

THE SIGNIFICANCE OF FLYING APSARAS IN DUNHUANG FRESCOES OF THE SUI AND TANG DYNASTIES AND THEIR APPLICATION IN VISUAL COMMUNICATION DESIGN

Pan Lyu^{*}, Akapong Inkuer^{}, Chanoknart Mayusoh^{***}, Pisit Puntien^{****}**

**Doctoral Student of Philosophy Program in Visual Arts and Design, Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University*

***Advisor in Visual Arts and Design, Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University*

****Visual Arts and Design, Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University*

E-mail: s63584948015@ssru.ac.th^{}, akapong.in@ssru.ac.th^{**}, chanoknart.ma@ssru.ac.th^{***}, pisit.pu@ssru.ac.th^{****}*

ABSTRACT

This paper explores the significance of flying apsaras in Dunhuang frescoes from the Sui and Tang Dynasties and their application in visual communication design using computer vision. Through the analysis of modeling, costume, and color characteristics of the flying apsaras, this study aims to provide theoretical and artistic research value for subsequent design. A range of research methods, including literature induction, field investigation, and information research, is employed to collect and analyze data on the flying apsaras in Dunhuang frescoes. The findings highlight the influence of Buddhism and Dunhuang on traditional Chinese culture and emphasize the need to integrate traditional Chinese culture into modern design, particularly in brand building and pattern design.

Keywords: Sui and Tang dynasties, Dunhuang Flying Sky, Visual design

INTRODUCTION

The Dunhuang frescoes, located in Gansu Province, China, are a world-renowned cultural heritage site that contains a vast number of murals and sculptures spanning over a thousand years of Chinese history (Wang, 2018). These frescoes are found in the Mogao Caves, a complex of Buddhist cave temples, which served as a vital center for Buddhist art, culture, and knowledge during the Sui and Tang Dynasties (6th-10th centuries CE). Among the various images depicted in the frescoes, the flying apsaras (Celestial nymphs) have attracted the attention of researchers and artists alike due to their rich content and artistic value (McKnight, 2015).

The cultural and artistic significance of the Dunhuang frescoes lies not only in their aesthetic value but also in their historical and social context (Bai, 2014). Created during the Sui and Tang Dynasties, a period of great artistic and cultural achievements in China, the flying apsaras in the frescoes reflect the cultural and social norms of that time, offering insights into the beliefs and values of ancient Chinese society (Zhang & Chen, 2019). These celestial beings are typically depicted as graceful and ethereal, with flowing garments and delicate features, embodying the harmony and beauty of the Buddhist paradise.

The Dunhuang frescoes are a treasure trove of information on various aspects of life during the Sui and Tang Dynasties, including religious practices, social customs, clothing, architecture, and more (Wang, 2018). They also serve as an essential repository of artistic techniques and styles, showcasing the evolution of Chinese painting and sculpture over the centuries. The flying apsaras, in particular, have become iconic symbols of Dunhuang art, representing the fusion of Chinese and Central Asian artistic traditions that characterized the Silk Road, which passed through Dunhuang (McKnight, 2015).

Research on the flying apsaras in Dunhuang frescoes has been conducted in various fields, such as art history, archaeology, and religion (Bai, 2014). Scholars have examined the artistic techniques employed in their creation, the symbolism and religious significance of these celestial beings, and their

role in conveying Buddhist teachings and ideals. However, there is still a lack of research on the application of flying apsaras in visual communication design. This study aims to provide reference value for the shape and color of pattern design, as well as offer insights into the cultural and historical context of ancient Chinese art (Zhang & Chen, 2019).

By exploring the potential application of flying apsaras in visual communication design, this research seeks to bridge the gap between traditional Chinese art and contemporary design practices. The integration of traditional cultural elements into modern design can help to preserve and promote the rich cultural heritage of China, while also inspiring new and innovative forms of artistic expression. Furthermore, the study of flying apsaras in Dunhuang frescoes can contribute to a deeper understanding of the artistic, cultural, and spiritual values that have shaped Chinese civilization throughout history.

In conclusion, this research will delve into the artistic and cultural significance of flying apsaras in the Dunhuang frescoes of the Sui and Tang Dynasties and explore their potential applications in visual communication design. Through the analysis of modeling, costume, and color characteristics, this study aims to provide a valuable reference for designers and researchers interested in incorporating traditional Chinese art and culture into their work.

Research Objectives

1. To investigate the significance of traditional patterns in Dunhuang frescoes and their integration into graphic design, in order to expand and inherit traditional culture, and to highlight the influence of Buddhism and Dunhuang on traditional Chinese culture.
2. To analyze the modeling, costume, and color characteristics of the flying apsaras in the Sui and Tang Dynasties in Dunhuang frescoes, and provide theoretical and artistic research value for subsequent design in visual communication.
3. To Research and analysis of contemporary Dunhuang flying visual design related works, comparative research to summarize the pattern, discover the strengths and weaknesses in the application of Dunhuang flying design, to provide reference value for designers.

RESEARCH METHODOLOGY

1. Conduct literature induction by reviewing books, materials, and literature publications about Dunhuang frescoes and flying apsaras to understand Dunhuang frescoes and analyze previous research achievements on flying apsaras in Dunhuang frescoes.
2. Perform field investigations by visiting the Research Institute, museum, and various grottoes of Dunhuang Mogao Grottoes to personally experience the cultural atmosphere of Dunhuang Mogao Grottoes and understand their historical development.
3. Collect information and images of flying apsaras in Dunhuang frescoes from the Sui and Tang Dynasties by consulting books, online resources, and other sources.
4. Study and analyze the collected data using modern design methods to summarize modeling features, color rules, extract creative elements, and combine them with modern design.

RESEARCH RESULTS

The Dunhuang Flying Sky is a fresco form in the Mogao Caves at Dunhuang, one of the representatives of Buddhist art in the Tang Dynasty. The Dunhuang Flying Sky image has unique visual effects and cultural connotations, and has wide application in the modern design field. The elegant lines of Dunhuang's frescoes, with their flowing beauty, are used in the Dunhuang Museum's creative product design, making them "concise and poetic" and applying Dunhuang's unique patterns to everyday life, reflecting the artistic essence of Oriental painting and strengthening the aesthetic function of art. (Liu & Zhang, 2021). The gradual secularization of fresco images and the delicate stylized portrayal made religious painting more human and compelling. The emergence of the "form and spirit" art proposition has brought the figures in Dunhuang murals closer to life-size. (Fu & Xing, 2020). In Dunhuang frescoes, the most distinctive type of painted figure is the Flying Heaven, which is graceful, light and agile, with a thousand variations of movement. (Zhang, 2019). Three representative caves of the Sui and Tang dynasties, Cave 315 of the Sui dynasty, Cave 321 of the early Tang dynasty, and Cave

44 of the Sheng Tang dynasty, were studied for comparison, and the head, upper and lower body, shape, costume, and ornaments of the flying celestial figures were analyzed and studied in detail. As shown in Table 1.

Table 1 Features of the Flying Sky in the Sui Dynasty

Dynasties	Cave	Styling features
Suiyo period	Cave 305	She wears a double bun, a crown on her head, her upper body is naked, andwearing a long skirt, collar and bracelets.
Early Tang Dynasty	Cave 321	She wears a bun, a crown on her head, her upper body naked andwearing a long skirt, a collar and an armlet.
Tang Dynasty	Cave 44	She wears a bun, a crown on her head, a lute on her chest andWearing a long skirt, a collar and an armlet.

Source: Author

After research, it was found that the image of the Dunhuang flying trapeze during the Sui and Tang dynasties was characterized by very smooth and graceful lines and very elegant postures, giving a sense of mystery and transcendence. Some of them have different postures, some are holding a magic weapon, some are holding a flower basket, some are holding a musical instrument, and some are flying in the air or standing on the clouds. The expressions are vivid, sometimes laughing, sometimes contemplating, very evocative. Dunhuang flying frescoes use a lot of gold, silver, red, green and other bright colors, making the whole fresco more colorful. The headdress, earrings, necklaces and other jewelry of the Flying Dutchman are very flamboyant and exquisite, comparable to jewelry craftsmanship.

1. Study the significance of Dunhuang flying apsaras in Sui and Tang Dynasties

The Flying Sky is the calling card of the Mogao Caves in Dunhuang, Gansu Province, a symbol of Dunhuang art and a monumental work of art. Whenever one sees the beautiful flying trapeze, one thinks of Dunhuang Mogao Caves art. Almost all of the caves in the Dunhuang Mogao Caves are painted with flying trapezes, totaling more than 4,500 bodies.

With the Tang period Dunhuang flying has completed the course of Chinese and foreign absorption, integration, fully formed their own unique style, reached the peak of the art. The four walls of the Tang Dynasty caves are filled with large paintings of the sutra. The flying skies are no longer just painted on algae, niches, or four phi, but mostly in the sutra paintings: the Buddha is speaking in the middle of the world of bliss, and the flying skies are flying overhead, some with their feet on colorful clouds, landing slowly; some with their heads waving their arms in the air; some holding flowers in their hands, going straight to the clouds; some with their hands on flower trays, floating across the sky. The wind swinging skirt, fluttering roll of ribbons, so that the flying sky incomparably light and clever, elegant and free, charming and moving.

Understanding the characteristics of Dunhuang flying apsaras, including modeling, costume, and color characteristics, is crucial for integrating these elements into visual communication design. Dunhuang frescoes are primarily influenced by Buddhism and feature various depictions of gods and Buddhas. Flying apsaras are the most common image, with their portrayal reaching its peak in the Sui and Tang Dynasties. The frescoes from this period showcase the feminine beauty of women and are still considered beautiful today.

Dunhuang frescoes from the Sui and Tang Dynasties represent a mature and brilliant stage of Dunhuang art. Despite its eventual decline, the art form continues to influence various artistic expressions. Modern murals have evolved alongside societal changes, and the fusion of Dunhuang flying apsaras and visual communication emphasizes both Dunhuang's cultural awareness and the artistic connotation of traditional Chinese culture. The group of flying trapezes in Mogao Cave 301 during the Sui dynasty is vivid and beautiful, lifelike, with ancient and elegant colors, as shown in Figure 1.



Figure 1 Group of flying celestials (Cave 301, Mogao Cave, Sui Dynasty)
Source: Baidu

The Sui Dynasty Mogao Caves Cave 301 Flying Sky Group is the most representative group of murals in the Mogao Caves at Dunhuang, with a total of 16 paintings. Located in Cave 301, they are one of the representatives of Buddhist art of the Tang Dynasty and the most colorful and exciting group of Dunhuang's flying trapeze images.

The frescoes are beautifully shaped, with different postures, vivid expressions, and majestic power. Some of the flying trapeze are holding magic weapons, some are holding flower baskets, some are holding musical instruments, and some are flying in the air or standing on clouds, giving them a sense of transcendence. In addition, the use of color in this group of flying frescoes is also very exquisite, using a large number of gold, silver, red, green and other bright colors, making the entire fresco more colorful.

The Sui Dynasty Mogao Caves Cave 301 group of flying trapezes reflects the high level of achievement of Buddhist art and the remarkable contribution of Dunhuang culture during the Tang Dynasty. Its profound cultural connotations and unique visual language are important references for innovation and development in the modern design field.

2. Research and Analysis of flying apsaras in Dunhuang Frescoes in The Sui and Tang Dynasties

2.1. Research content of flying apsaras in Dunhuang Frescoes in Sui and Tang Dynasties

To effectively incorporate traditional Dunhuang frescoes into modern design, it is essential to understand the connection between art, culture, and nationality. Graphic design is influenced by historical, regional, and cultural elements, and the appeal of restoring ancient ways has led to a resurgence in traditional art patterns. By combining traditional culture with emerging culture, designers can create innovative designs that resonate with the public and the market.

The research on Dunhuang fresco flying apsaras primarily focuses on illustration design for lifestyle brands, encompassing the overall composition of the illustration pattern, refinement of elements, and color design derived from Dunhuang frescoes.

2.2. Content and method of research on flying Apsaras in Dunhuang Frescoes in the Sui and Tang Dynasties

Research methods for studying flying apsaras in Dunhuang frescoes include literature induction, field investigation, and information research. These methods involve reviewing books, materials, and literature publications; conducting on-site visits and surveys in Dunhuang, Gansu province; and consulting various sources to collect information and images of flying apsaras from the Sui and Tang Dynasties. The information gathered is then analyzed using modern design methods to extract creative elements and integrate them into contemporary design.

3. Application of flying apsaras in Dunhuang Frescoes in the Sui and Tang Dynasties to computer vision communication

The Dunhuang Flying Sky is a valuable cultural heritage with promising applications in modern design. Through in-depth research and excavation of the cultural connotation and visual language of Dunhuang Flying Sky, we can inject more cultural heritage and innovative thinking into modern design, and provide richer design resources for brand building and promotion.

The Dunhuang Flying Sky is unique in its shape, with its smooth lines and beautiful posture, while at the same time not losing its steadiness and solemnity. In modern design, the visual language of Dunhuang Flying Sky can be borrowed to create design elements with brand characteristics.

3.1. Brand research

The integration of Dunhuang frescoes into modern brand design involves combining Western culture with Eastern culture and applying traditional fresco elements to the design [8]. Today's lifestyle brands, such as IKEA, Muji, and NOME, focus on creating beautiful, practical, simple, and natural products. The color schemes for these products generally involve muted tones to create a more comfortable visual effect. For example, the packaging design of Liangpinpuzi is designed using the image of the Dunhuang fresco Flying Sky, as shown in Figure 2.




Figure 2 Liangpinpuzi packaging design
Source: Baidu




In the design of the mooncake packaging, Liangpinpuzi drew on the beautiful flying heaven in the Dunhuang frescoes, and focused on the kindest and most beautiful images on earth. One to reflect the Mid-Autumn Festival reunion and the full moon, and two to highlight the moon cake as the theme of visual communication. We extracted animal elements such as "rabbit", "deer" and "crane" from the Dunhuang murals to show a sense of dynamism and vitality through the combination of humans and animals, expressing a sense of flying, cheerfulness and optimism. This is the vitality of the art of flying.

3.2. Application of flying Image in commercial illustration design

For brand commercial illustrations, ten different shapes of flying apsaras are selected, and their external contour curves are drawn to preserve their natural beauty. The images are then combined and adjusted to create a commercial illustration for the brand.

Table 2 Analysis of the results of the design application of Dunhuang flying illustrations in the Sui and Tang dynasties

Flying Illustration	Styling	Color
	<p>The body is "S" shaped, with beautiful lines. The shape is bold and unique.</p>	<p>Green and yellow are the main colors, with low saturation and delicate color variations.</p>

Flying Illustration	Styling	Color
	<p>The left hand holds the item, the right foot is raised, and the crane surrounds it with a serene expression.</p>	<p>With red as the main color, brown, light gray and yellow accents, the color contrast is strong.</p>
	<p>The figure shape presents a dancing pose with beautiful and vivid movements.</p>	<p>The picture is dominated by blue, forming a cool-toned picture, the characters are mainly red is a warm color, and the background is compared for warm and cold, with delicate color changes.</p>
	<p>The figures present upward flying posture, with coordinated, beautiful and vivid movements and a sense of rhythm.</p>	<p>The background of the picture is dominated by red with low saturation, forming a warm tone, and the characters are in green with low brightness, forming a contrast of warm and cold colors with the background, with strong color contrast.</p>


Source: Author




Dunhuang Flying Sky is an image in traditional Chinese art. The illustrations are designed with simple lines, bright colors, realistic shapes, rich details in realistic style, etc. The background elements in the illustration are elements from Dunhuang frescoes. According to the characteristics of the image of the flying sky and the background elements, a relatively low saturation color scheme is chosen to enhance the visual impact and attractiveness of the illustration. In the process of illustration design, contrast, repetition, and balance are used to ensure the visual effect and beauty of the illustrations.

3.3. Application of flying apsaras in pattern design

In the basic pattern design, elements from flying apsaras' head and clothing decorations are extracted and used in brand image design, creating square or round patterns suitable for brand packaging or textile patterns.

Table 3 Analysis of the application results of flying pattern design

Works	Styling	Color
	<p>The pattern is square-shaped, lotus-shaped, dispersion-like, symmetrical pattern, fresh and elegant design.</p>	<p>With white, light yellow, light colors, high brightness, low saturation colors give people a quiet and comfortable feeling.</p>

Works	Styling	Color
	<p>The pattern is square in shape, with elements such as flying sky and plants. The design is done with symmetry and repetition of expression.</p>	<p>Red and yellow are the main colors, with strong contrast, high saturation and rich changes in brightness.</p>
	<p>The pattern is circular in shape, using plants as elements, with a central point of divergence, symmetry and repetition in the form of expression design.</p>	<p>Brown, green and yellow are the main colors, with rich color variations, low brightness, low saturation and antique color feeling.</p>
	<p>The pattern is circular in shape, and the petals are used as the elements to carry out is the expression of dispersion, symmetry and repetition.</p>	<p>Rich colors, mainly red and blue for the contrast of warm and cold colors, low color saturation, high brightness, and delicate color changes.</p>

Source: Author

Pattern design, through the analysis and study of the flying modeling, the design elements of the ornaments on her body were extracted. The design of the pattern was generalized through the refinement of the ornaments, using simple geometric patterns for expression, rich in detail, the pattern as a whole is round, into a firing shape, bright colors, strong contrast, with a strong visual impact.


3.4. Application of flying apsaras in brand design




The household life brand studied in this research encompasses various aspects of daily life. Its products are categorized into the following:

First, textile products, such as carpets, towels, silk towels, pillows, and schoolbags. Second, kitchen supplies, including various seasoning bottles, cans, dishes, and more. Third, office supplies, such as folders and paper. Fourth, cosmetic products, encompassing a range of packaging types like hoses, bottles, and boxes.

The packaging of these products incorporates the flying apsaras of Dunhuang frescoes, highlighting their comfortable and free characteristics while also spreading Dunhuang culture to consumers. As shown in Table 4.

Table 4 Analysis of the results of the application of Feitian in brand design

Branded Products	Styling	Color
	<p>The design that combines the image of the flying sky with the fan has a very ancient feel and a very deep cultural heritage.</p>	<p>Black is the main color, the use of bold colors, giving a very heavy visual effect.</p>

Branded Products	Styling	Color
	<p>Clothing material is light and thin, very flowing, the combination of the image of flying and modern clothing design is very good.</p>	<p>With a light blue base and a large piece of red to contrast with it, the color layers are rich and very effective.</p>
	<p>This is a bookmark design with a very vivid flying figure shape and beautiful lines.</p>	<p>Yellow is the main color, and there is a little light green for the contrast of warm and cold colors, the color effect is coordinated very comfortable.</p>
	<p>The design of flying image and modern pillow is a combination of traditional culture and modern culture.</p>	<p>With brown as the main color, the whole picture is warm and very warm, with a little blue to contrast and harmonize, with rich color variations.</p>

Source: Author

Dunhuang Flying Sky is one of the representatives of Buddhist art in the Tang Dynasty. With its unique visual effect and cultural connotation, the Dunhuang Flying Sky image also has a wide range of applications in the modern design field. It is a very valuable cultural heritage and its application in modern design is promising. Through in-depth research and excavation of the cultural connotation and visual language of Dunhuang Flying Sky, we can inject more cultural heritage and innovative thinking into modern design, and provide richer design resources for brand construction and promotion.

CONCLUSIONS

In conclusion, the study of Dunhuang frescoes, particularly the flying apsaras from the Sui and Tang Dynasties, provides valuable insights into the integration of traditional Chinese art into modern visual communication design. The flying apsaras, which embody elegance, beauty, and cultural significance, can inspire and enhance contemporary design practices in various fields such as branding, commercial illustration, pattern design, and product packaging (Wang, 2015).

Similar research has demonstrated the potential for incorporating traditional Chinese art elements into modern design practices (Li & Luo, 2016). For example, the application of traditional Chinese painting techniques and patterns has been shown to enhance the visual appeal and cultural resonance of contemporary graphic design (Zhang, 2017). By utilizing the rich cultural and artistic heritage of Dunhuang frescoes, designers can create unique and meaningful visual experiences that resonate with audiences and promote traditional Chinese art (Chen, 2018).

Moreover, incorporating Dunhuang frescoes and flying apsaras into modern design highlights the importance of preserving and revitalizing traditional art forms, while also fostering cross-cultural exchanges and understanding (Yang, 2019). The blending of traditional Chinese elements and modern design concepts can lead to a harmonious and dynamic balance, enriching the global visual communication landscape (Liu, 2020).

Future research could explore additional ways to integrate Dunhuang frescoes and flying apsaras into various design domains, as well as investigate the potential impact of such integration on audience perception and appreciation of traditional Chinese art (Wu, 2021). Overall, this study emphasizes the value and potential of drawing upon the artistic treasures of the past to inspire and enhance contemporary visual communication design.

ACKNOWLEDGMENT

Researcher would like to express his sincere to the thesis advisor, Asst. Prof. Dr. Akapong Inkuer for his invaluable help and constant encouragement throughout the course of this research. In addition, the researcher has to give thanks to all lecturers for their assistance: Asst. Prof. Dr. Chanoknart Mayusoh, and Asst. Prof. Dr. Pisit Puntien. At the same time, the researcher gratefully thanks to Miss Kanyanee Phuangsuva, Miss Sasanant Rattanapornpisit, Miss Visitha Chintaladdha, Mr. Chat Sukarin, and others who give great supports.

Finally, the researcher would like to express his gratitude to the Faculty of Fine and Applied Arts, Suan Sunandha Rajabhat University for supporting in every aspect.

REFERENCES

- [1] Chen, X. (2018). Integration of traditional Chinese art elements in modern design. *Art & Design Review*, 6(3), 95-102.
- [2] Bai, X. (2014). Research on the Flying Apsaras in Dunhuang Art. *World Cultural Heritage*, 10, 61-62.
- [3] Deng, J. B. (2008). The Artistic Value of Dunhuang Flying Sky. *Anhui Literature: The second half of the month*, (7), 142-142.
- [4] Fu, S., & Xing, G. (2020). Research on the design of Dunhuang fresco elements in cultural and creative products. *Design*, 33(3), 20-23.
- [5] Guo, L., & Zhang, L. (2018). The Analysis of the Aesthetic Characteristics of Dunhuang Apsaras and Its Application in Design. *Journal of the Royal Society for Arts*, 49(2), 71-75.
- [6] Guo, X. (2011). The source of the Dunhuang Flying Sky: A Study of the Art of Flying Sky. *Art Review*, (3), 88-93.
- [7] Li, D. (2009). The artistic beauty of the Dunhuang Flying Sky, the embodiment of auspiciousness and beauty. *Studies in Literature and Art*, (2), 142-143.
- [8] Li, J., & Luo, X. (2016). Application of traditional Chinese painting techniques in contemporary graphic design. *Advances in Social Science, Education and Humanities Research*, 71, 102-105.
- [9] Liu, H. (2020). Aesthetic exploration of Dunhuang culture in visual communication design. *Journal of Arts and Humanities*, 9(6), 89-94.
- [10] Liu, W., & Zhang, Y. (2021). Research on the design of cultural and creative products based on Dunhuang cultural elements. In: *Ancient and Modern Culture*.
- [11] McKnight, B. (2015). The Celestial Nymphs of Dunhuang. *Religious Studies Review*, 41(4), 219-219.
- [12] Shi, M. (2001). An experiment on the kinetic and artistic image of Dunhuang Flying Sky. *Journal of Beijing Dance Academy*, (3), 61-64.
- [13] Wang, J. (2015). Dunhuang art in contemporary design. *Art & Design Review*, 3(2), 53-58.
- [14] Wang, X. (2018). *The Study of Dunhuang Apsaras' Image Art*. Atlantis Press.
- [15] Yang, D. F., & Gan, J. (2009). (2009). Some inspirations of Dunhuang Flying Sky for modern art design. *Popular Literature and Art (Theory)*, (9).
- [16] Yan, J. (2012). Experimental analysis of the aesthetic meaning of Dunhuang Flying Sky and its new life in modern art creativity. *Development*, (5), 108-109.
- [17] Yang, Y. (2019). The influence of Dunhuang frescoes on modern visual communication design. *Journal of Arts and Humanities*, 8(5), 72-77.
- [18] Zhang, Y. (2017). The application of traditional Chinese patterns in contemporary graphic design. *Journal of Visual Art & Design*, 8(1), 12-21.

- [19] Wu, X. (2021). The application and development of Dunhuang culture in modern design. *Design Journal*, 14(2), 34-40.
- [20] Zhang, Y. (2019). Research on the Application of the Flying Sky Image of Dunhuang Mural Painting in Sui and Tang Dynasties in Visual Communication (Master's thesis, Beijing Jiaotong University).
- [21] Zhang, T. I. (2013). An Appreciation of the Art of Dunhuang Flying Sky Modeling. *Silk*, 50(6), 56-60.
- [22] Zhang, Y., & Chen, Y. (2019). Research on the Application of Flying Apsaras in Visual Communication Design Based on Dunhuang Frescoes. *Journal of Visual Communication Design*, 6(1), 23-31.
- [23] Zhang, X. (2017). The Study of the Influence of Dunhuang Flying Apsaras on Modern Design. *Journal of Arts and Design*, 4(3), 12-17.
- [24] Zhang, P. (2012). A study of the "flying aesthetics" of Dunhuang's flying skies. *Qilu Yiyuan: Journal of Shandong Arts College*, (6), 65-70.
- [25] Zhou, S. (2009). The female figure of the flying Tian in Tang Dynasty Dunhuang. *Journal of Changchun University of Technology: Higher Education Edition*, (1), 74-75.