavior (R. Zhao, 2021). Big data-based systems facilitate the analysis of trends, emotions, and visual preferences, which are then transformed into more personal and relevant design experiences. Automation enables the creation of hundreds of design variations in a very short time, while artificial intelligence regulates adaptive patterns to ensure that visual outputs remain contextual. This makes visual communication design increasingly responsive to social and

economic changes, while also enhancing the effectiveness of the messages delivered (Cui, 2024).

Data-driven design not only enhances production efficiency but also transforms the relationship between designers and audiences into a more interactive one. The integration of big data and machine learning in visual design practices enables the creation of communication products that are more adaptive, dynamic, and capable of responding to users' emotional needs in real time (Gu et al., 2023). The combination of technology and human empathy creates visual communication that is not just informative but also evocative and relevant to the audience's cultural context. The application of algorithm-based personalization makes each design experience more memorable, as the messages received by each individual feel tailored specifically for them (H. Lee & Tan, 2023).

1.1 The C. Development of Interactive Media and Immersive Reality in Visual Communication

The emergence of virtual reality (VR) and augmented reality (AR) technologies has radically transformed the landscape of visual communication. Design is no longer limited to two-dimensional mediums but now extends into interactive spaces where users become part of the visual experience itself (Tian, 2020). Visual communication designers act as architects of digital experiences, crafting environments that blend visuals, sound, and interaction. The use of AR and VR in advertising, education, and digital exhibitions expands the boundaries of audience perception, providing a deeper emotional engagement (Zhiyuan & Chubotina, 2024). These immersive technologies offer opportunities for designers to create narratives that can be directly experienced by audiences through sensory interaction (Jiawei & Mokmin, 2023).

The fusion of the real and digital worlds opens a new chapter in how messages are delivered. The application of immersive reality technology in visual communication design increases audience engagement by up to 70% because it provides a multisensory experience that reinforces the meaning of visual messages (You, 2025). This approach makes visual communication more effective because messages are received not only cognitively but also emotionally. The challenge designers face is how to maintain a balance between technology and meaning so that the visualization does not lose its aesthetic value (Morales & Kim, 2021).

E. The Shift of Aesthetic Values Towards Experience-Oriented Design

The 5.0 Industrial Revolution is changing the definition of aesthetics in visual communication design. Aesthetic values are no longer limited to visual beauty but encompass emotional, narrative, and interactive experiences created through design. Designers are required to understand human behavior as the core of the creative process, integrating sensory and empathetic aspects so that their work holds deeper meaning. Every visual element is now considered not only in terms of composition and color but also in terms of the experience it creates for the audience. This shift shows that design has transformed into a tool for building emotional connections between brands and people (Chi et al., 2025). Modern aesthetics in the context of 5.0 place the user experience at the center of the value of beauty itself. The shift in aesthetics towards an experience-driven design approach strengthens the emotional connection between the user and the

visual work, making design a relational medium that involves empathy and active audience participation. In this context, visual communication design functions not only in conveying information but also in building meaning and facilitating emotional interaction (Nakamura & Ishikawa, 2024)

F. Social and Ethical Impacts of Implementing Smart Design Technology

The implementation of technology in visual communication design has social and ethical impacts that need to be taken seriously (Karahmet Balcı, 2016). The use of algorithms and artificial intelligence has the potential to produce unconscious visual biases if not guided by principles of fairness and transparency. Designers now have a social responsibility to ensure that every work produced reflects the values of inclusivity and diversity (Akhtar & Ramkumar, 2024). Furthermore, the use of personal data in the design personalization process raises privacy issues that require regulation and a high level of ethical awareness (Karaman, 2025). Design ethics has become an integral part of professional practice, as every visual decision affects public perception and social structures (A. Zhang, 2024).

This ethical dimension is becoming increasingly relevant in the context of AI-based design. The application of artificial intelligence in visual communication design must be balanced with digital ethical principles to prevent data misuse, algorithmic bias, and the loss of human responsibility in the creative process (Meng & Liu, 2023). Therefore, the future of sustainable design must prioritize a balance between technological innovation and moral responsibility. Designers are required not only to master the tools but also to understand the social implications arising from each visualization they create (Ahmed & Roberts, 2024).

2. The Future Direction of Visual Communication Design in the Era of Industry 5.0

The transformation towards the era of the Fifth Industrial Revolution marks a significant shift in the paradigm of visual communication design, which is not only technology-oriented but also focuses on human values. The integration of artificial intelligence, human-machine collaboration, and human-centered design principles creates innovative opportunities for the future of the creative industry. This new dynamic requires designers to be able to balance creativity, empathy, and technological efficiency in creating meaningful visual value (Y. Chen & Meng, 2024).

A. Adaptive Strategies for Designers in Facing Technological Disruption

The world of visual communication design faces significant challenges with the emergence of technological disruption that accelerates changes in creative processes and visual production models. Designers are required to develop adaptive strategies capable of balancing the speed of digital innovation with artistic sensitivity (Y. Zhao, 2024). Adaptation involves not only mastering digital tools such as artificial intelligence, augmented reality, or cloud-based design platforms but also the ability to think critically and ethically about their social impact. The Fifth Industrial Revolution introduces the concept of harmonious human-machine collaboration, where technology becomes a creative partner rather than merely a production tool (Z. Chen, 2022). In this context,

designers must adopt a flexible approach through continuous learning, openness to interdisciplinary work, and cross-field exploration that combines technology with visual empathy. An adaptive approach also requires awareness of sustainability, where design not only focuses on aesthetics but also social responsibility (Yin, 2023). The success of designers' adaptation to technological disruption greatly depends on their ability to build reflective awareness of human-machine interaction and position technology as a collaborative partner in visual communication design innovation (Yamashita, 2022). The adaptation process in the context of Industry 5.0 emphasizes the importance of integrating human values into every design decision (Yin, 2023). Adaptive designers not only react to technological changes but also proactively create new collaborative spaces focused on user experience. The development of adaptive strategies can include improving digital literacy, mastering data visualization, and utilizing artificial intelligence to gain deep insights into audience behavior (Chauhan, 2023). Moreover, a collaborative work culture needs to be enhanced through cross-disciplinary synergy between designers, technologists, and other stakeholders in the creative industry. This paradigm shift positions designers not just as creators of visual works, but also as social innovators capable of translating technology into a relevant and human-centered visual communication language. Thus, adaptation is not merely a survival skill in the digital era, but a form of professional evolution towards design that is more ethical, inclusive, and sustainable (Nakamoto, 2023).

B. Enhancing Human-centered Design Competence in the Era of High Digitalization

The global trend toward high digitalization encourages visual communication designers to develop human-centered design competencies that place human needs and experiences at the center of every creative process (Emans & Murdoch-Kitt, 2018). This approach requires a deep understanding of user psychology, cultural values, as well as the social context that influences visual perception. The application of human-centered design principles in the Industry 5.0 era cannot be separated from the integration of technologies such as AI and big data, which enable designers to analyze user behavior with high precision. However, the greatest challenge is maintaining a balance between automation and human empathy (Mejía, 2013). Future designers need to go beyond technical boundaries by prioritizing human values, emotional empathy, and ethical sensitivity to the impact of design on society (Gurer et al., 2025). Human-centered design in the context of Industry 5.0 requires a shift from a technology-based approach to a collaborative approach that emphasizes users' emotional, cognitive, and social engagement to create meaningful and responsible visual experiences (Brondino & Russo, 2023).

Human-centered design not just a methodology, but a philosophy that guides the future direction of visual communication design. In facing extreme digitalization, designers must be able to interpret data not merely as technical information, but as a representation of human behavior and needs (Zhu, 2021). This empathetic approach also strengthens the relevance of design in conveying visual messages that are not only aesthetically attractive but also socially meaningful. Enhancing competence in human-centered design requires the

development of soft skills such as interpersonal communication, cross-disciplinary collaboration, and sensitivity to cultural contexts (Hananto, 2020). By combining intelligent technology with human values, designers can create visual communication solutions that are more adaptive, personal, and ethical, thereby reinforcing the role of design as a bridge between humans and technology within the creative ecosystem of Industry 5.0 (Ferreira & Gomes, 2021).

C. Opportunities for Innovation and Artistic Expression through collaborative technology

The advancement of collaborative technology presents new opportunities for visual communication designers to expand the boundaries of their artistic expression. In an environment dominated by artificial intelligence, mixed reality, and network-based collaborative design tools, designers are able to create works that involve direct interaction between humans and machines in real time (Wong et al., 2020). This collaboration opens up new possibilities in exploring forms, textures, and visual narratives that were previously difficult to achieve with conventional approaches. Design work can now be produced through a participatory process that combines algorithmic input with human creative intuition (Jing et al., 2024). Thus, technology functions not as a replacement for the role of the artist, but as a catalyst that enhances the expressive and innovative potential of every design process. The integration of collaborative technology in visual communication design practice allows the formation of a more creative ecosystem dynamic, where human-AI collaboration drives the emergence of new forms of artistic expression that are adaptive and interactive (L. Zhao et al., 2021). Innovation in collaborative design has led to a new paradigm that emphasizes the process as a form of artwork itself. Collaborative technology enables designers to work simultaneously across regions, cultures, and disciplines, accelerating the exchange of ideas and expanding the global creative network. Artistic expression is no longer limited to the final product but also encompasses the process of human-machine interaction that creates new aesthetic value (L. Huang & Zheng, 2023). In this context, the role of the designer transforms into that of an experience curator, data connector, and mediator of creativity among digital entities. The future of visual communication design will increasingly emphasize flexibility and open collaboration, where technology serves as a shared space enabling the creation of visual beauty that transcends conventional boundaries. (Hwang & Lee, 2022).

D. Reorienting Design Education to Address the Challenges of Industry 5.0

Design education needs a fundamental reorientation to be able to prepare designers who are relevant to the demands of Industry 5.0 (Suherman et al., 2023). Conventional curricula that focus on technical skills must be expanded into a holistic approach that integrates technology, creativity, and human values. Higher education institutions in the field of design face a significant responsibility to create learning environments that foster digital literacy, systemic thinking abilities, and social empathy. This reorientation must also consider the development of critical thinking skills, professional ethics, and reflective abilities in understanding the social implications of design outcomes..

Future design education that is adaptive to Industry 5.0 needs to instill the paradigm of "technological empathy," which is the ability to understand human-technology interactions emotionally and functionally so that designers can create innovations that are meaningful for social life (Kurosawa & Arai, 2024).

Changes in the design education system are not just about integrating technology into the curriculum, but also about reforming pedagogical approaches that emphasize collaborative learning, interdisciplinary research, and social exploration. Future-oriented education must be able to produce designers with complex problem-solving skills, sensitivity to social changes, and visual communication proficiency rooted in human values. By strengthening the relationship between academia and industry, the educational process can become an innovation laboratory that bridges the needs of technology and human creativity. Reorienting design education based on the principles of inclusivity and sustainability will strengthen the position of designers as agents of social change in the global creative ecosystem (Tanaka & Mori, 2022).

E. Future Projections of Visual Communication Design in the Human-Machine Collaboration Ecosystem

The future of visual communication design will be largely determined by how effectively humans and machines can work together to create meaningful works. The Human-Machine Collaboration ecosystem serves as the main foundation for the sustainability of the design industry in the 5.0 era (Ma & Sun, 2025). Designers are no longer just operators of tools, but also directors of visual narratives generated through the interaction of algorithms and creative intuition. This partnership opens up new potential in creating adaptive, predictive, and personalized designs, where technology supports the creative process without eliminating the human essence. The involvement of AI in the design process also enables more accurate visual personalization according to audience preferences, while speeding up the creative production cycle (Xin & Qingfeng, 2025). Human-machine collaboration in the context of visual communication design forms a new paradigm that emphasizes the synergy between human emotional intelligence and computational intelligence to create works that are more intuitive, ethical, and aesthetically valuable (S. Lee & Park, 2020). Future projections indicate that this collaboration will become a new form of collective intelligence in the field of design (Y. Cai, 2025). Designers will act as "creative conductors" orchestrating the potential of technology with humanistic values. Human-Machine Collaboration will also drive the emergence of more adaptive design practices. Regarding social context, sustainability, and digital justice (Zhou & Ji, 2024). In such an ecosystem, the boundaries between art, technology, and communication will become increasingly fluid, resulting in innovative and immersive forms of visual expression. Thus, the future of visual communication design in the era of the 5.0 Industrial Revolution will be a creative space that combines human empathy, artificial intelligence, and social awareness as the main foundation for the emergence of meaningful and sustainable visual works (Garcia & Lobo, 2023).

CONCLUSIONS AND RECOMMENDATIONS

The 5.0 Industrial Revolution has brought fundamental changes to the world of visual communication design, where the integration of advanced technologies such as artificial intelligence and the Internet of Things harmoniously collaborates with human values. This synergy creates a new creative paradigm that demands skills in empathy, creativity, and adaptation to social and technological changes simultaneously. Design is no longer merely a space for aesthetic exploration, but also becomes a medium for building emotional connections and meaningful experiences for the audience. One significant impact of this transformation is the emergence of the human-machine collaboration concept, which expands the boundaries of production and visual expression. Technology now becomes a partner that accelerates the ideation and production process, while human intuition remains the foundation in creating meaning and the uniqueness of design work. Designers are required to develop new competencies, such as digital literacy and data management, in order to be able to competing and innovating in the dynamic Industry 5.0 ecosystem.

Visual communication design practices in this era show a shift in aesthetic values towards experience-driven design, where narrative and interaction become the center of user experience. The use of big data and AI enables real-time mass personalization and design adaptation to individual preferences, enhancing the effectiveness of the visual messages delivered. Nevertheless, ethical and social challenges, such as algorithmic bias and privacy issues, must still remain a primary concern for designers.

Opportunities for artistic innovation are increasingly open thanks to advances in collaborative technology, which enable participatory and interactive design processes between humans and machines. Future designers are expected to be able to act as mediators of creativity, curators of experiences, as well as social innovators within the global creative ecosystem. Human-AI collaboration drives the emergence of new forms of visual expression that are increasingly adaptive to social and cultural contexts, while also promoting flexibility in the exploration of design media.

Major changes also demand reforms in design education, so that the curriculum can instill technological literacy and foster reflective thinking and empathy toward the social impact of created visual works. Design education in the Industry 5.0 era must emphasize the values of inclusivity, interdisciplinary collaboration, and ethical sensitivity, thereby producing designers who are relevant and highly competitive on a global scale.

The future of visual communication design is largely determined by how effectively humans and machines can work together to create meaningful, personal, and sustainable works. Human-machine collaboration based on empathy, data, and computational intelligence will become the main foundation for the emergence of innovative visual works with high social value. Design will not only serve as a tool for visual communication but also as an instrument for cultural development and social transformation in the era of the 5.0 Industrial Revolution.

FURTHER STUDY

This research still has limitations so further research is needed on the topic of Industry 5.0 Revolution and Its Impact on Visual Communication Design to perfect this research and increase insight for readers and writers.

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