



# Exploring User Acceptance of AI Image Generator: Unveiling Influential Factors in Embracing an Artistic AIGC Software

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**Abstract.** This study aims to explore the user acceptance of AI Image Generators and offers an analysis based on their distinct features. Drawing from the Technology Acceptance Model (TAM), we examined the impact of factors such as creativity, accuracy, image quality, interactivity, and efficiency on users' willingness to adopt. Furthermore, we evaluated the mediating effects of perceived usefulness and perceived ease of use. Data analysis reveals that both perceived usefulness and ease of use play a significant role in users' intentions to adopt the AI Image Generator technology. The features of the AI Image Generator significantly influence users' perceptions of its usefulness and ease of use. Additionally, perceived ease of use has a notable effect on perceived usefulness. The insights from this research offer valuable guidance for the design, development, and promotion of AI Image Generators, facilitating the industry in catering better to users' needs and promoting its adoption in the art world.

**Keywords:** TAM · AIGC · AI Image Generator · Acceptance

## 1 Introduction

In recent years, the surge in Artificial Intelligence (AI) has catalyzed revolutionary changes across a myriad of sectors, encompassing healthcare, education, transportation, commerce, politics, finance, security, and even warfare [5]. This influence unmistakably extends to the realm of digital arts and creative content generation.

Delving deeper into the technology, AI Image Generators, such as Midjourney or Stable Diffusion, are underpinned by neural networks or machine learning algorithms. These neural networks, mimicking a rudimentary brain, comprise numerous interlinked elementary units. Predicated on the task at hand, these networks analyze the artworks uploaded to their database, identifying imagery, techniques, and stylistic hallmarks, subsequently leveraging this newfound knowledge in creative endeavors [14].

The booming market for generative AI has witnessed the emergence of a multitude of AI Image Generators. A thorough investigation into AI Image Generators, as AI-driven software applications, is imperative to pinpoint the key elements affecting user

receptivity and intent to use. By illuminating these factors, we can offer valuable insights for enhancing user experience, refining software design, and promoting wider adoption among artists and creative professionals.

The primary objective of this study is to delve into the user acceptance of AI Image Generators and probe the influencing factors that propel their adoption. Specifically, this research aims to:

First, investigate the influence of key factors such as creativity, accuracy, quality of illustration, interactivity, and efficiency on users' intent to accept.

Second, examine the mediating effects of perceived usefulness and perceived ease of use on the relationship between the identified factors and user acceptance.

Third, offer insights and recommendations for the development and enhancement of AI-driven art content generation software, fostering its integration into the arts community.

To accomplish these research objectives, we will employ a mixed-methods approach, marrying quantitative surveys with qualitative interviews. Our subjects will comprise artists, designers, and creative professionals with experience in using AI Image Generators. Data analysis techniques, such as regression analysis and thematic analysis, will be utilized to study the interrelationships between variables and uncover underlying patterns and themes.

## 2 Literature Review

### 2.1 AI-based Art Content Generation and Relevant Theoretical Frameworks

The intersection of computer science, specifically AI, and artistry is primarily attributed to the emergence of theoretical frameworks like Generative Adversarial Networks (GANs) and Variational Autoencoders (VAEs) [2].

Key theoretical frameworks employed in AI-based art content generation encompass GANs, VAEs, and Convolutional Neural Networks (CNNs).

Firstly, the Generative Adversarial Network (GAN) is a deep learning architecture devised for the creation of novel images and artworks. Comprising a generator and discriminator, the GAN operates as a tandem of neural networks. While the generator processes the image, the discriminator evaluates it, fostering a continuous symbiotic tug-of-war of learning. Through iterative training, GANs have proven adept at crafting astonishingly lifelike synthetic images, as showcased by creations like DeepArt and DeepDream. This innovation has profoundly accelerated AI's application in the visual art creation process [2].

Secondly, Variational Autoencoders (VAEs) function as probabilistic models tailored for learning and generating data distributions. Within generative artistry, VAEs can craft new images mirroring specific characteristics by learning the latent space representations of input imagery [10].

Lastly, the Convolutional Neural Network (CNN) is a deep learning model intrinsically designed to handle grid-like structured data such as images. Through convolutional layers, CNNs autonomously and adaptively decipher spatial hierarchical features, proficiently recognizing images and videos. Based on this technology, AI-driven art content generation achieves feats like style transfer [7].

While these frameworks differ in their generative techniques and structures, their unified goal is the creation of new artistic content. Typically rooted in deep learning and supported by robust neural networks, they can be synergistically combined to accomplish more intricate tasks.

## 2.2 AI-based Art Content Generation and Relevant Theoretical Frameworks

User acceptance refers to the user's attitude and acceptance of a technology, product, or service. Its research can assess and predict users' attitudes towards new technologies. Key models proposed in past literature, like the Technology Acceptance Model (TAM), the Unified Theory of Acceptance and Use of Technology (UTAUT), and the Extended Expectation-Confirmation Model (EECM), are employed to examine user intentions towards new technology. Of all the information system usage theories, TAM, introduced by Davis in 1989, stands out as one of the most influential and commonly applied theoretical frameworks for understanding technological acceptance. The TAM, built on the foundation of the Theory of Reasoned Action (TRA) and the Theory of Planned Behavior (TPB), aims to predict user intention through two perceived attributes [4].

Numerous studies reveal that a user's perception of the usefulness of a technology or system plays a significant role in influencing its acceptance and adoption behaviors. For the AI Image Generator, when users deem it as a valuable tool that delivers relevant and real-time information, personalized recommendations, and efficient drawing capabilities, they're more inclined to embrace it. Thus,

*H1: Perceived usefulness significantly affects the intention to accept AI drawing tools.*

Research indicates that users' perceptions of the ease of use of a technology or system critically affect their acceptance and adoption intentions. When users find the AI Image Generator user-friendly, having an intuitive interface and straightforward operation, it positively impacts their acceptance intentions. This perceived ease of use is vital in shaping user attitudes and behavioral intentions towards new technologies. Therefore,

*H2: Perceived ease of use significantly influences the intention to adopt AI drawing tools.*

For users of the AI Image Generator, perceived ease of use is paramount as it directly affects their perception of the software's usefulness. When users find the AI Image Generator's interface to be intuitive, easy to learn, and operate, they can better understand and master its features. They'll perceive the AI Image Generator as a practical and valuable tool since they can effortlessly harness its diverse functionalities during usage, thereby enhancing their perception of the software's usefulness. Thus,

*H3: Perceived ease of use significantly influences the perceived usefulness of AI drawing tools.*

## 2.3 Characteristics of AI Image Generator

AI Image Generators are distinguished by their adaptability. They can mimic artistic styles, autonomously generate artworks, and assist in creation, thus allowing artists to materialize their ideas more efficiently [11]. Additionally, they possess the traits of

versatility and diversity. By referencing a multitude of artworks, they can reproduce the unique techniques and styles of different artists, rendering diverse aesthetic styles [12].

AI-driven artistic content generation has recently garnered significant attention. Research in this domain has explored the capacities and limitations of AI systems, their influence on the creative process, and perceptions towards AI-generated art. However, the user acceptance of AI Image Generators like Midjourney requires further exploration.

Creativity is the key for users to measure the utility of artificial intelligence image generators. This ability includes positive and useful creative ideas, products, and innovative processes. Users' self-efficacy can be improved when they believe in their creative potential [8]. Thus,

*H4: Creativity significantly influences the perceived usefulness of AI drawing tools.*

Accuracy, given the subjective nature of artistic preferences, is paramount. AI content generators cater to individuals with diverse artistic tastes and preferences. This accuracy in reflecting user preferences enhances user trust and satisfaction, influencing their intention to use the software. Thus,

*H5: Accuracy substantially affects the perceived usefulness of AI drawing tools.*

The quality of the generated image is a critical factor in assessing the usefulness of AI Image Generator software. This quality is reflected in the clarity, detail, realism, and artistic effect of the images. When users feel that the images generated by the software are of exceptional quality and meet their artistic standards, it reinforces their perception of the software's utility. Therefore,

*H6: The quality of the generated artwork significantly affects the perceived usefulness of AI drawing tools.*

The quality of the artwork generated is an important factor affecting how users perceive the ease of use of the AI Image Generator. The quality can be measured in terms of image clarity, detail, realism, and artistic effect. When users perceive the artwork generated by the software as high-quality and in line with their artistic standards, they find it easier to master and use. Thus,

*H7: The quality of the generated artwork significantly impacts the perceived ease of use of AI drawing tools.*

Interactivity is a key feature of the AI Image Generator. Through touch screens, gesture recognition, or drawing pads, users can directly participate in the drawing process, receiving real-time feedback. This interactivity strengthens the bond between users and the software, elevating the user experience and fostering greater engagement and satisfaction. Its interactive capabilities attract users to be actively involved in the creation process. With an intuitive interface and instantaneous feedback, users can explore and experiment more freely, which enhances their connection and engagement with the software. Therefore,

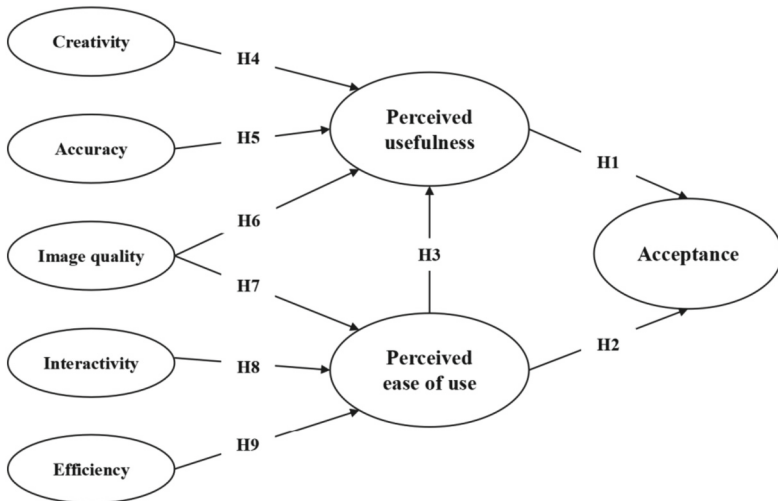
*H8: Interactivity significantly affects the perceived ease of use of AI drawing tools.*

Efficiency is another pivotal attribute of the AI Image Generator, encompassing both software performance and streamlined workflows. The software excels when processing large images or intricate effects, maintaining high speeds and smooth operations. Additionally, the AI Image Generator offers a user-friendly workflow, enabling users to complete their creative tasks with increased efficiency. This heightened efficiency inclines users to adopt the software, relishing the convenience and outcomes it offers.

The software's efficiency significantly influences how users perceive its ease of use. Therefore,

*H9: Efficiency significantly affects the perceived ease of use of AI drawing tools.*

The following proposed conceptual framework illustrates the relationships among variables in this study (Fig. 1).



**Fig. 1.** Conceptual model.

### 3 Research Methodology

For this study, we predominantly employed a questionnaire survey method to gather sample data. After meticulous selection from existing measurement scales, modifications were made, and new scales were integrated to construct the research questionnaire. Prior to its official distribution, a preliminary survey was conducted on a smaller scale. Feedback and suggestions from various sources led to revisions, culminating in the finalized questionnaire version. Once data collection was complete, we utilized the SPSS statistical software to undertake a descriptive statistical analysis, which provided insights into the demographics of our sample and their experiences with the AI Image Generator. Additionally, we rigorously verified the reliability and validity of our sample data, ensuring the accuracy of our research findings.

We use TAM as a research method because it has a significant advantage. The structure of the TAM model is relatively simple, easy to understand and operate, and is supported by extensive empirical research. It can study people's acceptance or willingness to accept new technologies and information systems. It is not only easy to measure but also can be extended and modified according to the needs of specific research. On the whole, TAM is very suitable for the research method of this study.

## 4 Data Analysis and Results

### 4.1 AI-based Art Content Generation and Relevant Theoretical Frameworks

The questionnaire design was rooted in a comprehensive review of pertinent literature. It was bifurcated into two sections: one delving into the basic demographics of the respondents, and the other probing into their use of the AI Image Generator and the associated influential factors. The items in the latter were constructed to measure the variables present in our theoretical model. A Likert five-point scale was employed for the questionnaire setup.

The primary intent of the questionnaire was to investigate users' interactions with the AI Image Generator and the factors affecting this interaction. For the actual survey, we used the "Questionnaire Star" platform to create the survey, which was then disseminated online at random. The survey was active from July 29 to August 14, 2023. It comprised 16 questions in total. Utilizing a combination of snowball and judgment sampling techniques, we gathered 412 responses. Of these, 343 were deemed valid, resulting in an effective response rate of 83.25%. The study mainly targeted users of the AI Image Generator. In terms of the demographic breakdown of the respondents, 73.78% were between the ages of 18 and 24, and 18.73% ranged from 25 to 34 years old. Moreover, undergraduates made up 57.35% of the sample, while postgraduates accounted for 28.82%.

The variables of this measurement include Acceptance, Perceived usefulness, Perceived ease of use, Creativity, Accuracy, Image quality, Interactivity, Efficiency, and so on, all of which refer to the previous maturity scale. Acceptance set up five measurement items [16], such as "Using AI image generator is a great choice for me." Perceived usefulness has set up a total of 5 measurement items [6], including "Using AI image generator made the process of creating art easier and more effortless for me." Perceived ease of use sets four measurement items [9], such as "Learning to use AI image generator has been easy for me." Creativity set four measurement items [1], such as "AI image generator is a creative tool for creating artwork." Accuracy set up four measurement items [15], such as "The generated images in AI image generator are based on user input prompts." Image quality sets five measurement items [3], such as "The imaging styles generated by AI image generator are comprehensively diversified." Interactivity sets five measurement items, such as "The interactive features of AI image generator meet my artistic requirements." Efficiency sets five measurement items, such as "Using an AI image generator is user-friendly and easy for me to operate[13]."

### 4.2 Skewness and Kurtosis Statistical Analysis

In data analysis, skewness and kurtosis are typically used to determine the normality of the data. The results show that the absolute values of the skewness for each variable factor in this measurement (with the exception of CR1, CR2, AC1, AC3, and PU1) are all less than 1, and the absolute values for kurtosis are all less than 7. This largely indicates conformity to univariate normality. Specifically, CR1 (with an absolute skewness value of 1.238), CR2 (1.017), AC1 (1.110), AC3 (1.043), and PU1 (1.171) all approach a value of 1. This suggests that these factors align with the trend of univariate normality. However,

due to constraints in the time and budget allocated for the survey distribution, there was an insufficiency in the collected sample data, which resulted in a non-significant normality. Subsequent experiments could address this issue by increasing the sample size.

Additionally, the Cronbach's Alpha values for each sub-item are all greater than 0.75 (ranging from 0.754 to 0.874), verifying that the internal validity of each measurement variable is sound.

### 4.3 Variable Correlation Analysis

The data analysis results show that the absolute values of the correlation coefficients for each measured variable are all greater than 0.4 and fall within the 0.491 to 0.809 range, indicating a moderate correlation among the variables.

Furthermore, some variables exhibit absolute correlation coefficients greater than 0.7. For instance, the correlation coefficient between creativity and interactivity has an absolute value of 0.711; between interactivity and usefulness, it's 0.809. This indicates a high degree of correlation between these variables.

### 4.4 Variable Correlation Analysis

This path analysis consists of four sets of evaluations. In the first set, perceived usefulness and perceived ease of use are the independent variables, with acceptance intention as the dependent variable. The second set employs perceived ease of use as the independent variable, focusing on perceived usefulness as the dependent variable. The third set has creativity, accuracy, and drawing quality as independent variables, targeting perceived usefulness as the dependent variable. For the fourth set, drawing quality, interactivity, and efficiency serve as independent variables, with perceived ease of use being the dependent variable.

The first set of path analysis. Typically,  $R^2$  (the square of the multiple correlation coefficient) indicates the extent to which a model fits the data. The data analysis results show that the measured data has an  $R^2$  value of 0.653, significantly greater than 0. This demonstrates that the data from our sample measurement has a robust explanatory power.

A significant ANOVA indicates that at least one independent variable has explanatory power. Given that the ANOVA value in this group of data analysis results is 0.000, which is less than 0.05, this implies that at least one independent variable is related to the dependent variable.

If the p-value derived from the T-test is less than 0.05, it indicates that the corresponding independent variable has a significant impact on the dependent variable. And data reveal that both perceived usefulness and perceived ease of use have p-values of 0.000, significantly less than 0.05. This signifies that both perceived usefulness and ease of use have a notable influence on acceptance intention.

A Durbin-Watson test value close to 2 indicates the data's independence. With a test value of 2.073, which is proximate to 2, the data demonstrates good independence. Moreover, the VIF values for both perceived usefulness and ease of use are less than 5, indicating the absence of multicollinearity.

The second set of path analysis. The data analysis results show that with an R<sup>2</sup> value of 0.384, exceeding 0, it suggests that this group's data provides a moderate explanatory strength.

The ANOVA value stands at 0.000, which is below the 0.05 threshold, indicating that at least one independent variable is significantly related to the dependent variable. Notably, the p-value for perceived ease of use is a striking 0.000, significantly less than 0.05, which signifies its substantial influence on perceived usefulness. Additionally, the Durbin-Watson test value for this group is 1.801, closely approximating 2, suggesting a commendable independence of the data. The VIF value for perceived ease of use in this group's measurement is significantly below 5, which implies an absence of multicollinearity.

The third set of path analysis. The data results show that the R<sup>2</sup> value is 0.604, which is significantly greater than 0, indicating that the regression model is meaningful for this group. The ANOVA value was 0.000, less than 0.05, indicating that at least one independent variable was significantly correlated with the dependent variable. Specifically, the p-values of Creativity, Accuracy, and Image quality were significantly less than 0.05, between 0.000 and 0.007. This shows that creativity, accuracy, and painting quality have an important impact on perceived usefulness. In addition, the Durbin-Watson test value of this group is 1.735, which is approximately 2, indicating that the data has good independence. In this group of measurements, the VIF values of the independent variables (Creativity, Accuracy, and Image quality) are all lower than 5, indicating that there is no multicollinearity problem.

The fourth set of path analysis. With an R<sup>2</sup> value of 0.595, notably exceeding 0, this suggests that the regression test for this group possesses a robust explanatory capability. The ANOVA value registers at 0.000, which is below the 0.05 threshold, implying that at least one independent variable is significantly related to the dependent variable. Moreover, the Durbin-Watson test value for this set is 1.973, hovering close to 2, affirming a commendable data independence. In this group's measurement, the VIF values for the independent variables—Image quality, Interactivity, and Efficiency – all stand below 5 (2.263–3.484), indicating no issues of multicollinearity.

Unstandardized coefficients are used to gauge the significance of regression coefficients and are typically utilized in the regression model equation. In contrast, standardized coefficients are employed to ascertain the extent to which independent variables influence dependent variables. A larger value indicates that the variable exerts a more potent impact on the dependent variable. As shown in Table 1, this test will use the non-standardized coefficient B value and P value in the previous four groups of path analysis to be used in the hypothesis test table and the subsequent path analysis chart.

As shown in Table 1, hypotheses H1, H2, H3, H4, H5, H6, H8, and H9 are confirmed.

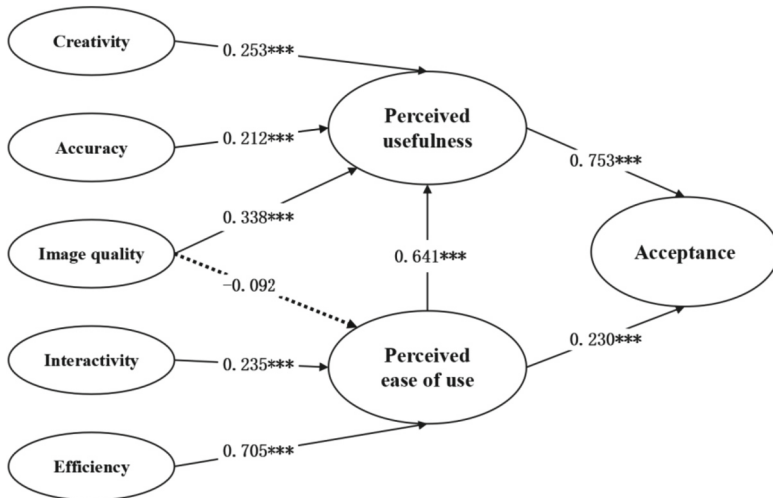
As depicted in Fig. 2, the model has been refined based on data from the preceding four path analyses and hypothesis tests. The unstandardized coefficients for the paths all consistently exceed 0.1, specifically ranging between 0.183 and 0.753. This indicates that the corresponding predictor variables significantly influence their outcome variables. Most prominently, the effect of perceived usefulness on the intention to accept stands out, boasting an unstandardized coefficient of 0.753.



**Table 1.** Hypothesis testing.

The hypotheses	Path coefficients	P-values	Results
H1 Perceived usefulness → Acceptance	.753	***	yes
H2 Perceived ease of use → Acceptance	.230	***	yes
H3 Perceived ease of use → Perceived usefulness	.641	***	yes
H4 Creativity → Perceived usefulness	.253	***	yes
H5 Accuracy → Perceived usefulness	.212	***	yes
H6 Image quality → Perceived usefulness	.338	***	yes
H7 Image quality → perceived ease of use	-.092	n.s	no
H8 Interactivity → Perceived ease of use	.235	***	yes
H9 Efficiency → Perceived ease of use	.705	***	yes

Note: \*\*\*:  $p < 0.001$ , \*\*:  $p < 0.01$ , \*:  $p < 0.05$

**Fig. 2.** Path analysis.

## 5 Conclusions

This study employed TAM to investigate how characteristics of artificial intelligence art generation software (such as creativity, accuracy, paint quality, interactivity, and efficiency) influence perceived usefulness and perceived ease of use. The goal was to predict user acceptance of AI art generation software. Our empirical research yielded several insights.

Hypotheses 1 and 2 of this study confirm positive relationships between perceived usefulness, perceived ease of use, and user intentions towards AI Image Generator. The

TAM framework supports these findings, showing that positive evaluations of technology's benefits and value, as well as smooth visual design and interactions, contribute to user acceptance. Both perceived usefulness and ease of use address user needs and enhance the user experience, leading to greater adoption of AI Image Generators.

Hypothesis 3 confirms that the user's perceived ease of use has a positive impact on perceived usefulness, and this effect is very significant. Users feel relaxed about the use of AI Image Generator, which will increase their sense of efficacy in the use of AI Image Generator.

Hypotheses 4, 5, and 6, we identified creativity, accuracy, and image quality as salient features of the AI Image Generator that significantly impact users' perceived usefulness. Users relish the experience of crafting artwork with a creative tool. Users utilize the AI Image Generator for assisted creation, which in turn provides them with information and inspiration. Thus, user perceptions of feedback usefulness tend to be holistic. In this study, accuracy, and image quality as salient features of the AI Image Generator that significantly impact users' usefulness was confirmed.

Hypotheses 7, 8, and 9 suggest that while image quality positively impacts perceived usefulness, it does not affect perceived ease of use. From this perspective, for perceived usefulness, users using AI Image Generators focus on achieving their goals, focusing on the efficiency and interactivity of AI Image Generators. Among them, hypothesis 8 affirms that interactivity positively affects perceived ease of use. The smoother and easier the interactive function is, the smoother the user experience is, and the enhanced perceived ease of use. Hypothesis 9 confirms efficiency's significant positive impact on perceived ease of use.

This study delves deep into the user acceptance of AI Image Generators, offering a meticulous analysis tailored to the unique attributes of such tools. Beyond the conventional dimensions of perceived usefulness and ease of use, factors such as image quality, interactivity, creativity, and accuracy emerge as pivotal in shaping user adoption. These elements highlight the distinction between AI Image Generators and traditional digital utilities, underscoring the latent value of AI in artistic endeavors. Applying TAM further reaffirms the central roles of perceived usefulness and ease of use. These remain paramount when users evaluate novel technologies. Collectively, these insights offer potent guidance for the design, development, and promotion of AI Image Generators, aiding the industry in better catering to user needs.

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