

# THE THEORETICAL FRAMEWORK OF THE ARTIFICIAL INTELLIGENCE (AI) CHALLENGES IN THE JEWELLERY INDUSTRY

Ainatul Husni<sup>1</sup>, Saadiah Kaspin<sup>2</sup>

<sup>1,2</sup> Faculty of Arts and Design, Universiti Teknologi MARA Shah Alam

*Corresponding Author: ainatulhusni11@gmail.com*

*Received: August 31, 2025*

*Accepted: October 15, 2025*

*Published: October 30, 2025*

## ABSTRACT

Jewellery design is both an artistic and technical practice, combining craftsmanship, creativity, and cultural expression. Rooted in traditional techniques such as stone setting and metallurgy, it continues to evolve through contemporary styles while balancing functionality, aesthetics, and identity. Recent advancements in artificial intelligence (AI) have introduced new opportunities in this field, particularly as a co-assistant in concept exploration, storytelling, and experimentation. Generative AI enables efficiency in the early stages of design by transforming sketches into 2D or 3D renderings, accelerating decision-making, and supporting cultural translation. However, current research on AI in jewellery design remains limited, with a predominant focus on technological applications and little attention to emotional, ethical, or cultural dimensions. Examining how the incorporation of AI impacts authenticity, professionalism, and heritage in jewellery creation, requires interdisciplinary and regionally informed research to ensure responsible adoption. Ultimately, while AI enhances creativity and efficiency, the human touch remains indispensable for imparting jewellery with cultural meaning, emotional value, and identity.

**Keywords:** Theoretical framework, Jewellery Design, Digitalization, Generative AI.

## 1. INTRODUCTION

A jewellery designer is a craftsperson who designs and makes jewellery, including bracelets, necklaces, earrings, and rings. They usually create distinctive and beautiful jewellery pieces using a variety of materials, such as gemstones, beads, precious metals, and more. Jewellery designers frequently blend technical expertise with artistic imagination to create designs that are both stylish and functional. At the same time, jewellery designers are innovators who have retained the designs' identities through cultural and historical significance.

Jewellery design is a broad, visually appealing art form that incorporates characteristics such as utility, functionality, material selection, and technical expertise. It is seen as a creative expression that prioritises aesthetic value and inventiveness. As a result, jewellery design can be regarded as both workmanship and artistic expression. Each piece has a sense of craftsmanship and heritage according to these ancient techniques that have been passed down through the centuries. All jewellery design is based on traditional craftsmanship, whether it is the fine art of metallurgy, the delicate skill of stone setting, or the meticulous care to detail in filigree work. (Coskun, M., 2024)

Additionally, jewellery designers employ distinct competence approaches for various design projects, indicating a necessity for the profession to create plans to ensure the appropriate competence for every project. Competency methods in this context refer to the knowledge, abilities, and skills that compose up each person's unique design competencies (Mohd Rajili, Olander, Warell, 2015) The process of solving design difficulties involves coming up with a variety of original, possibly imaginative concepts as well as unexpected solutions. (Casakin, H, Wodehouse, A., 2021)

From concept to product manufacturing, in jewellery design process requires numerous steps to achieve. In relation to the phase of transforming concepts from drawing to product, choices are made about materials, dimensions, colours, wearability, flexibility, weight, cost, processes, and necessary equipment. (Mohd Rajili, et al 2015). This is essential to upholding the reputation of a jewellery practitioner as a member of the creative industry.

In a nutshell, jewellery design practice is the method of making jewellery that emphasises material, historical, and conceptual elements in the first stage of the jewellery design process, when artists express their identities and ideas (Mohd Rajili, et al, 2015). Since the beginning of jewellery making, materials have been the primary choice for jewellery design. As a result, the task of building parts involves unavoidable problem-solving, a strong desire to communicate ideas, and the creation of original designs.

### 1.1 Two Major Stages in Jewellery Creation

Jewellery design is commonly defined as the intricate of creative and technological process of designing, creating and manufacturing of ornaments. The conventional

jewellery creation process is depicted in Figure 1. It stated that the jewellery creation process is divided into two major processes: jewellery design and jewellery manufacturing.

The jewellery design process includes is the initial process of design idea, stages of finding inspiration, exploring and generating ideas, and evaluating and translating these ideas. The concept of a jewellery piece is developed by idea sketching, known as the creative and planning stage. In reality, the planning stage requires the proposal of ideas involving rejection and alteration in the process of design selection. Here, choices are made regarding function, style, and material (gold, silver, platinum, gemstones). Thus, the design becomes a blueprint for production.

While, jewellery manufacturing process involves stages of fabrication, which include prototyping and model making using low-cost materials and finishing. The design is turned into a tangible object at this point in the production process. The final product is then achieved by polishing, refining, and finishing the jewellery. The term manufacturing was introduced in the nineteenth century as craft-based products, which implied something by hand, became increasingly industrially produced. (Mohd Rajili, et al, 2015)

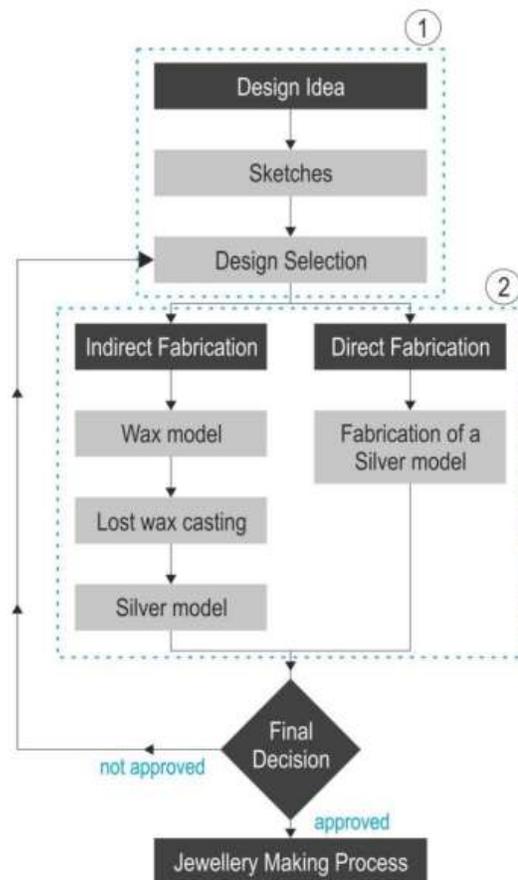


FIGURE 1. JEWELLERY CREATION PROCESS

Source: Ferreira, T. M., Almeida, H. A., & Bártolo, P. J., I. Campbell (2013).

The jewellery industry generally produces three main categories of products, according to T. Ferreira, H.A. Almeida, P.J. Bartolo, and Campbell (2013): casting, which allows jewellery to be produced in large quantities; handcrafted pieces made to small-scale, custom client requests; and repair work, such as ring resizing, fixing broken items, and altering existing designs.

Otherwise, theory in jewellery design can be described as a fundamental concept of designers' expression that encompasses both technical and design elements related to jewellery manufacturing, such as forms, history, composition, movement, tools, and materials. By this point, the field has seen several advancements, including the advent of computerised tools and modern jewellery design techniques. (Mohd Rajili, et al, 2015)

## 1.2 Digitalization in Jewellery Design

The emergence of various technologies has helped facilitate the jewellery creation process in manufacturing. Research has found that the presence of CAD technology in the jewellery industry has minimised the cost of production. Digital tools today help produce CAD models by using CAD software. A combination of the conventional method of idea sketching and developing of 2-Dimensional Image constructive design structure. Followed by the transformation of a 2-dimensional image into 3- dimensional using a CAD tool. Finally, 3-Dimensional modelling and constructions. CAD technology allows designers to simplify the iterative design or to easily modify or adjust the specification of the sketches, to facilitate sketching of jewellery products in any size, and to shorten the required time as well. (Ghag, 2018)

Furthermore, the modern jewellery designer has access to a variety of digital tools that enable the creative visualisation, modification, and manufacture of jewellery, eliminating the need for traditional manual techniques. The digitalization enables the discovery of novel avenues for jewellery design, encouraging creativity and the creation of unique, innovative pieces. By incorporating technological advancements into jewellery design, metal jewellery design, shape, and manufacturing processes become simpler and faster, increasing accuracy and efficiency. (Alayar, M., Alrashaidi, E., & Alrashidi, N., 2024) Through the use of these software applications, artists can refine their designs before they are realised by experimenting with compositions, forms, and proportions in a virtual setting. In addition to improving design process efficiency, this iterative approach promotes an innovative and experimental culture. (Coskun, M., 2024)

However, studies found there is tension between innovation and heritage for jewellery companies that require adopting digital technology to succeed. Meanwhile, each jewellery company stands on its own identity or signature that must be preserved. (Avidano V, 2024) Thus, the presence of new technology of artificial intelligence as a co-assistant can help the design project push the boundaries of human cognition and offer more opportunities for creative exploration. (Rossato B.; Tenuta L.; Testa S.; Cappellieri A. 2024)

## 2.0 IMPLEMENTATION OF ARTIFICIAL INTELLIGENCE IN DESIGN IDEA

From the document analysis study, the use of artificial intelligence is still expanding. This may assist in the process of designing ideas, particularly in the jewellery industry. For instance, brainstorming, sketching, and rendering are the common steps in the design process for proposal ideas. It can occasionally take an extended period to complete these three steps to reach a design selection decision.

AI technology has totally overcome the constraints of conventional jewellery design, improving productivity and creativity in tandem with the quick development of AI modelling and picture tools. Over time, AI-assisted technology has emerged as the primary engine accelerating the jewellery industry's digital transformation. Xue, Z. (2024).

According to Magee, M.D.(2024), teams employing generative AI in ideation activities generated better ideas faster and with more diversity and efficiency than control groups, supporting the fact that artificial intelligence speeds up the initial idea-generating process. Blending, upscaling, inpainting, and outpainting are four common approaches. In addition to these shared tools, each generative AI software has unique, exclusive features, capabilities, and specialisations.

The study found three different types of artificial intelligence as image generators for the initial stage of design, such as Alideation, Midjourney and ChatGPT. Generative artificial intelligence methods offer notable benefits over traditional design in terms of short-term creative generation, concept combining, and stylisation. AI jewellery design can produce four to ten sets of effect plans in a minute, whereas traditional design takes three to seven days. (L.C. Jain et al., 2024).

### 2.1 Concept Exploration

AI contributes more with benefits in initial jewellery design by generating creative variations from prompts or sketches in ideation and concept exploration. The study from Generative transformers for Design Concept Generation, able to provide the guiding and stimulating stage of the idea from AI. But without offering any original thought of their own, these technologies can only help people become more creative. During the early stages of the design process, the human designer group's knowledge and creative thinking skills remain crucial. (Zhu, Q., & Luo, J., 2022).

With just a few words as input, AI can produce numerous variations from a single concept or idea. AI has proven to possess the capacity to generate design concepts at an incredible speed. Magee, M. D.(2024)

### 2.2 Idea Generation

A form of artificial intelligence known as "generative AI" is capable of producing previously unseen text, images, music, and even films. In essence, generative AI uses a lot of data

and sophisticated algorithms. The machine learning utilised to identify patterns in such data is what distinguishes the procedure. Magee, M. D. (2024)

Furthermore, the same study discovered a way to use artificial intelligence in the early phases of jewellery creation, particularly by generalising GPT-like models to generate text-based concept generation and suggest new design concepts. (Zhu, Q., et al, 2022). A basic prompt can produce completely original designs. Unfortunately, AI is no substitute for a skilled designer, and it lacks an understanding of what can be produced. Magee, M. D. (2024)

However, result shows that despite generative transformers' excellent performance in creating design concepts, certain drawbacks require more consideration, such as four main limitations: absence of baselines, generalizability, extendibility, and interpretability. (Zhu, Q., et al, 2022).

### 2.3 Sketch Rendering

The initial stage of designing using the traditional method in designing is by sketching. Today, research found another stage of Sketch-to-Visual Conversion where AI converts rough sketches to rendered visuals for review. Research demonstrates the potential at the nexus of computation and design, allowing designers to concentrate on the important things while algorithms handle the tedious, uncreative tasks. The rendering style transfer assumes that images that could take up to an hour to render will be replaced by CycleGAN renderings in a matter of seconds. Pedroso, T. C., Del Ser, J., & Díaz-Rodríguez, N. (2022)

Additionally, a freehand sketch made by a user in artist mode can be rendered. The machine learning model can be fed the sketch and a style guide to produce a rendered 3D model of the jewellery item that the sketch depicts. A beauty pass image that explains the meaning of the colours in the image might be included in a style guide. For example, style guides can describe common material combinations (e.g., brilliant with diamond, sapphire with rose gold). Details like adjusting a gem's reflection in other metal parts of a ring to match the gem's hue are examples of the machine learning model's advantages. Additionally, an instance matrix that further describes subcomponents of specific objects (such as band or setting characteristics) may be included in the rendering in a 0.2 version of the graphical user interface. Comploi et al, (2020)

A method known as "sketch to render" that starts with a loose sketch of a design as an image prompt by using a generative AI algorithm to fill in the colour, materials, lighting, and shading of a 3D object based on the original sketch and a text prompt that goes with it. A more photorealistic rendition of the original sketch is produced by combining a hand sketch with a thorough written prompt. A skilled salesperson or designer can quickly transform their drawn ideas into realistic visuals for a client to assess by using "sketch to render." Examples of this technology that show promise include Vizcom.ai and Dzine.ai. The designer may avoid using labour-intensive CAD modelling for the final design, and the client can see the finished product more clearly according to the AI-generated image's photorealism. Magee, M. D. (2024)

## 2.4 Cultural Storytelling

Otherwise, AI supports designers to infuse cultural storytelling and emotional resonance. In the early phases of jewellery design, designers are thinkers who produce crafts based on human preferences in order to satisfy emotional demands and maintain cultural identity. Research indicates that Generative AI receives initial visuals and instructions from humans, then algorithms decode the data to comprehend human intent before encoding a wide range of potential outputs. Lyu, Y., Shi, M., Zhang, Y., & Lin, R. (2023). A hybrid imagination model of human–AI co-creation for culture translation in jewellery design is based on the findings of the data analysis. Ultimately, AI also facilitates faster decision-making during the design ideation process.

A jewellery designer tasked with creating a product as a novice has an individual style. This is demonstrated in the first step of the design process by establishing a vision or theme and preserving the aesthetic element and sensitivity to generate a high-quality product. (Rossato B et al, 2024) This demonstrates the value of a jewellery designer taking on the decision-making role early in the design process. Long-term accumulations of information, experience, and preferences are used to inform decision-making. Every business also needs to preserve the identity of its product brands. As a result, the majority of brand identity data is turned into proprietary information that will not be publicly disclosed. Liu, Y. Shi, M. Zhang, Y. Lin, R. 2023)

Furthermore, a study on jewellery as an emerging form of cultural interpretation has revealed results about human-AI interaction with limitations on invalid or biased communication, as AI is unable to comprehend the knowledge of professional crafts and materials used in jewellery design. Therefore, to maintain their advantage in personalised direction, designers need to be attentive throughout the design process with the aid of AI studies. From Image to Imagination: Examining the Effect of Generative AI on Cultural Translation in Jewellery Design (Liu, Y. et al, 2023)

## 3.0 ANALYSIS: ARTIFICIAL INTELLIGENCE AS A CO-ASSISTANT IN JEWELLERY DESIGN

Artificial intelligence (AI) has changed the creative industries by bringing new methods of brainstorming, design, and production. In the jewellery industry, which is closely related to craft, symbolism, and cultural significance, AI has started to function mainly as a technical tool but also as a co-assistant in the design process. Instead of taking the place of human creativity, AI helps designers explore new ideas, increase productivity, and incorporate cultural storytelling into artefacts.

Recent studies indicate that generative AI technologies can be included in jewellery manufacturing processes to work alongside human designers. Using platforms like Midjourney, DALL·E, Stable Diffusion, Leonardo, and Firefly, Magee, M. D. (2024) examines the "Alideation" process in his essay Generative Artificial Intelligence as a Tool for Jewellery Design. Early on in the brainstorming process, designers use text or picture

prompts to produce a variety of visual alternatives that act as creative catalysts. AI is viewed as a quick sketching tool that helps increase the option space, which means human designers may choose, refine, and evaluate outputs rather than as an independent designer.

Although research on jewels focuses on practical procedures, a more general design study offers crucial theoretical foundations for thinking of AI as a co-assistant. A thorough literature overview on AI's functions as a co-creator, stimulus, evaluator, and even design material is provided by Müller and Meyer (2025). According to this viewpoint, AI may impact both conceptual research and practical results, making it a versatile collaborator in creative processes.

In addition, Yang, Z., Zhang, W., Liu, H., & Jiang, H. (2022) add to this topic by putting up a framework for co-creation engagement in intelligent design systems. Their concept emphasises interactional reciprocity over one-sided tool use, placing AI inside an iterative human-machine dialogue. This methodology is particularly applicable to jewellery creation, as repeated exchanges of interactions between the designer and the AI system enhance designs, motifs, and material exploration.

This discussion is continued by Zhou, J., Yao, J., Kim, Y., & Dow, S. (2024)., who dispute linear models of human–AI interaction. Instead of using AI as a passive tool, their co-design paradigm promotes nonlinear cooperation in which AI functions as a "opinionated colleague." In this context, AI questions human presumptions, encourages introspection, and presents design options that could not have been otherwise considered. This kind of thinking fits perfectly with jewellery design, since concept development heavily relies on aesthetic exploration and symbolic richness.

Lastly, most research found that AI contributes as a co-assistant in the design stage through efficiency and creative spark. Research found that the entire jewellery industry will move towards sustainable development as a result of the integration of AI and design. AI technology can assist more ecologically friendly craftsmanship and manufacturing processes while optimising material utilisation, decreasing trial-and-error costs, and increasing production efficiency. AI will eventually play a significant role in propelling the green transformation of the jewellery sector, in addition to serving as a tool for jewellery creation. (Xue,Z. 2024)

#### **4.0 FINDINGS: ARTIFICIAL INTELLIGENCE CHALLENGES IN JEWELLERY INDUSTRY**

This study found that the challenges of AI in the jewellery manufacturing industry are divided into two main elements, namely invalid professionalism, which covers the identity, and emotional touch in the technical aspect of the manufacturing process using AI. The second element is Malaysia's readiness to implement artificial intelligence in the

jewellery manufacturing industry, in terms of top management support, funding and training for designers.

#### 4.1 Invalid Professionalism in The Jewellery Industry

A jewellery designer tasked with creating a product as a novice has an individual style. This is demonstrated in the first step of the design process by establishing a vision or theme and preserving the aesthetic element and sensitivity to generate a high-quality product. (Rossato B et al, 2024) This demonstrates the value of a jewellery designer taking on the decision-making role early in the design process. Long-term accumulations of information, experience, and preferences are used to inform decision-making. Every business also needs to preserve the identity of its product brands. As a result, the majority of brand identity data is turned into proprietary information that will not be publicly disclosed. Liu, Y. Shi, M. Zhang, Y. Lin, R. 2023)

Furthermore, a study on jewellery as an emerging form of cultural interpretation has revealed results about human-AI interaction with limitations on invalid or biased communication, as AI is unable to comprehend the knowledge of professional crafts and materials used in jewellery design. Therefore, in order to maintain their advantage in personalised direction, designers need to be attentive throughout the design process with the aid of AI., Studies from Image to Imagination: Examining the Effect of Generative AI on Cultural Translation in Jewellery Design (Liu, Y. et al, 2023)

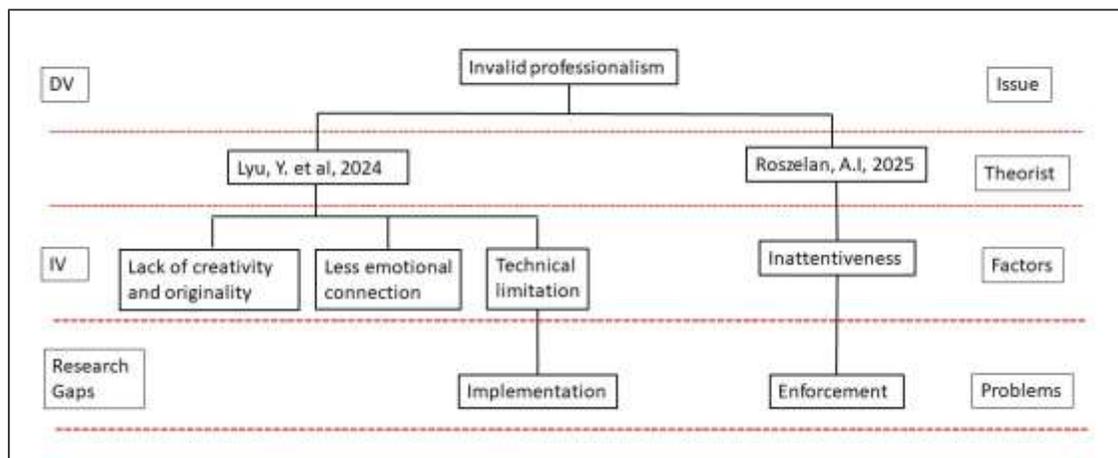


DIAGRAM 1: THEORETICAL FRAMEWORK OF THE CHALLENGES THE IMPLEMENTATION OF AI IN JEWELLERY DESIGN

Diagram 1 shows the theoretical framework of this study. The primary focus of this study is the emergence of invalid professionalism in the creative industry, especially in jewellery design, resulting from the integration of artificial intelligence (AI). As AI technologies increasingly influence the design process, concerns arise regarding the dilution of professional standards, authenticity, and human creativity. This framework is based on

the research of Lyu et al. (2024) and Roszelan, A.I. (2025), who investigate the technical and conceptual disruptions that AI brings to professional creative fields. Lyu et al. (2024) highlight three significant independent variables (IVs) that lead to unprofessionalism when AI is integrated into design processes:

Lyu et al. (2024) highlight three significant independent variables (IVs) that lead to unprofessionalism when AI is integrated into design processes:

- **Lack of creativity and originality:** AI systems inherently create outputs based on pre-existing datasets and established patterns. Although they can replicate styles, they often struggle to generate genuinely novel or original concepts, especially in culturally specific fields such as jewellery design.
- **Less emotional connection:** Human-created jewellery often embodies emotional, symbolic, or cultural significance. In contrast, AI-generated designs are frequently viewed as impersonal or lacking the depth derived from personal experience and insights.
- **Technical limitation:** Numerous AI-generated designs overlook practical manufacturing considerations, including material characteristics, wearability, or structural soundness. This leads to implementation difficulties for designers and manufacturers. The challenges of effectively integrating AI tools into real-world design processes can compromise professional standards, particularly when there is insufficient human supervision or correction.

In summary, a lack of originality and creativity, a lack of emotional connection, and technological limitations are the main root causes of the insufficient professionalism of artificial intelligence (AI) in the jewellery sector. This is due to the reality that, besides to its primary purpose as an ornament, jewellery has a character of its own. Therefore, some studies explain Malaysia's readiness to implement AI in the jewellery manufacturing industry.

#### **4.2 Malaysia Readiness to Implement AI in The Jewellery Manufacturing Industry**

Conversely, Roszelan (2025) highlights inattentiveness as a widespread obstacle, which pertains to the absence of enforcement mechanisms, regulatory frameworks, and ethical governance regarding the deployment of AI tools within creative industries. This lack of enforcement deteriorates quality control, intellectual property safeguarding, and cultural conservation, thereby exacerbating issues of invalid professionalism. Together, these concepts create a dual-level theoretical framework. On one hand, challenges at the individual level (such as creativity, emotional factors, and technical feasibility) impede implementation. On the other hand, failures at the systemic level (including policy deficiencies and inattentiveness) hinder the upholding of professional and ethical norms.

The study identifies three key indicators of Malaysian manufacturing's preparedness for the deployment of artificial intelligence. The first element, Malaysians' IT proficiency,

demonstrates that there is no discernible relationship between IT proficiency and the application of artificial intelligence, which significantly streamlines human labour processes.

The second aspect, which has a significant impact on a company's adoption of artificial intelligence, is the backing of top management in the work process. This is because new technology necessitates funding and training for staff members to gain abilities comparable to the technology. The support of the government in keeping Malaysia's industry competitive with those of developed countries is the third element. This is because government assistance and participation may boost the sector in Malaysia by providing suitable funding and training, as well as promoting the growth of the country's technology sector on par with that of developed countries. Ghani, E. K., Ariffin, N., & Sukmadilaga, C. (2022).

The technological, organizational structure, and environmental aspects of readiness are also influenced by some of other factors, such as relative advantage, compatibility, resources, competitive pressure, top management support, and government regulations. According to the study, the biggest factor influencing readiness to use AI is organizational ability. This necessitates making investments in technological infrastructure, cultivating leadership, and interacting with regulatory agencies. (Roszelan, A.I., 2025)

## 5.0 CONCLUSION

Designing jewellery is both an art and a skill, combining technical expertise with artistic vision to create pieces that are beautiful, useful, and culturally significant. It reflects tradition while adjusting to contemporary styles, with roots in traditional techniques such as stone setting and metallurgy. The design process necessitates choices about materials, wearability, cost, and production and depends on knowledge, talents, and problem-solving abilities. Designers strike a balance between creativity and craftsmanship by acting as both engineers and artists. While maintaining the crucial function of the human designer, artificial intelligence now improves this process by acting as a co-assistant, speeding up concept development, assisting with storytelling, and encouraging experimentation.

Artificial intelligence is developing and providing humans with a variety of benefits, especially in the jewellery design sector, such as generative image-based AI, cultural translation, or human-AI co-creation. AI has proven the capacity to encourage efficiency and innovation in the very beginning of the design process. Decision-making is accelerated by saving designers' time during the sketch stage by providing the ability to render images from 2D to 3D visuals. AI technology must be introduced to jewellery designers in order for them to utilise it to further enhance manufacturing procedures and efficiency of labour.

However, the existing literature on AI in jewellery design is predominantly focused on technology and is geographically limited, with little attention paid to emotional, cultural, ethical, and contextual aspects of design. There is an urgent need for interdisciplinary and regionally informed research that examines how its integration influences the cultural significance, authenticity, and professionalism of jewellery design. Bridging these gaps is crucial to ensuring the responsible development and use of AI in a manner that enhances, rather than diminishes, the core values of design traditions.

In summary, we currently acknowledge that jewellery design incorporates two primary values: artistry and functionality. In addition to the fact that some people wear jewellery every day, people are drawn to it because of its cultural significance and ability to convey stories. Therefore, as an additional value and symbol to an identity, the human touch that provides emotional value and distinctiveness is still essential. However, as artificial intelligence was developed to support human labour, it cannot preserve a brand's identity in the absence of human decision-making based on experience and knowledge. Therefore, the importance of designers and craftsmen in jewellery design cannot be overstated, and they must evolve to new technological advancements.

## REFERENCES

- Alayar, M., Alrashaidi, E., & Alrashidi, N. (2024). The impact of technology on creativity of metal jewelry design. 0 , (80)2024 ,مجلة بحوث التربية النوعية, <https://doi.org/10.21608/mbse.2023.245856.1393>
- Casakin, H., & Wodehouse, A. (2021). A Systematic review of design creativity in the Architectural Design Studio. Buildings, 11(1), 31. <https://doi.org/10.3390/buildings11010031>
- Comploi et al, (2020) "Systems and Methods for Generating Jewelry Designs and Models Using Machine Learning, PCT/US2021/073106
- Coşkun, M. (2024). Synthesis of art and technology. In Advances in media, entertainment and the arts (AMEA) book series (pp. 130–138).
- Ferreira, T. M., Almeida, H. A., & Bártolo, P. J., I. Campbell (2013). Additive Manufacturing and Design Strategies for Customized Jewellery Production. International Conference on Competitive Manufacturing. <http://conferences.sun.ac.za/index.php/doie/coma13/paper/viewFile/480/339>
- Ghani, E. K., Ariffin, N., & Sukmadilaga, C. (2022). Factors influencing artificial intelligence adoption in publicly listed manufacturing companies: A technology, organisation, and environment approach. International Journal of Applied Economics Finance and Accounting, 14(2), 108–117. <https://doi.org/10.33094/ijaefa.v14i2.667>
- <https://doi.org/10.4018/979-8-3693-1950-5.ch007>

- Lyu, Y., Shi, M., Zhang, Y., & Lin, R. (2023). From Image to Imagination: Exploring the Impact of Generative AI on Cultural Translation in Jewelry Design. *Sustainability*, 16(1), 65. <https://doi.org/10.3390/su16010065>
- Lyu, Y., Shi, M., Zhang, Y., & Lin, R. (2023). From Image to Imagination: Exploring the Impact of Generative AI on Cultural Translation in Jewelry Design. *Sustainability*, 16(1), 65. <https://doi.org/10.3390/su16010065>
- Magee, M. D. (2024). Generative artificial intelligence as a tool for jewelry design. *Gems & Gemology*, 60(3), 264–275. Gemological Institute of America. <https://www.gia.edu/gems-gemology/fall-2024-artificial-intelligence-in-jewelry-design>
- Müller, V. C., & Meyer, T. (2025). AI as a co-creator and a design material: Transforming the design process. *Design Studies*, 92, 101164. <https://doi.org/10.1016/j.destud.2025.101164>
- Pedroso, T. C., Del Ser, J., & Díaz-Rodríguez, N. (2022). Capabilities, Limitations and Challenges of Style Transfer with CycleGANs: A Study on Automatic Ring Design Generation. In *Lecture notes in computer science* (pp. 168–187). [https://doi.org/10.1007/978-3-031-14463-9\\_11](https://doi.org/10.1007/978-3-031-14463-9_11)
- Rajili, N. a. M., Olander, E., & Warell, A. (2014). Characteristics of Jewellery Design: An Initial review. In *Smart innovation, systems and technologies* (pp. 613–619). [https://doi.org/10.1007/978-81-322-2229-3\\_52](https://doi.org/10.1007/978-81-322-2229-3_52)
- Roszelan, A.I., (2025) Readiness for Artificial Intelligence Adoption in Malaysian Manufacturing Companies. *Journal of Information Technology Management*, 17(1), 1-13. <https://doi.org/10.22059/jitm.2025.99920>

- Xue,Z (2024).AI-Assisted jewelry design: A Perfect Integration of Creativity and Efficiency. *Frontiers in Art Research*, 6(12).  
<https://doi.org/10.25236/far.2024.061211>
- Yang, Z., Zhang, W., Liu, H., & Jiang, H. (2022) Co-creation interaction framework and its application for intelligent design system. *International Journal of Design Creativity and Innovation*, 10(2), 123–140.
- Zhou, J., Yao, J., Kim, Y., & Dow, S. (2024) Understanding nonlinear collaboration between human and AI agents: A co-design framework for creative design. arXiv preprint arXiv:2401.07312. <https://arxiv.org/abs/2401.07312>
- Zhu, Q., & Luo, J. (2022). Generative transformers for Design Concept generation. *Journal of Computing and Information Science in Engineering*, 1–61.  
<https://doi.org/10.1115/1.4056220>