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Artificial Intelligence Assists in Innovation Construction of the Intelligent Pedigree of Chinese Traditional Silk Design

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ABSTRACT: In this research, innovation building and the intelligent lineage of Chinese traditional silk design are examined, with an emphasis on how artificial intelligence (AI) may help preserve and promote this cultural legacy. Industrialisation, digitalisation, and global fashion demand threaten ancient Chinese silk designs, rich in history, religion, and meaning. Museum collections and textual archives have preserved these designs, but they lack digital flexibility. The present research uses AI-driven methodologies like machine learning, recognition of patterns, and data processing to categorise, reinvent, and revitalise silk designs, preserving traditional authenticity while encouraging fresh creativity. These results show that the silk sector benefits from both small-scale and large-scale innovations in terms of cultural transmission, design development, and sustainability. As per the extensive research results of this study, innovation-driven by AI has been significantly successful in combining age-old traditions and latest developments, thereby facilitating digital data preservation, facilitating collective work across different areas of expertise, and maintaining flexibility in the market. While combining state-of-the-art technology and time-honoured traditions, China's silk industry can uniquely respect and pay tribute to its illustrious past and history. This innovative process will not only bring forth extensive creative growth but also act as an enhancement and boost to China's image at an international level. The long-term intent of this systematically crafted two-step process is to ensure that classic designs in silk will continue to be bright, usable, and long-lasting over several decades to come, securing their identity for posterity to cherish and remember.

1. INTRODUCTION

It is a well-known fact that embroidery, which is a method of embellishing materials, is an essential element in the day-to-day existence of many people. The cultural significance of works of art that are produced using exquisite needlework is undeniable. Following breakthroughs in artificial intelligence (AI) and robotics, these technologies have been researched and applied to the process of stitching. The purpose of this research is to examine the many ways in which these technologies make the process of stitching easier to accomplish. Some of the most frequent ways that silk design genealogy has been maintained throughout the years are narratives, museum collections, and written records. Despite their practicality, these methods may lack the adaptability and simplicity for users that modern digital technology requires (Zhang & Gao, 2025). Digital versions of traditional silk designs may be found in intelligent genealogy databases, which use adaptive algorithms and interactive technologies to catalogue, track, and enhance these designs. A comprehensive survey was filled out by experts in the fields of cultural heritage studies, digital humanities, textile design, and AI research and development. The research aimed, in part, to gauge how individuals see the status of AI pattern development for textiles. Another objective was to assess the pros and cons

of AI categorisation systems. An additional question posed in the survey was whether respondents thought innovation might help lessen AI's negative impacts. This paves the way for the organised retrieval, decipherment, and creative use of patterns both inside and outside their original cultural contexts. Utilising this AI-powered approach has potential uses beyond only preserving history; it might also be used for the creation of new technologies. By rethinking classic concepts using data-driven design methods, digital artists, textile engineers, and apparel designers all take part in this process (Wenji et al., 2022).

2.BACKGROUND OF THE STUDY

Ancient Chinese silk designs are some of the most remarkable textile arts in the world. Stunning and historically significant textile designs like these cannot be found. These patterns have religious, historical, and symbolic purposes in addition to being aesthetically pleasing. Its foundation in monarchs' histories is what gives it its relevance. Aesthetic elements of Confucianism, Taoism, and Buddhism were preserved by ancient Chinese silk, which has a long history of use as ceremonial clothes and regal robes. It has represented dynastic shifts, social classes, and regions among its various functions. The complex patterns that hold cultural legacy are becoming more difficult to preserve due to the impacts of industrialisation, urbanisation, and the extensive use of digital technologies in the modern era (Yang et al., 2021). Few AI studies have specifically examined Chinese silk designs, and the field is still in its infancy when it comes to textile design. Digital technology has lagged the techniques used to preserve, replicate, and innovate upon traditional themes, even though the historical importance of Chinese silk is well-known. Researchers have sought out cutting-edge technical solutions, particularly AI, to fulfil this need and ensure the continued success of traditional silk design methods. The broad application of AI is already having an impact on many different industries, including medicine, commerce, schools, factories, and, increasingly, the media and entertainment sector. Several of these fields are already seeing the effects of AI. Image recognition, cultural asset protection, and creative work creation are a few examples of current AI applications. Methods like ML, GANs, and deep neural networks fall under this category. Thanks to modern technology, textile designers may now automate the process of developing new designs and analysing large amounts of visual data and extracting stylistic components. It is also within the range of possibility that all these things may happen. The pattern-recognition capabilities of AI hold great promise for the preservation and improvement of historic silk designs for centuries to come. This is because of the remarkable capacity to automatically detect and collect patterns. To ensure that past designs remain relevant in modern fashion, home design, and academic study, it is essential to maintain a balance between maintaining and inventing (Chen, 2021).

3.PURPOSE OF THE RESEARCH

The use of artificial intelligence facilitates the generation of novel concepts. "The Creation of the Intelligent Pedigree of Chinese Traditional silk design" delved into the application of modern AI technologies for monitoring, analysing, and enhancing the exquisite and intricate traditional silk designs of China. One thing that distinguished China was its ancient silk design, which displayed the country's artistic and cultural treasures. Since technological developments and science were advancing at a rapid pace and the world was changing, it was still important to conserve and develop these ancient treasures. The goal of this project is to use AI to make an "intelligent pedigree"—a full, organised way to keep track of how traditional silk designs came to be, how they have changed over time, and what they mean symbolically. Using AI techniques like deep learning, picture recognition, and data analysis, the study tries to correctly rate and group complex silk designs, identify themes and patterns that keep coming up, and show how they have changed over time. This made historical patterns more appealing to modern customers by pushing new creative designs and helping to keep them alive. AI-powered technologies also made it easier for cultural groups, artists, and manufacturers to work together; this will help make sure the traditional craft of silk will be passed down to future generations. The foremost objective is to create a system that is both trendy and long-lasting, protecting historic items while promoting new ideas. In this digital age, this approach would bring old Chinese silk designs back to vitality. In general, this topic shows how important it is to hold on to both modern technology and ancient history. This supports both cultural diversity and creative innovation in China's silk industry.

4.LITERATURE REVIEW

The study and generation of visual, symbolic, and stylistic feature data have shown much of AI's promise in many applications. These submissions have shown a lot of enthusiasm. The fashion and textile sectors stand to benefit from AI in several ways. Trend prediction, pattern creation, virtual garment simulation, and user experience customisation are all within these fields. Machine learning algorithms may perform extra operations to create new designs from old data, find hidden patterns in datasets, and categorise visual themes. These approaches may be used to develop new designs (Amjad et al., 2025). In terms

of creatively recombining previous themes, GANs really shine because of how well they generate new images while preserving the aesthetic integrity of the training data. Given their versatility, they are a great pick for fresh takes on old ideas. For that reason, they are the ideal technological solution for this job. AI might have also helped sort patterns into categories based on their symbolic significance, historical context, geographical location, and aesthetic value. The use of this technical understanding might lead to the creation of an "intelligent pedigree" of classic silk designs. So, everything is in place to launch a dynamic digital library that can accommodate both long-term storage and future innovation (Mazur-Włodarczyk, 2024).

The present inquiry also heavily relies on innovation across all domains. A creative approach to traditional arts might include developing entirely new forms or giving existing ones a contemporary spin while yet honouring their cultural heritage. Everyone responds to the same method. If the heritage wants to be flexible and dynamic rather than static and unmoving, someone needs to discover a way to combine tradition with change. To do this, a middle ground between the two may have to be found. There are several measures that are used to quantify innovation. To name a few, there must be cultural relevance, pragmatism, flexibility, and originality. Questions of authenticity, originality, and the very essence of creativity have been further compounded by the incorporation of AI into creative processes. There are others who believe that AI does not possess the same level of cultural sensitivity and awareness of problem-solving context as human inventors. On the other hand, proponents of AI claim that improvements in technology have the potential to unleash the full creative potential of individuals by making it easier to uncover areas of study that have not yet been explored and by offering access to resources that were not previously accessible. As a result of this, the way that AI is portrayed in literature is changing from a portrayal that emphasises the possible threat to human imagination to one that emphasises the potential ally of AI to the designing community (Liang, 2024).

5. RESEARCH QUESTION

- How does the innovation construction influence the intelligent pedigree of Chinese traditional silk designs?

6. RESEARCH METHODOLOGY

6.1 Research Design

This study employed a quantitative research technique to conduct its examination. Researchers used SPSS version 25 to do the statistical analysis. Using descriptive statistics made the demographic data easier to grasp. The researcher assessed the strength and direction of the connections through studying odds ratios (OR) with a 95% confidence interval (CI). The findings were considered statistically significant when the p-value was less than 0.05. Quantitative approaches are becoming more popular due to their capacity to do comprehensive statistical analysis and systematic reviews of survey data.

6.2 Sampling

Researchers used a simple random sampling technique to ensure that the sample was representative of the study population. A total of 587 participants were included in the study after the calculations were performed using Rao-soft. In all, 780 questionnaires were sent to those who were to take part in the study. With the total number of returned questionnaires being 673 full questions and 24 discarded due to incomplete data, the final sample size was 649. Statistics for the social sciences (SPSS) version 25.0 was used to analyse the surveys.

6.3 Data and Measurement

Data for the study were mostly derived via questionnaires. A portion of the poll sought basic demographic information, while another portion used a 5-point Likert scale to enquire about concerns pertaining to both conventional and digital media. Most of the secondary data came from a wide range of print and digital sources.

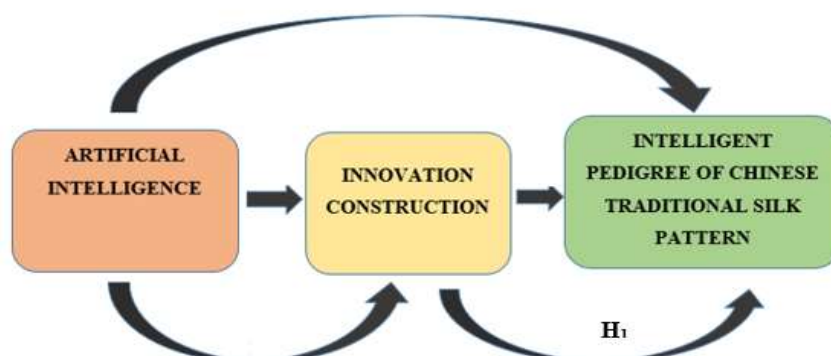
6.4 Systematic Software

Researchers used SPSS 25 and MS-Excel to conduct the statistical analysis.

6.5 Systematic Tools

A description-based approach was utilised to analyse the data extensively. Utilising factor analysis is the recommended method for evaluating reliability.

7.CONCEPTUAL FRAMEWORK



8.RESULT

●Factor Analysis

One common method for extracting latent variables from apparent data is Factor Analysis (FA). When there are no obvious visual or diagnostic clues, a common method is to use regression coefficients to generate ratings. Models are crucial to the success of financial analysts. Finding errors, intrusions, and observable linkages are the goals of modelling. When evaluating datasets generated by multiple regression analyses, one might use the Kaiser-Meyer-Olkin (KMO) test. They ensure that the variables in the sample are accurate and that the model is representative.

From what everybody can see from the numbers, there is data duplication. Reducing proportions makes data clearer. The result of the KMO algorithm is a number between zero and one. With a KMO value between 0.8 and 1, everyone has a sufficiently large sample. Kaiser specifies the acceptable limits: Here are the restrictions that Kaiser has established for entry:

The usual range is 0.60 to 0.69; therefore, this is a dismal 0.050 to 0.059.

Between 0.70 and 0.79 is the typical range for middle grades.

Having a quality point score between 0.80 and 0.89.

Between 0.90 and 1.00, they find amazement.

Table 1: Evaluation of the Adequacy of Bartlett's Sampling and KMO The 982 scale of the Kaiser-Meyer-Olkin statistic

Below are the results of Bartlett's sphericity test: Chi-square test, 190 degrees of freedom, significance level = .000. The validity of the claims on sampling is supported by this. To determine whether the correlation matrices were relevant, the researchers used Bartlett's Test of Sphericity. According to the Kaiser-Meyer-Olkin measure, a result of 0.982 is indicative of a valid sample. The p-value from Bartlett's sphericity test is 0.00. If the result of Bartlett's sphericity test is substantial, the researcher may determine that the correlation matrix is not an identity matrix.

Table 1: KMO and Bartlett's Test

KMO and Bartlett's Test ^a		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.982
Bartlett's Test of Sphericity	Approx. Chi-Square	7315.249
	df	190
	Sig.	.000
a. Based on correlations		

As a result of using correlation matrices extensively, Bartlett's Test of Sphericity confirmed their validity. A sample adequacy measure developed by Kaiser-Meyer-Olkin yields a value of 0.982. By using Bartlett's sphericity test, the researchers were able to get a p-value of 0.00. The correlation matrix was found to be unsatisfactory based on the significant conclusion of Bartlett's sphericity test.

❖ **MEDIATING VARIABLE**

● **Innovation Construction:**

When many different people, both within and outside of the company, work together, innovation occurs because of the dynamic relationship between a company and its external environment at the corporate level. The argument goes like this: building innovation is defined by being ad hoc and project-specific, and there is supposedly no strategic planning for it. Companies in the construction industry are separate from others because they are project-based, run on-site, and depend on temporary supply chains. Unlike other industries, the construction industry provides unique challenges when it comes to identifying and assessing innovation. What innovation has done so far has affected the current situation of the sector. Two competing definitions of innovation exist: one describes a revolutionary change in an industry's essence and character brought about by a huge leap forward in science or technology, while the other describes incremental innovation as a more subtle change in emphasis built on existing knowledge. In the construction sector, new ideas are usually little tweaks to old services or products, not complete overhauls, according to some. When new methods become widely used due to improvements in technology and business processes, many in the construction industry consider this a sign of innovation (Ying et al., 2022).

❖ **DEPENDENT VARIABLE**

● **Intelligent pedigree of Chinese traditional silk design:**

Silk clothing and traditional Chinese auspicious designs go hand in hand since they both reflect and enhance traditional Chinese culture. Throughout several Chinese dynasties, auspicious designs were heavily used in silk clothing design. Using auspicious patterns deftly in contemporary silk garment design has the dual benefit of enhancing international competency and transmitting a particular Chinese spirit. In this lineage, both the static (spatial characteristics at a certain point in time) and the dynamic (cultural transformations over the course of a given period) aspects of the evolution of the spaces in these villages have been included. After a lengthy history of using traditional techniques of building and architectural principles in a number of these communities, it is determined that a high degree of sustainability and remarkable artistic quality have both been attained. Furthermore, it is commonly accepted that the establishment of a pedigree for traditional villages and silk design is essential for the inheritance, protection, and enrichment of both the tangible and intangible heritage of these villages. In these villages, some primitive and less intentional forms of sustainable technologies are extremely inspiring for the design of sustainable textiles (Tomasic, 2023).

● **Relationship between innovation construction and the intelligent pedigree of Chinese traditional silk design:**

Light and thin business attire is designed to include current fashion principles and explore new visual expressions and manufacturing approaches that reinterpret water yarn. This method modernises water yarn's traditional aesthetics by experimenting with style, colour, and design, giving it new life in today's fashion world. There are benefits and disadvantages of using silk cloths in the cultural business, including design and manufacturing challenges and washing gauze clothing designs, styles, and designs. The connection between innovation in building and the illuminating lineage of traditional Chinese silk design is found in the merging of tradition and contemporary imagination. While innovative construction brings new technology, design ideas, and manufacturing processes, intelligent pedigree reflects cultural lineage, symbolism, and craftsmanship handed down through centuries. Collectively, they make sure that contemporary techniques are used to replicate old silk designs, styles, and procedures. Innovation brings new life to silk's creative potential by exploring new visual expressions, colours, and forms; the garment's lineage ensures its authenticity and cultural continuity. The modern cultural and fashion industries are actively working towards sustainable growth, yet this synergy is preserving old traditions at the same time (Li, 2022).

Based on the above discussion, the researcher acquired the following hypothesis, which analysed the relationship between innovation construction and the intelligent pedigree of Chinese traditional silk design.

“H01: There is no significant relationship between innovation construction and the intelligent pedigree of Chinese traditional silk design.”

“H1: There is a significant relationship between innovation construction and the intelligent pedigree of Chinese traditional silk design.”

Table 2: H₁ ANOVA

ANOVA					
Sum					
Source	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	78,635.472	139	565.723	331.162	0.000
Within Groups	869.524	509	1.708		
Total	79,504.996	648			

In this study, the result is important. The value of F is 331.162, which reaches significance with a p-value of .000 (which is less than the .05 alpha level). This means the “H1: There is a significant relationship between innovation construction and the intelligent pedigree of Chinese traditional silk design” is taken and the null hypothesis is rejected.

9. DISCUSSION

This research showed that innovative textile designs greatly influenced the growth and maintenance of Chinese traditional silk designs' intelligent ancestry. The statistically significant link suggested that new processes—from technology integration to creative reinterpretation—shape and preserve traditional silk designs' cultural and artistic integrity. Innovation in silk design revitalises old themes and made them more relevant in modern situations, according to the positive connection. This supported the idea that design and industrial innovations like AI-driven pattern recognition, data analysis, and new visual expressions may reconcile historical craftsmanship with current aesthetics. Combining traditional cultural aspects with modern processes keeps silk designs vibrant, adaptive, and attractive to new markets and different customer tastes. This dual strategy promotes sustainable cultural heritage management, preserving Chinese silk art despite fast technical advancement. The research also emphasises that innovation includes artistic experimentation, environmental practices, and cultural reinterpretation, not only technology development. The silk industry might preserve its history while exploring new creative and commercial opportunities by adopting gradual and revolutionary changes. In conclusion, innovation creation and the establishment of an intelligent lineage for Chinese traditional silk designs showed how contemporary technology may alter cultural preservation. It promotes an integrated strategy that blends tradition and innovation to provide the Chinese silk legacy a bright future that honours its rich history and promotes creative innovation and sustainable growth.

10. CONCLUSION

The importance of creativity in protecting the intellectual history of traditional Chinese silk designs and its impact on their growth and preservation is highlighted by this investigation. According to research, there was a substantial positive association between novel approaches, particularly those that are driven by AI, and the preservation, improvement, and cultural transmission of traditional silk designs. The amalgamation of current technology and AI-driven methodologies with traditional craftsmanship might augment the authenticity, significance, and sustainability of the Chinese silk legacy in contemporary settings. This relationship helped keep cultural emblems and historical skills alive while also opening new ways for the textile sector to improve technology and be innovative. The best way of making sure that China's rich silk heritage stays alive and well-known throughout the world is to integrate new ideas with respect for old ones. This will help future generations preserve and in innovative ways reinterpret this priceless cultural heritage.

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