Available online at
https://journal.uitm.edu.my/ojs/index.php/IJAD/index

e-ISSN: 2710-5776

International Journal *of* Art and Design 10(1) 2026, 321–334

International Journal *of* Art and Design

A Quantitative Semiotic Study: AI Applications in Museum Cultural and Creative Design

Zhang Mengni[1*], Azhari Md Hashim[2], Faryna Mohd Khalis[3]

[1,2] *Faculty of Art and Design, Universiti Teknologi MARA, Cawangan Kedah, Malaysia*
[3] *Faculty of Art and Design, Universiti Teknologi MARA, Shah Alam, Malaysia*

ARTICLE INFO

Article history:
Received 29 NOvember 2026
Revised 26 June 2026
Accepted 26 June 2026
Online first
Published 30 June 2026

Keywords:
AI art and creative products
Culture development
Quantitative research
Semiotic analysis

DOI:
10.24191/ijad.v10i1.cg85wy24

ABSTRACT

At present, it is evident that there has been an increasing phenomenon of the interrelation of AI with cultural and creative product development in museums, and this is gradually becoming a new drive to progress in the sector. Regarding cultural and creative practice, the use of algorithms enables one to access traditional culture cues which can be used to make effective reconstruction of a creative sort. Most of the literature available about cultural and creative items linked to AI are mainly based on qualitative orientation, where quantitative information would be needed if they wanted to estimate objectively the rate of consumers acceptance of these culturally-oriented products. The study has been established using the Peircean triadic sign-object interpretant paradigm. After collecting 375 valid questionnaires, the researchers analyzed data in SPSS using frequency analysis, multiple response analysis, and cross-tabulation. Results reveal old challenges that prevent AI adoption, such as wrong perception of culture features or insufficient expressiveness emotions. To solve this, they proposed three-dimensional actions (technology incorporation), improvement of the design process and institutional control to achieve higher quality innovations with AI-driven cultural planning in the museum context.

1. INTRODUCTION

Since AI technological progress is progressing at a greater speed, creating cultural and creative products in relation with the help of artificial intelligence has become another new trend in the cultural industry. It has been commonly recognized that artificial intelligence may be used to optimize design workflows and stimulate creativity. Still it brings into consideration various unexplored issues upon entering into the field of culture: perhaps the most critical question being what are all those cultural signs which AI could understand well enough to reflect the culturally entrenched messages. In regard to the experience, there exists skepticism over the fact that empowering through technologies might really offer extra layers in consuming artistic objects and thereby enhance cultural worth. However, this has not been made apparent as the most vital balance between the technological know-hows and the culturally sound condition has remained poorly examined up until now. The given matters are precisely what are considered by the current research study.

Semiotics as the form of its theoretical model is used in order to address these questions. Semiotics studies signs, the act of constructing meaning and cultural manifestation that are effectively applied when analyzing a symbolic system of culture and creative products. The foundation of the Peirce triadic model forms an AI analysis framework

2* Corresponding author. *E-mail address : 2022999123@student.uitm.edu.my*

suitable to be applied within a museum environment. A combination of both qualitative and quantitative methods is adopted to investigate the two processes behind incorporating the implementation of artificial intelligence into cultural and creative goods as well as the perceptions and attitudes of the consumers toward culturally new solutions made on the grounds of artificial intelligence. Further research will require the recognition of translation and reconstruction skills of the art of artificial intelligence concerning cultural symbols but also the cognitive responses and emotional reactions of the people to such creations made with AI. This type of research aims at producing fruitful communication between AI and heritage culture since it gives the conceptual base and example practice of innovation on issues of culture that can be performed with control over the work process carried out by museums.

2. LITERATURE REVIEW

The study explores the application of AI in developing cultural and creative products presented by museums. While there are other researches that have focused on this domain as much as they focus on how useful AI could be, this paper is less radical. It summarizes existing research results on research accomplishments through the prism of semiotics theory, and defines an area of artificial intelligence playing within design practices. Throughout the text various interconnected themes are elaborated on. These include the development of the technology of AI based on museum framework, semantics of cultural objects and their socially and culturally rooted nature of meaning production. The discussion also touches upon specific local realities such as indigenous Orang Asli during this process.

2.1 Current status of AI application in the museum's cultural and creative products

As of 2024 the technology underlying artificial intelligence design has been significantly developing. Diffusion models and generative adversarial networks are also enhancing their capacity to produce images, style transfer and visual compositions (Zhang, 2025). A museum oriented use of AI is going to be mainly focused on two aspects, namely digitizing culture symbols and automated development of design solutions. Its realization in a museum setting is very targeted as there are the main spheres of AI application identified, viz. cultural symbolisation digitalisation and automation of design output generation. The first refers that an image-recognition and deep-learning-enabled AI system extracts and organizes graphical attributes like motifs, colors palettes, structures into collections that enable saving and accessing traditional symbols heritage (Chen, 2025). Regarding the second, by combining text-to-image approaches with generating reference pictures it would help to develop visualizations under given themes or styles using AI efficiently. As was stated by Zhu, Xu, Qi (2024) that major improvements were attained in the visual quality based on iteration of model training and Zhang (2025) gives the case example of how cultural heritage designs can be recreated under the IP Mawangdui of the Hunan museum using a research paper as evidence of AI-driven creation of new designs inspired by culture (Zhu et al., 2024; Zhang 2025).

Nevertheless, according to the available research works, the situation remains striking due to the low levels of critical analysis. Besides that, now a day more emphasis has been placed on the potentials of technology and efficiency improvements as it will take precedence over reviewing of what was done before. The specific issue regularly brought up by Fan and Casey (2025) is the susceptibility of artificial intelligence produced texts to mistakes including culturally mistaken portrayals or improper emotive language expressions. This kind of weakness can not be technical but epistemological since AI trained in pictorial representations may reproduce external features and overlook symbolic meaning of cultural images in human mentality. Also it could also become quite dangerous because output uniformity based on algorithmic optimization leads to creation of cultural homogeneity in the resulting outputs which needs to be closely watched. Finally, reliance on generative models will gradually weaken creative capacities of people creators.

2.2 The semiotic theory application in cultural and creative product design

The semiotics deals with exploring how symbols convey meaning. The semiotics has provided us the theory foundation to recognize that it is not easy at all that an artificial intelligence might analyze, change or even recreate

https://doi.org/10.24191/ijad.v10i1.cg85wy24

cultural heritage symbolism. One of the American researchers who were inspired by the theories of both Saussures (1916) and Pierce is Charles William Morris(1946) who developed an intricate semiotics system. Semantics, syntax and pragmatics are the three dimensions that relate in the semiotic system.

Semantics is the study of relationships between one symbol and another, that is, it explores the relationship between a symbol and what is intended by it as well as how symbols map to concepts. It considers organizing principles and rules in constructing combinations of symbols, which will show the mechanisms underpinning the way a group of symbols generates meanings upon encoding or decoding. On the other hand, pragmatics concerns itself with analysis on how symbols get implemented under particular sociocultural conditions including the choice of media, cognition process among people involved in interpreting the information, availability of channels to communicate and eventually the influence exerted by signs.

Based on the theory of semiotics, each artifact of culture is also able to transform into a sign-system created in combination with one of the so-called "signifiers", and significance of the appropriate idea of the so-called concept "signified". The above mentioned notion is getting more attention within the area of cultural and creative design nowadays. Cultural relic elements are recommended by Wang et al. (2025) as a signifier in the case of designing museum-based cultural and creative goods which are intended to be based on cultural memory and heritage of art and skills transmission. There are others who share these concepts: Zhao (2025). He suggests that designers could understand the possibility of using symbolic, informative or iconic function of culture signs better if they engaged themselves intensively in their studies. These products have nothing specific about them – they come either through cultural relics or conventional designs, but they live due to observers' perception, understanding, and vibrations.

In order to develop a cultural IP plan of the Qinling Museum through AI digital instruments as one of its means of representing and interpreting traditional symbols into contemporary language Shen (2024) implemented the theory of semiotics. Liang (2020) recommends taking on a three-tier strategy with surface-level literal translation, structural-level symbolic interpretation and deeper-level interpretative planning when it comes to studying cultural products in museum creative industries aimed at attracting visitors. This is evidence that semiotics could also serve as explanation behind the design processes as well as direct guide of the entire process of developing designs ranging between coming up with ideas and producing end-products.

2.3 The semiotics applicability in AI cultural and creative design

Semiotics is a unique assortment of concepts which may find efficient solutions to the answers previously sought. Semiosis involves examining how symbols are organized and transferred through them, an in-depth examination of semiotic approaches towards understanding the analysis, coding and combination of cultural representations throughout the course of designing AI systems. It has a particular enlightenment in such a regard with the semiotic framework developed by Charles W. Morris (1946) semantics, syntax and pragmatics). In addition, Weng et al. (2025) have provided explanations about the dimensions where semantics focuses on associations between form and representation; syntactics deals with rules regarding grouping together of symbols; and pragmatic research functions of symbols under specified application circumstances involving media, interpretation processes and communications effectiveness.

It can be easily noticed when discussing the issue of semiotics analysis as an AI-driven museum culture and creativity. Based on a study conducted by researchers at Huang (2025) there is a possibility of perceiving cultural relics like a multi-level symbol system. Such tangible properties such as shape, design and material become signifiers whereas their history, skills of craftsmanship, accumulated value are all regarded as so-called signifieds. The same thing says his publication from Chen (2025): AI with its features to identify pictures, analyze style or semantic content may reconstruct layers of signs once more. Semiotically speaking referent process might explain how tech has altered the traditional form into new language in the context of design. Like it was discussed above this is the reference between a particular sign and some other thing that this sign can refer or mean; specifically regarding the cultural designs it means that the conventional emblems enter into contemporary symbolic vocabularies generating novelty semantics within societies. New forms of combinations of symbols can be made through algorithmic synthesis and

https://doi.org/10.24191/ijad.v10i1.cg85wy24

style transfer employing historical patterns which do not have any original appeal but still address current aesthetic requirements.

Zhao (2025) further states that the symbolic, indicative and iconic connotations of cultural symbols may be analyzed and therefore help to enable designers to act with more purposefulness upon mobilizing those levels of meaning. It is gaining popularity in its use of semiotics as a tool in artificial intelligence-supported designing procedures. The digital tools based on the semiotic principles created by Shen (2024) in creating IP at Qinling Museum have evolved, traditional symbols are improved and transformed into contemporary concepts. Liang (2020) proposed a design approach with three-level strategy consisting of literal translation on the surface level, transformation on the structural level, and interpretation on the deep-level as a demonstration of what extent semiotics might provide when one considers the process at each point starting from the concept through the final product.

The existing research has a bias towards this particular tendency with most of the researchers viewing the semiotic framework as useful in improving design rather than perceiving it as an alternative way to critically discuss the constraints of technology. The fundamental issue that remains unexplored and has not been fully examined is, even with all its precision algorithms cannot give any answers regarding whether or not there is any possibility of actually addressing what could be termed interpreters within the symbolic activity? As per Peirce, interpretant cannot be perceived as an ultimate determination however like a process of continuous meaning-making among some kind of interpretive group. Also, AI discovers statistical correlation between various elements and therefore it cannot access those cultures in which symbols have a life.

2.4 Sociocultural context and indigenous cultural production: the case of the Orang Asli

While talking about how artificial intelligence affects product design within museums, social and cultural history often does not play a role. These foundations are what define the process of creation of cultural symbols as well as their distribution among people and perception by others. Semiotics asserts that symbols cannot be located inside meaning rather they are formed via some specific socio-cultural and historical systems where symbols are involved in those systems. It can also be seen when handling indigenous or marginalised cultures specifically. In most cases, symbolic systems employed by such communities are based on a logic unlike that underlying popular artificial intelligence models which operate according to principles of Western or East Asian cultural corpora.

One of the most outstanding examples of this can be found in Orang Asli in the Malay Peninsula. This group that numbers about 210 000 people and splits into 18 sub-groups has a thriving material culture, oral traditions, and symbolism of tremendous symbolic value. Nevertheless, many of these traditions remain undocumented, and do not occur frequently enough in mainstream museum narratives as would have been anticipated. Previous work on the topic indicates that the approach must adopt a participatory framework or community-based ideology. Nicholas (2000) and Tuck Po (2011) point out that the extraction and commercialization of cultural symbols without community consent is inherently a form of cognitive violence. The action wipes out every connection related to the signs simplifying it to another beautiful product with a sales intent. This raised ethical dilemmas on the issue of using curator power as well as on the way representation acquired its political nature at museums, where even more so artificial intelligence adds further complications to things. Those who are taught through images provided online cannot ever know about tales spoken by people of this ethnicity, their old-fashioned ways they used to practice among each other and laws they abide by that endow their lives to their signs. Even though attractive designs created may support some kind of invisible culture theft masked under the illusion of neutralization based on algorithms.

In the event of AstraZeneca which may be taken as a paradigm in the field of AI used in culture and creative design, there is also likely to be a certain common question why parsing and recombinant action of signs is unrelated to cultural comprehension. Following separation of the symbolic interpretive element into actual experience of people who are carrying cultures the result produced by AI is culturally shallow and superficial. This does not imply that it is necessary to discard design abilities that are enabled by implementing the concept of artificial intelligence but more importantly it calls on one to assume a greater responsibility when applying such a technology based on its moral

https://doi.org/10.24191/ijad.v10i1.cg85wy24

implications. The population needs an understanding of the difference between statistical pattern recognition and authentic interpretation information.

3. METHODOLOGY

The previous literature on the topic has a lot as most of the research done on the subject are based mostly on description of cases and qualitative approaches rather than the use of quantified data, thus users' influence or approval does not have an objective nature. The solution to this issue is that the given paper, which will apply semiotics theory, will attempt to consider a quantitative approach in studying how exactly AI technology can be applied within cultural & creative museum design and its impact.

The methodology value of the questionnaires used in this paper is highly significant. In line with what was stated by Zhu (2023), questionnaires could also be beneficial to the researchers in their attempt to learn more about the existing state of knowledge within a particular discipline as well as formulate some patterns on evidence-based research. Furthermore, Kruse et al. (2023) noted that because it has a standard structure questionnaires can contribute towards consistency when collecting information and similarity between collected information, both of which are important for subsequent statistical analysis or reasonable deductions thereafter. A purposeful sampling method was used so that participants possessing relevant knowledge or experience were chosen in the process of conducting the study at which point structured and unstructured interviews were carried out among probable respondents who had useful details about issues investigated in this paper as shown visually on Fig. 1 representing all stages included, starting with literature review and ending on writing up the findings and conclusions.

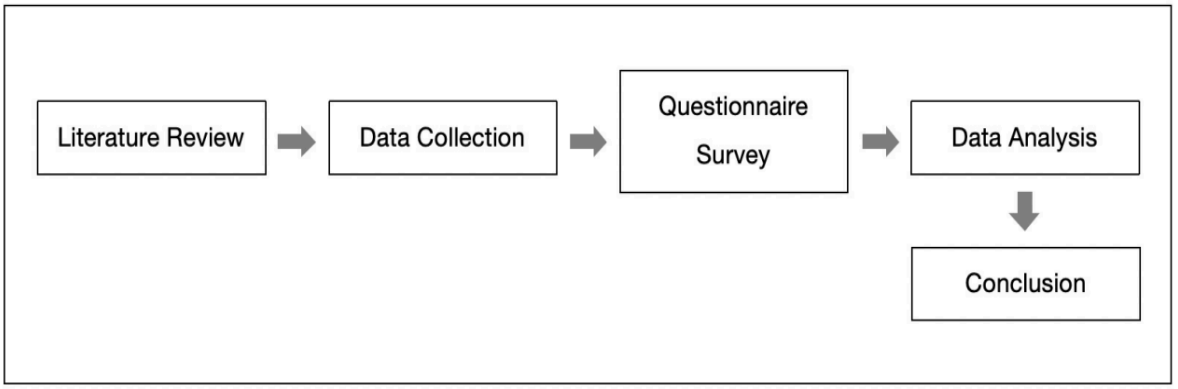

Fig. 1. Procedure of methodology
Source: Author, 2025

3.1 Questionnaire

Peirce's semiotic "triadic relationship" serves as the core theoretical framework for the research analysis, establishing the three fundamental dimensions corresponding to the study. "Sign" refers to the cultural and creative forms of artificial intelligence, "object" refers to cultural connotations, and "interpretant" refers to users' cognition and attitude. The entire process of questionnaire survey analysis is shown in Fig. 2. The questionnaire consists of three parts. The initial part of the questionnaire examines the background characteristics of the respondents to determine the factors that may influence the formation of the interpretant. The second part focuses on the cultural symbols generated by AI and their related interpretants, paying attention to users' attitudes, behavioral intentions, and participation. The final part of the questionnaire is used to explore the public's acceptance of artificial intelligence as a cultural interpretation tool in the specific context of museums.

During the project development stage, researchers designed specific measurement items for each section of the questionnaire. The first section included four questions to capture demographic and experiential variables such as age, occupation, frequency of museum visits, and familiarity with artificial intelligence technology. To measure

https://doi.org/10.24191/ijad.v10i1.cg85wy24

respondents' overall evaluation of AI cultural products and their purchase intentions, five related questions were set in the second section. The final section utilized four questions to assess the audience's views on AI museum cultural and creative products, such as experience preferences and opinions on technology application. For the collection of questionnaire data, this study distributed questionnaires through online channels. After screening out invalid data, SPSS was used for analysis.

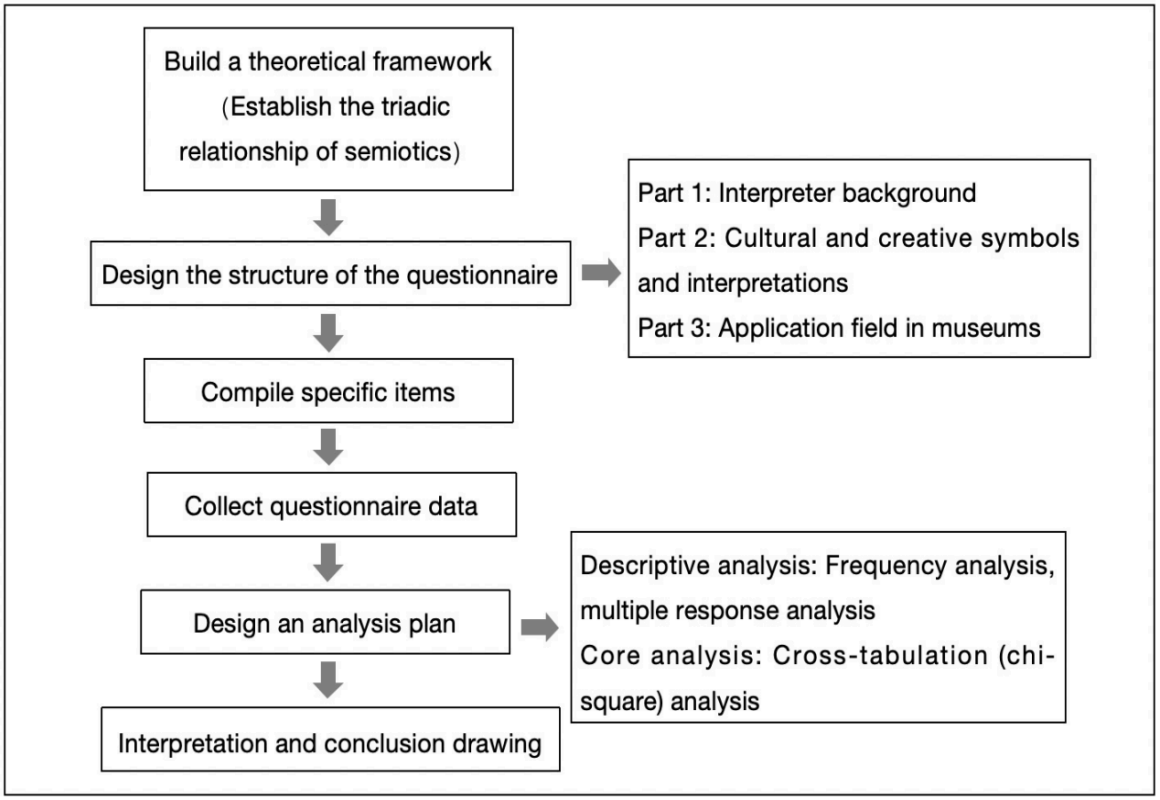

Fig. 2. Procedure of the questionnaire survey
Source: Author, 2025

4. ANALYSIS AND FINDINGS

The study establishes an analytical framework based on Peirce's semiotic "triadic relationship". Here, "sign" refers to the cultural and creative expressions generated by artificial intelligence, "object" represents the cultural connotations they carry, and "interpretant" reflects users' cognition and attitude towards the sign. These dimensions form the basis for subsequent research (as shown in Fig. 3).

The questionnaire was distributed online, and a total of 400 responses were collected. After screening, questionnaires with incomplete answers or exhibiting regular patterns were excluded, resulting in 375 valid data sets. All data were analyzed using SPSS, including descriptive statistics, multiple response analysis, and chi-square cross-tabulation.

https://doi.org/10.24191/ijad.v10i1.cg85wy24

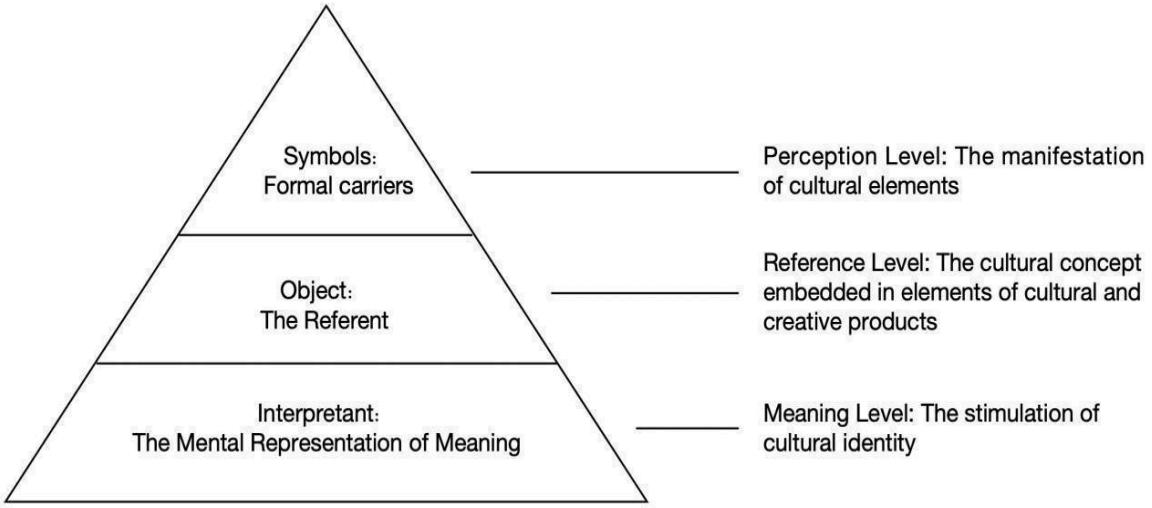

Fig. 3. The semiotic triadic relationship and its application in the design of cultural and creative products
Source: Author, 2025

4.1 Multiple response analysis

Multivariate response analysis is a statistical method for analyzing multiple-choice questions, applicable when respondents can select multiple options. It primarily examines selection patterns for options using two indicators: response rate and penetration rate. (The sum of the response rates of all options is 100%. The penetration rate can be used to compare the user participation levels of different options. Since each respondent can select multiple options, the sum of the penetration rates of each option usually exceeds 100%.)

Table 1. Summary table of response rates and penetration rates

Name	Option	response		Penetration rate (%)
		n	Response rate %	
What advantages do you think AI technology can bring to the design of cultural and creative products?[Multiple]	Innovativeness and uniqueness: Generate unexpected design styles and elements.	103	14.090	27.467
	Personalization and customization: Produce one-of-a-kind products based on users' preferences.	168	22.982	44.800
	High efficiency and low cost: Rapidly generate a large number of design sketches and plans.	249	34.063	66.400
	Revitalization of cultural elements: Reinterpret and reinterpret traditional culture in novel ways.	211	28.865	56.267
	Others	0	0.000	0.000
	Total	731	100.00	194.933
What concerns do you have about AI-generated cultural and creative products? [Multiple]	Copyright and originality: The source of the design is unknown, and the copyright ownership is ambiguous.	281	33.693	74.933
	Risk of homogenization: It may lead to a convergence of design styles.	203	24.341	54.133
	Lack of emotion and story: The works lack the emotion and depth imparted by the designer.	218	26.139	58.133

https://doi.org/10.24191/ijad.v10i1.cg85wy24

	Difficulties in craftsmanship realization: Unconventional designs may be challenging to produce physically.	132	15.827	35.200
	Others	0	0.000	0.000
	Total	834	100.00	222.400
What aspects do you value most in your museum visit experience? [Multiple]	The historical and artistic value of the exhibits	111	13.325	29.600
	The visual appeal and immersive experience of the exhibition design	171	20.528	45.600
	The fun and involvement of the interactive experience	211	25.330	56.267
	The convenience and depth of knowledge acquisition	210	25.210	56.000
	The comfort of leisure and social interaction	130	15.606	34.667
	Total	833	100.00	222.133
Which of the following AI technologies have you experienced in museums?[Multiple]	AI smart tour guide: personalized recommendation of visiting routes, intelligent voice explanations	106	14.324	28.267
	AR/VR immersive experience: "restoring" historical scenes or "disassembling" the structure of cultural relics through devices	206	27.838	54.933
	AI digital human tour guide: interactive explanations by virtual characters	206	27.838	54.933
	AI interactive devices: interaction with exhibits through gestures, movements, etc.	207	27.973	55.200
	None of them have been experienced.	15	2.027	4.000
	Total	740	100.00	197.333
What do you think are the most valuable aspects of AI technology in enhancing the museum visit experience?[Multiple]	Enhance interactivity and fun to bring history to life	122	14.489	32.533
	Offer personalized services to meet the in-depth needs of different tourists	194	23.040	51.733
	Lower the threshold of understanding by interpreting complex knowledge through visualization and storytelling	243	28.860	64.800
	Break through the limitations of time and space to achieve online virtual tours and cultural relic appreciation	184	21.853	49.067
	Assist in the protection and research of cultural relics, and conduct restoration and dating through data analysis	99	11.758	26.400
	Total	842	100.00	224.533
What concerns might you have regarding the application of AI technology in museums? [Multiple]	Technical malfunctions affect the visiting experience.	158	16.826	42.133
	Excessive entertainment weakens the educational and serious nature of the museum.	148	15.761	39.467
	Privacy and security concerns arise as facial recognition and behavioral data are collected and used.	308	32.801	82.133

https://doi.org/10.24191/ijad.v10i1.cg85wy24

High equipment costs may lead to an increase in ticket prices.	195	20.767	52.000
Interpersonal communication decreases, and the interactive experience with real human guides is lost.	130	13.845	34.667
Total	939	100.00	250.400

The analysis, which combines response and penetration rates, helps distinguish among options in multiple-choice questions. Respondents have recognized the advantages of artificial intelligence technology in the field of cultural and creative design. The aspects of "high efficiency and low cost", "activation of cultural elements", and "personalized customization" are particularly prominent, and their high response rate and penetration rate also confirm the point.

Table 1 presents that the public still has concerns about cultural products generated by artificial intelligence. The public's worries mainly focus on "copyright and originality", "lack of emotional depth and narrative", and "the risk of homogenization". The analysis results reflect people's concerns about the authenticity of AI creations, especially regarding the humanistic core. In terms of preferences for museum visits, visitors are eager for more engaging, educational, and aesthetically valuable experiences. The audience considers "interactivity and participation", "accessibility and depth of knowledge acquisition", and "visual appeal and immersive exhibition design" as the top priorities.

The respondents also affirmed the value of AI in enhancing the museum experience, indicating that it has potential in public education. AI technology can "lower the cognitive threshold through visualization and narrative", "provide personalized visitor services", and "break the limitations of time and space through virtual visits". Regarding AI integration, the main concerns of people include "data privacy and security risks" and "the possibility of ticket price increases due to high infrastructure costs". The research findings suggest that although AI offers the potential for innovation, its application needs to be carefully weighed against multiple factors, such as ethics.

4.2 Cross-tabulation (Chi-square) analysis

Chi-square analysis is used to test the relationship between two categorical variables (X and Y) and whether there is a statistically significant difference. When conducting the analysis, the judgment is usually made based on the p-value, such as whether it is lower than common standards like 0.05, 0.01, or 0.001. If a significant difference exists, the specific percentage distribution of each option can be further compared to describe the actual manifestation of the difference.

Table 2. Cross-tabulation (chi-square) analysis results 1. (n = 375)

Name	Option	What is your age group					total	X^2	p
		under 18	19 - 25	26-35	36-45	over 46			
What is your overall attitude towards cultural and creative products designed by AI (such as AI-generated paintings, patterned postcards, T-shirts, etc.)	Very interested	2(13.33)	15(10.56)	16(12.50)	4(5.88)	7(31.82)	44(11.73)	29.943	0.018*
	Somewhat interested	1(6.67)	16(11.27)	15(11.72)	2(2.94)	4(18.18)	38(10.13)		
	Neutral	2(13.33)	20(14.08)	24(18.75)	11(16.18)	2(9.09)	59(15.73)		
	Not very interested	2(13.33)	40(28.17)	42(32.81)	20(29.41)	6(27.27)	110(29.33)		
	Completely reject	8(53.33)	51(35.92)	31(24.22)	31(45.59)	3(13.64)	124(33.07)		
	Total	15	142	128	68	22	375		

* p<0.05 ** p<0.01 *** p<0.001

https://doi.org/10.24191/ijad.v10i1.cg85wy24

As shown in Table 2, a chi-square test was conducted to analyze the differences in attitudes towards AI-generated cultural products among respondents of different age groups. The products included AI-generated artworks, patterned postcards, and T-shirts. The test results indicated that the p-value was 0.018, which was lower than the conventional significance level of 0.05. Therefore, the differences in attitudes among age groups were statistically significant among respondents aged 18 and under, 53.33% expressed "complete rejection and no collection value", a proportion significantly higher than the average of 33.07% in the overall sample. In contrast, only 13.64% of respondents aged 46 and above held the same view. As a result, it clearly shows that younger people have a significantly stronger tendency to reject AI-generated cultural products.

Table 3. Cross-tabulation (chi-square) analysis results 2. (*n* = 375)

Name	Option	What is your occupation?							Total	X^2	p
		Student	Cultural creation/design/art practitioner	Education/research worker	Technology/Internet practitioner	Corporate employee	Freelancer	Other			
If there was a personalized cultural and creative product generated by AI based on your description (such as "Tang Dynasty style + space elements"), how willing would you be to purchase it?	Very willing	6(11.54)	9(20.00)	8(10.13)	5(6.58)	10(12.66)	4(11.43)	4(44.44)	46(12.27)		
	relatively willing	1(1.92)	6(13.33)	7(8.86)	10(13.16)	4(5.06)	10(28.57)	3(33.33)	41(10.93)		
	General	3(5.77)	5(11.11)	7(8.86)	9(11.84)	7(8.86)	7(20.00)	0(0.00)	38(10.13)		
	Not willing at all	20(38.46)	6(13.33)	19(24.05)	23(30.26)	18(22.78)	3(8.57)	2(22.22)	91(24.27)	57.543	0.000***
	Completely unwilling	22(42.31)	19(42.22)	38(48.10)	29(38.16)	40(50.63)	11(31.43)	0(0.00)	159(42.40)		
	Total	52	45	79	76	79	35	9	375		

* p<0.05 ** p<0.01 *** p<0.001

Based on the analysis of the purchase intention of personalized AI cultural and creative products according to the professional background (as shown in Table 3), it is found that there is a significant correlation between the type of occupation and the purchase intention ($p = 0.000 < 0.05$). Professional identity significantly affects the acceptance of AI personalized cultural and creative products. Among enterprise employees, 50.63% indicated "completely unwilling to purchase", which is higher than the overall average of 42.40% in the sample, indicating that the resistance of enterprise employees is significantly stronger. None of the respondents in the "other occupations" group chose "completely unwilling to purchase", showing that this group holds a completely open attitude.

Table 4. Cross-tabulation (chi-square) analysis results 3. (n = 375)

Name	Option	What is your level of understanding of artificial intelligence (AI) technology?				Total	X^2	p
		Very familiar	Relatively familiar (know common applications and can use them)	Generally familiar (have heard of some applications)	Not very familiar			

If there was a personalized cultural and creative product generated by AI based on your description (such as "Tang Dynasty style + space elements"), how willing would you be to purchase it?	Very willing	22(32.84)	13(19.40)	8(5.03)	3(3.66)	46(12.27)	137.720	0.000***
	relatively willing	22(32.84)	9(13.43)	8(5.03)	2(2.44)	41(10.93)		
	General	15(22.39)	8(11.94)	11(6.92)	4(4.88)	38(10.13)		
	Not willing at all	3(4.48)	17(25.37)	44(27.67)	27(32.93)	91(24.27)		
	Completely unwilling	5(7.46)	20(29.85)	88(55.35)	46(56.10)	159(42.40)		
	Total	67	67	159	82	375		

* p<0.05 ** p<0.01 *** p<0.001

Table 4 shows that the p-value obtained from the test is 0.000, which is lower than 0.05, indicating a significant difference. In the cross-tabulation data, among those who claim to be "not very familiar" with AI technology, 56.10% said they were "completely unwilling to purchase", a proportion much higher than the overall average of 42.40% in the sample. Among those respondents who are "very familiar" with AI technology, only 7.46% held the same view. From the analysis, it can be concluded that respondents with less knowledge of AI are significantly more resistant to such products. In contrast, those familiar with the technology have a much higher acceptance rate.

Table 5. Cross-tabulation (chi-square) analysis results 4. (n = 375)

Name	Option	What is your level of understanding of artificial intelligence (AI) technology?				Total	X^2	p
		Relatively familiar (know common applications and can use them)	Generally familiar (have heard of some applications)	Not very familiar	Relatively familiar (know common applications and can use them)			
What advantages do you think AI technology can bring to the design of cultural and creative products? [Multiple]	Innovation and uniqueness: generating unexpected design styles and elements	43(26.71)	25(17.73)	25(8.56)	10(7.30)	103(14.09)	40.234	0.000***
	Personalization and customization: generating unique products based on user preferences	38(23.60)	35(24.82)	61(20.89)	34(24.82)	168(22.98)		
	High efficiency and low cost: quickly producing a large number of design sketches and plans	44(27.33)	43(30.50)	109(37.33)	53(38.69)	249(34.06)		
	Revitalization of cultural elements: reinterpreting and reenacting traditional culture in novel ways	36(22.36)	38(26.95)	97(33.22)	40(29.20)	211(28.86)		
	Total	161	141	292	137	731		

* p<0.05 ** p<0.01 *** p<0.001

To explore the respondents' understanding of AI technology and their views on AI in cultural and creative products, the p-value obtained was 0.000, which is far below the critical value of 0.05, indicating a significant correlation (as shown in Table 5). The percentage data in the table reflecting the multiple-choice questions are based on 731 responses rather than the number of respondents. The data reveal an interesting difference. Among all responses, the advantage of "high efficiency and low cost" was mentioned 249 times, accounting for 34.06% of the total. Among those who claimed to be "not very familiar" with AI, this advantage was mentioned 53 times, accounting for 38.69% of their responses, which is higher than the overall proportion. In contrast, those who claimed to be "very

https://doi.org/10.24191/ijad.v10i1.cg85wy24

familiar" with AI mentioned it only 44 times, accounting for 27.33% of their responses, which is lower than the overall level.

The analysis results reveal that different levels of technical literacy have an impact on people's varying considerations of the value of AI design. Respondents with less technical knowledge seem to focus more on the practical benefits of AI in terms of time and cost savings. In contrast, those with a stronger technical background have a more diverse range of concerns.

5. CONCLUSION

This study is about how to use semiotics theory as one of the approaches in designing cultural and creative items at museums with AI and how to assess how AI affects user perceptions and acceptance. This was accomplished by means of questionnaires that were administered to the respondents, and then this data has been studied.

According to the research findings, it can be inferred that with its assistance and generation of algorithms, AI has certainly added more in terms of depiction and diversity in visual form of cultural symbols. However, an AI-based system does not have accuracy when reading cultural symbols. With Peirce's triadic model analysis, AI performs well in the phase of symbol-carriers, however further development is required as far as understanding the objects depicted through a certain symbol is concerned. Interaction among interpretants (meaning: meanings entering the mind of a viewer) cannot be made entirely effective. Consumer opinion of the goods offered in the market due to AI will vary highly. The demographics and behavior such as demographic age group, education level and frequency of museum visits greatly affect acceptance and satisfaction rates. Cumulatively speaking, a general picture can be identified: conventional approach to implementing the museum design project based purely on human labor gives way to something new that enables access to other avenues of innovations while introducing some persistent challenges namely, cultural misunderstanding and inadequate expression of emotions.

This research will theoretically enhance the application of the semiotic model in creating AI culture. Inclusion of the Peirce triad design scheme into the design processes can offer different angles of how it might be useful. This study provides more insights on the benefits and challenges of employing AI as a carrier of symbols that enhances the discussion on the interaction between technology and culture.

The results of this study have practical applications not only in museums and among designers. Research shows that it can be done to create the human-machine collaboration system with an AI-based large scale analysis and identification of images with cultural background and value assessments by professionals. Its implementation depends largely on data quality used as the input variable into the AI model. Developing highly specialized digital collections inside the museum would positively contribute towards making the artificial intelligence services effective. To designers, this research underlines how it needs to ensure they integrate technological tools during design processes accompanied by a culture consciousness.

This should be highlighted to indicate that the paper is plagued with some shortcomings. Though there were enough people to conduct a survey, due to the sampling taking place in a given national context thus it did not provide all possible diversity of reactions to AI design under different cultural environments. When the reliance was placed on self-report measures there existed a chance that response bias would be introduced that might have been corrected by utilizing alternative forms of methodology in future studies through observing behaviors. Moreover, the studied AI systems can only reflect at best what they are today as far as innovation processes go and these advantages as well disadvantages need to be observed and evaluated consistently. Other research could proceed further to compare cultures, and application of ethnographic or experimental methods to determine the interaction between humans and the outputs of artificial intelligence manufacturing as well as reasons behind modifications resulting in technological advancement and changing view on it.

https://doi.org/10.24191/ijad.v10i1.cg85wy24

ACKNOWLEDGEMENTS/FUNDING

My supervisors, Dr. Azhari Bin Md Hashim and Dr. Faryna Binti Mohd Khalis were helpful to me due to their support and mentorship in the course of the study.

It is obvious that after the manuscript was submitted the writer had ensured his proper names and certain quite erudite phrases in a number of ways with help of Google Translator. Grammarly has helped the author to check grammar and edit the language. In this manner, there occurred an increase in similarity rates during detection stage for AI. The significant portion of the paper which includes research design, analysis of results, theoretical explanation and final results are completely original works done by the author.

CONFLICT OF INTEREST STATEMENT

The authors declare that this research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest. No funding was received for the conduct of this study and/or preparation of this article.

AUTHORS' CONTRIBUTIONS

Authors' Contributions To ensure proper credit and accountability, the individual contributions of the authors are specified as follows:
[Main Author Name 1. Zhang Mengni]: Substantial contribution to the conception and design of the work; and the acquisition, analysis, and interpretation of data.
[Corresponding Author Name 2. Azhari Bin Md Hashim]: Overall project supervision. Responsible for ensuring the integrity of the final manuscript.
[Co Author Name 3. Faryna Binti Mohd Khalis]: Overall project supervision.

DATA AVAILABILITY/SUPPLEMENTARY MATERIALS

No data/Theory-based:

Data sharing is not applicable to this article as no new datasets were generated or analysed during the current study.

ETHICS STATEMENT

This study was reviewed and approved by the Institutional Ethics Committee of Research Ethics Committee (REC). (Approval No: REC/07/2025 (PG/MR/406)). All procedures involving human participants/animal subjects were in fulfilment of the ethical standards of the 1964 Helsinki Declaration. Informed consent was obtained from all participants, and data anonymity was strictly maintained throughout the study.

REFERENCES

Chen, H. R. (2025). Research on AI-empowered cultural and creative design pathways for Yi ethnic Bimo painting intangible cultural heritage. *Screen Printing, (17)*, 111–113. https://doi.org/10.20084/j.cnki.1002-4867.2025.17.034

Chen, R. W. (2025). Application of AI-generated graphics in packaging design of cultural and creative products. *Shanghai Packaging, (06)*, 33–35. https://doi.org/10.19446/j.cnki.1005-9423.2025.06.010

Fan, L., & Kai, X. (2025). *Practical application of artificial intelligence-assisted artistic creation and design.* Chemical Industry Press.

Huang, X. Y., & Zhang, Y. (2025). Research on pastel cultural and creative product design from a semiotic perspective. *Ceramics, (04)*, 40–42. https://doi.org/10.19397/j.cnki.ceramics.2025.04.003

Kruse, A. B., Isailov-Schöchlin, M., Giesler, M., & Ratka-Krüger, P. (2023). Which digital learning strategies do undergraduate dentistry students favor? A questionnaire survey at a German university. *GMS Journal for Medical Education, 40*(4), Article Doc49. https://doi.org/10.3205/zma001631

Liang, C. (2020). Research on public demand-oriented cultural and creative product design in small and medium-sized museums [*Master's thesis, Tianjin University of Technology*]. https://doi.org/10.27360/d.cnki.gtlgy.2020.000731

Tuck-Po, L. (2011). One the wild and the tame in protected-areas management in Peninsular Malaysia. In M. R. Dove, P. E. Sajise, A. A. Doolittle, A. Escobar, & D. Rocheleau (Eds.), *Beyond the sacred forest: Complicating conservation in Southeast Asia* (pp. 37–61). Duke University Press. https://doi.org/10.1515/9780822393078-005

Nicholas, C. (2000). *The Orang Asli and the contest for resources: Indigenous politics, development, and identity in Peninsular Malaysia.* International Work Group for Indigenous Affairs; Center for Orang Asli Concerns.

Shen, W. M., & Chen, X. (2024). Digital translation of museum IP design based on semiotics: A case study of the Qinling Museum. *Design, 37*(20), 138–142. https://doi.org/10.20055/j.cnki.1003-0069.002180

Weng, G. F., Xu, C. L., & Peng, D. M. (2025). Research on red cultural creativity for Generation Z consumer demand from a semiotic perspective: A case study of Yimeng red culture. *Design, 38*(20), 69–73. https://doi.org/10.20055/j.cnki.1003-0069.002976

Wang, X., Xie, S. P., & Peng, B. Y. (2025). Research on the application of museum cultural and creative product design from a semiotic perspective. *Art and Design (Theory), 2*(03), 28–30. https://doi.org/10.16824/j.cnki.issn10082832.2025.03.009

Zhu, Y. Y., & Hong, S. Y. (2023). How to use questionnaire survey method effectively in research and investigation. *Fujian Education, (36)*, 26–29.

Zhang, G. B. (2025). Research on the application of automated image and text processing technology based on AI large models in contract auditing. *Value Engineering, 44*(30), 150–152.

Zhao, K. L. (2025). Research on museum cultural and creative product design from the perspective of Peircean semiotics: A case study of the pottery linked-branch lamp. *Identification and Appreciation of Cultural Relics, (16)*, 87–90. https://doi.org/10.20005/j.cnki.issn.1674-8697.2025.16.021

Zhu, K. H., Xu, X. F., & Qi, R. W. (2024). Research on AI-empowered local cultural and creative product design pathways: A case study of Jiangxi local culture. *Packaging Engineering, 45*(S1), 191–197. https://doi.org/10.19554/j.cnki.1001-3563.2024.S1.025

Zhang, X. (2025). Design of Mawangdui IP cultural and creative products at Hunan Museum based on AI tools. *Toy World*, (06), 112–114.