Journal of Namibian Studies, 38 S1 (2023): 413-433 ISSN: 2197-5523 (online)

Silver Product Design Strategy Based On The Concept Of Ecological Symbiosis

Wei Jinye[1*], Pastraporn Thipayasothorn[2],Thanate Piromkan[3]

[1] School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand. 63603132@kmitl.ac.th
[2] School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand.
[3] School of Industrial Education and Technology, King Mongkut's Institute of Technology Ladkrabang, Thailand.

Abstract

The craftsmanship of making silver products in Heqing (also known as Xinhua Village), Yunnan Province, China, was designated as a national intangible cultural heritage in 2014. However, the overwhelming volume of orders can no longer be fulfilled through handcraft alone. This has led to the integration of modern techniques such as mechanical processing into silver product manufacturing, which has in turn resulted in a rise in the similarity of silver product designs. Researchers aimed to address the issue of homogenization in silver product design in Xinhua Village, Yunnan Province, and drew on the theory of ecological symbiosis to explore the relationship between silver product design and production technology. The study was conducted using questionnaires, quantitative analysis, and design practices. Firstly, through literature review and analysis, proposed the hypothesis model and design process of this project; Secondly, design silver products based on the design process, and conduct a questionnaire survey on the products to validate the path relationship of the model. The findings of the study show that production technology does not significantly influence the design of silver products, yet under the influence of the ecological symbiosis theory, production technology significantly influences the design of silver products. In silver product design, the more crucial factors to consider are the demands of orders and cultural factors. The findings of this study can offer insights for other similar traditional crafts to address the issue of design homogeneity.

Keywords: Silver Products, Production Technology, Ecology, Symbiosis Theory, Evolutionary Design.

INTRODUCTION

Xinhua Village in Heqing County, Yunnan Province, is a renowned silver product manufacturing village in China. In 2014, the "Heqing Silver Product Forging Skills" was inscribed on China's Intangible Cultural Heritage List. Xinhua Village is the largest silver product processing base in China. As reported by Dali Daily on August 22, 2022, as of May 2022, there are 1835 enterprises in Xinhua Village engaged in the forging and processing of silver products, employing 15,200 people, with an annual consumption of 400,000 kilograms of silver. The village offers over 2,000 varieties of silver products, with an annual processing output of around 10 million pieces and an annual sales volume of 3.5 billion yuan.

The demand for silver products exceeds the supply, and the manual production methods are unable to meet the market demand. As a result, mechanical processes and other technologies are being gradually applied to the production of silver products in Xinhua Village. The use of standardized mass production methods using machinery has greatly improved production efficiency. In order to cater to mechanical production, the design of silver products has been simplified, and some designs that can only be achieved through manual production have been omitted. The culture of the Bai ethnic group has also been weakened in silver products, losing the expression and inheritance of the Bai ethnic culture.

Regarding the causes of the homogenization issue, they are a lack of innovation ability and insufficient market research (Han, 2022), as well as a lack of unique cultural elements and innovative design in products (Cheng, 2019). It is due to the similarity of consumer demands that consumers tend to have similar needs for products, resulting in companies launching similar products to meet these demands (Lu, 2005).

Besides the cultural innovation and consumer demand factors mentioned above, is there a relationship between the homogenization of silver products and the application of new technologies? To find an answer to this question, the research process focuses on two main questions:

- What kind of silver product is designed based on the ecological symbiosis theory, evolutionary design theory, and integrated silver product production technology?

- Will the silver product production technology affect the design of silver product based on the ecological symbiosis theory, evolutionary design theory, and silver product production technology in the hypothetical model?

LITERATURE REVIEW

Symbiosis Theory

The concept of "symbiosis" was first proposed by German mycologist Anton de Bary (1879), referring to the close mutually beneficial relationship formed between two different organisms. There is a symbiosis between animals, plants, fungi, and any two of them. In a symbiotic relationship, one party provides survival assistance to the other while also receiving assistance from the other party. American biologist Lynn Alexander Margulis (1970) proposed "cell symbiosis", a theory about the origin of endosymbiosis between mitochondria and chloroplasts. She believes that bacteria and blue-green algae, after being engulfed by primitive eukaryotic single-cell organisms, have some undigested and evolved into mitochondria and chloroplasts during long-term symbiosis.

Yuan Chunqing (1998) drew inspiration from the concept of symbiosis and related theories in biology, and used mathematical analysis to construct a "symbiotic theory" framework for economic analysis: describing the essence of symbiosis through the three elements of symbiosis (symbiotic unit, symbiotic mode, and symbiotic environment). The essence of symbiosis is synergy and cooperation, which is one of the fundamental driving forces for the development of nature and human society.

Product Design

Xinhua Village's silver products, as one of the symbols of traditional handicrafts in Yunnan, have garnered extensive research and attention from scholars. Through prolonged evolution and development, the silver products of Xinhua Village have merged their own unique features with those of other ethnicities (Jessica Rawson, 1984), forming a highly symbolic and stylized style, characterised by its intricate and elaborately crafted style.

The design and decoration of silver products emphasize the use of elements from various ethnic groups such as the Han, Bai, and Tibetan, and aim for the stylization of forms and the complexity of craftsmanship (Fu, 2021). The chen carving technique, a core skill in the silver and copper craftsmanship of the Bai ethnic group in Xinhua Village, Heqing, Yunnan, continuously improves and innovates over a long period of practice and production, based on the extensive learning of other ethnic silver and copper craftsmanship, thus forming a unique style in silver and copper production, providing the Bai ethnic artisans with greater opportunities for survival and development (Chen, 2017).

Evolutionary design theory is a design methodology based on the principles of biological evolution, whose core idea is to employ evolutionary algorithms and optimization techniques to discover and generate optimal solutions, thereby addressing complex design problems (Sato& Kato,2016). Evolutionary design theory considers design problems as optimization problems, employs evolutionary algorithms to mimic the process of biological evolution, and gradually evolves better solutions from the initial solutions through mechanisms such as genetic operations, selection, and mutation (Goldberg,1989).

The common framework used in the design process consists of three stages: functionality, concept, and implementation. These three stages overlap and iterate multiple times, with each stage itself containing multiple rounds of iterations (Hatchuel & Weil, 2003), as shown in Figure 1. The design-build-test cycle is widely welcomed by synthetic biologists, but the details of how they are connected remain vague (Castle & Gorochowski, 2023), as shown in Figure 2. The CK theory by Armand Hatchuel and Benoît Weil (2003) describes design as existing in two spaces: the concept space and the knowledge space. These two spaces are key concepts in the design process, clarifying the ambiguity of the former two, as shown in Figure 3.

Figure 1: The basic design cycle of Roozenberg and Eekels.

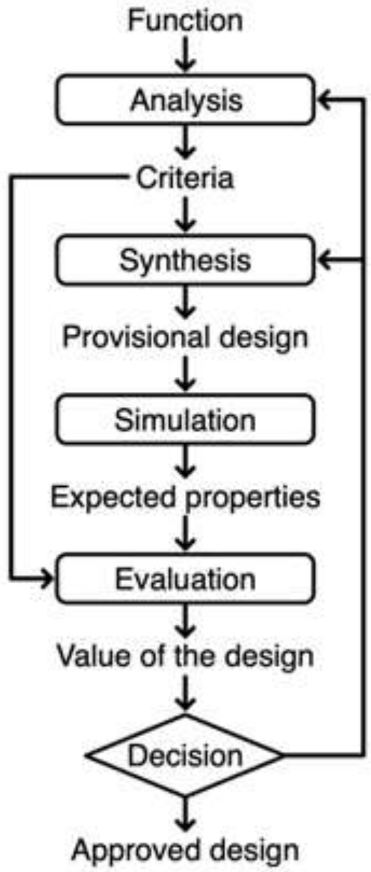


Figure2: The design-build-test cycle that is often referred to in synthetic biology.

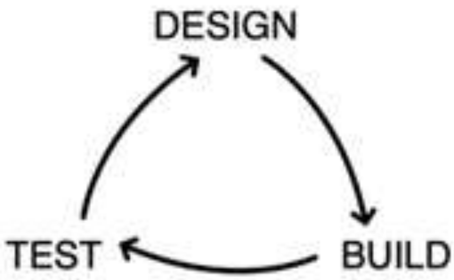
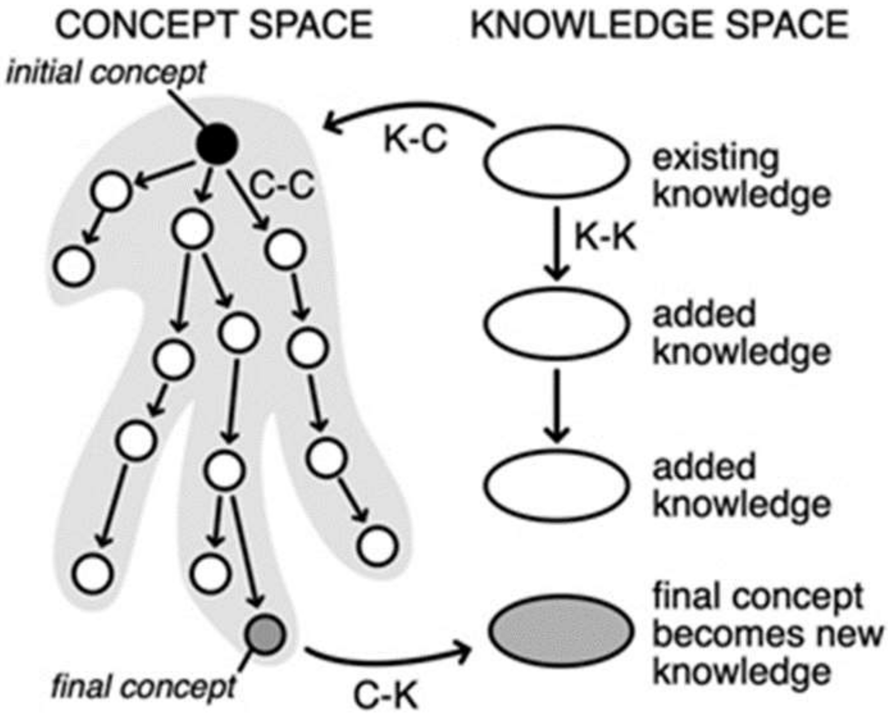


Figure3: C-K theory (1973).



Production Technology

The traditional handicrafts of Xinhua Village have, through long-term practice, evolved a complete set of craftsmanship processes (Chen, 2017). Typically, starting from the initial processes of silver melting and slitting, followed by washing and polishing, until the completion of the product, there are nearly fifteen major and minor procedures. These methods are not only practical and rational but also based on traditional methods that are continually refined and improved upon over time, forming new processes tailored to meet the requirements of different products (Zhou, 2020). The common procedures mainly include selection of materials, pressing plates, cutting patterns, hammering, chiseling, shaping, installation, surface treatment, quality control, and delivery.

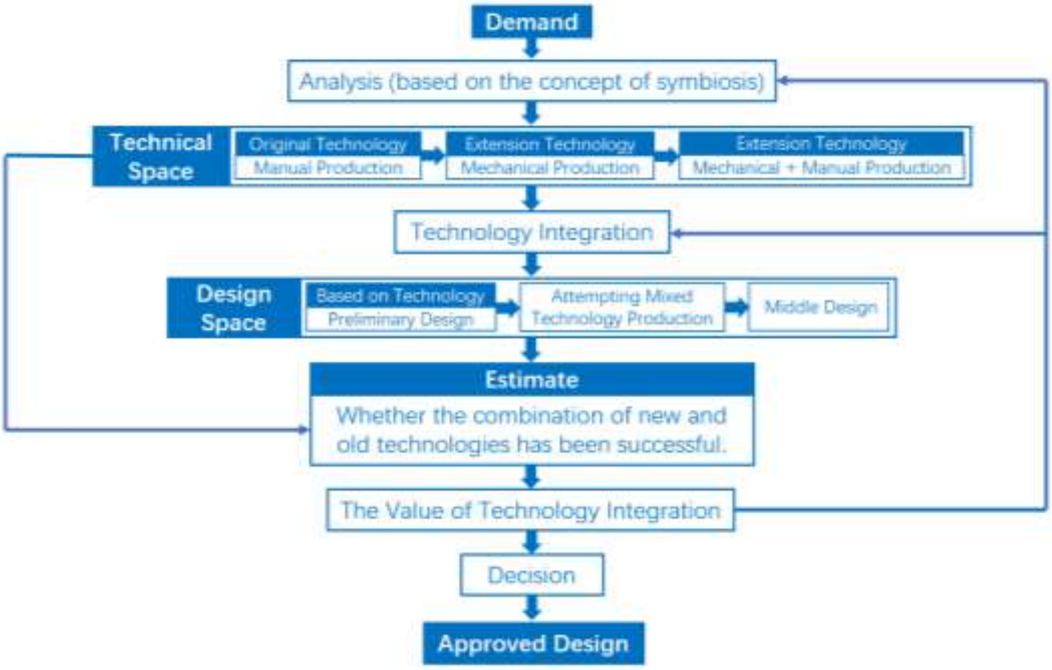
Taking the handmade production of silver teapots in Xinhua Village as an example, the integrated molding technology of manually pounding the spout on the teapot body is commonly adopted, which requires workers with years of production experience to complete. In recent years, silver product craftsmen from all over the country, with different skills, have combined product design innovation with traditional silver product forging techniques. They communicate and improve with the masters and craftsmen of Xinhua Village, and have innovated products that integrate various intangible cultural heritage techniques such as silver and porcelain, lacquer, and cloisonn é, which are popular in the market. Together, they inject new vitality into Xinhua Village's silver product industry (Zhao, 2023). After the integration of silver products with various intangible cultural heritage techniques, it has brought more possibilities for the design of silver products in Xinhua Village. The application of mechanical production technology and mass production have improved production efficiency.

In summary, under the impact of mechanical production technology, the traditional handicraft skills of Xinhua Village silver products are facing great challenges. Under the theory of ecological symbiosis, mechanical production technology is combined with handcraft skills to efficiently complete basic tasks in mechanized production. Handcraft production adds unique aspects to the product, thereby addressing the issue of design homogenization in silver products. Based on this assumption, the hypothesized theoretical relationship in this study is illustrated in Figure 4

Figure 4 Theoretical framework (Draw by Author)

Based on theoretical relationship assumptions and evolutionary design theory, the silver product design process of this study is shown in Figure 5.

Figure 5: The design process of silver product based on evolutionary design (Draw by Author)



METHODS AND TOOLS

Research Method

This study employs the literature review method for qualitative analysis, a questionnaire survey method is employed to survey product satisfaction, and quantitative analysis method is used for data analysis.

Sampling

The sample survey is targeted at individuals aged 15-59 in Xinhua Village, who possess a high school education or above in Dali Prefecture, Yunnan Province. According to the data from the 2020 Seventh National Population Census (every five years) on the government website of Dali Bai Autonomous Prefecture, the total resident population of Dali Prefecture is 3337559. Within this total, there are 444439 individuals aged 15-59 who possess a high school education (or its equivalent) or above.

The sampling basis for the sample is the YAMANE sampling formula proposed by Japanese statistician Yoshitaka Yamamoto in 1967: n=N/(1+N * e2), where n represents the sample size, N represents the population size, and e represents the expected sampling error (Almeda, Capitrano&Sarte, 2010). Randomly sample the population aged 15-59 who have a high school (including vocational school) or higher education level.

The error is set at 5%, so the sample size is: n=444439/(1+444439 * 0.052) ≈ 400 (people).

Research Steps

Step 1: Product design practice. Strategies are customized according to the theoretical hypothesis model, and silver product design is carried out under the principle of combining new and old production technologies under the ecological symbiosis theory.

Step 2: Verify the path relationship of the model. Product satisfaction surveys are conducted on the finished products of the design practice to verify the path relationship of the model.

RESULT

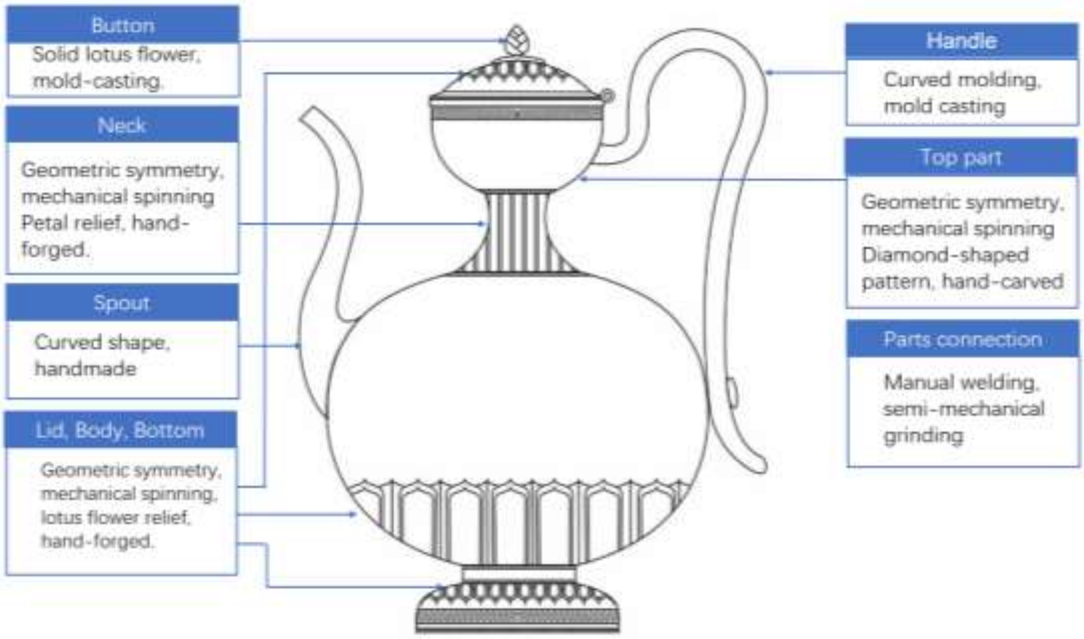
Silver Product Design Based on Production Technology Intergrowth

Mechanically produced components. Mechanized mass production, which is based on molds or the same programming for automated engraving, produces products that all look the same, leading to issues of similarity. However, mechanized manufacturing can handle basic production, such as making geometric components. In the initial phase, handcraft production requires geometric parts，to ensure the product's sealing and other related issues。Mechanical production, on the other hand, can quickly and accurately meet the design specifications.

Decorations crafted by hand. No two handmade products are identical, especially when crafting more regular shapes, as they cannot be as precise as those produced by machinery. Therefore, handcrafting is more suitable for decorations and the creation of unique, personalized customizations.

For the above reasons and based on the theory of symbiosis, a preliminary design is illustrated in Figure 6.

Figure 6: Preliminary Design



After obtaining the preliminary design, we consulted with three technical experts: Mu Binglin (inheritor of national intangible cultural heritage representative projects), Cun Fabiao (inheritor of national intangible cultural heritage representative projects), and Li Jinfu (inheritor of provincial-level intangible cultural heritage representative projects). Adjustments were made based on their suggestions regarding practicality and production techniques. The handle, for instance, was changed from solid silver to wood, effectively preventing burns during use. Furthermore, the technique used to create the spout was changed from hand-forging to pressure molding using a mechanical mold, resulting in a more efficient shaping process. The final design is shown in Figure 7.

Figure 7: Final Design

Product Satisfaction Survey

This survey is based on the distribution of test papers on the Wenjuanxing online platform (www.wjx. cn). A total of 424 questionnaires were distributed, and 424 were actually collected. The collected questionnaires are fully filled out and there are no missing items in the answers, which are considered valid questionnaires with an effective response rate of 100%. The data of this survey questionnaire was mainly analyzed using descriptive and regression analysis.

Demographic characteristics of the sample. Among the 425 participants in this questionnaire survey, 45.8% were females and 53.3% were males, with males as the majority. The age group is mostly concentrated between 18-25 and 31-40 years old, accounting for 61.3%. Office workers, arts and crafts professionals, and others account for 30%, 27.8%, and 24.1%, respectively. The specific basic information is shown in Table 1 。

Table 1 Basic Information of the Respondent

	Options	Frequency	Proportion（%）
	Male	226	53.3
Gender	Female	194	45.8
	Other	4	0.9
Age	Under 18 years old	3	0.7

	18-25	139	32.8
	26-30	74	17.5
	31-40	121	28.5
	41-50	66	15.6
	51-60	20	4.7
	61 and above	1	0.2
Occupation	Xinhua Village Silver Product Practitioners	6	1.4
	Silver product collectors or consumers	10	2.4
	Silver Craftsman	13	3.1
	Intangible Cultural Heritage Inheritor	11	2.6
	Office workers	127	30.0
	Freelancers	37	8.7
	Arts and Crafts Practitioners	118	27.8
	Other	102	24.1

Analysis of the current situation. In this survey, we used descriptive statistical analysis and a single-sample T-test to examine the current situation. The overall values of ecological symbiosis theory, production technology, product design, and the scale all exceed 3, indicating that the respondents hold a positive view of each dimension. Detailed information can be found in Table 2.

Table 2 Current Situation Analysis

	N	Mean ± Standard Deviation	Test Value	T	P
Ecological Symbiosis	424	4.13±0.67	3.00	34.858	<.001
Production Technology	424	4.25±0.70	3.00	36.801	<.001
Product Design	424	4.16±0.74	3.00	32.315	<.001
Total	424	4.18±0.59	3.00	40.968	<.001

The production technology, product design, and the entire scale's Cronbach's Alpha reliability coefficient values for this survey are 0.886, 0.908, and 0.914 respectively, all exceeding

0.8, indicating that these three dimensions of the scale have good reliability. The Cronbach's Alpha reliability coefficient value for the Ecological Symbiosis Theory dimension is 0.775, which is within the acceptable range as an exploratory scale. Specific results are shown in Table 3.

Table 3 Reliability Analysis

Variable	Cronbach α	Number of Items
Ecological Symbiosis	0.775	4
Production Technology	0.886	4
Product Design	0.908	6
Total	0.914	14

The results of the model fit test indicate that the CMIN/DF (chi square degree of freedom ratio) is 4.363, indicating that the data is within the satisfactory range. The root mean square error of approximation (RMSEA) is 0.089, indicating that the data is within the acceptable range. Furthermore, the test results of IFI, TLI, and CFI all reached an excellent level of 0.9 or above. In summary, based on the analysis results, the fit of the CFA model is considered acceptable. Detailed results can be found in Table 4.

Table 4 Model Adaptability Test

Index	Reference standards	Value
CMIN/DF	1-3 is excellent, 3-5 is good	4.363
RMSEA	<0.08 is good, 0.080-1 is qualified	0.089
IFI	>0.9 is excellent,>0.8 is good	0.929
TLI	>0.9 is excellent,>0.8 is good	0.913
CFI	>0.9 is excellent,>0.8 is good	0.929

Under the premise that the model has a good fit, further testing of the convergent validity (AVE) and composite reliability (CR) of each dimension of the scale is required. Through the established CFA model, the verification process calculates the standardized factor loads of each item in the corresponding dimension. Among them, the AVE values of Production Technology and Product Design for Ecological Symbiosis reached over 0.5, and the CR values of Ecological

Symbiosis, Production Technology, and Product Design reached over 0.7, with the AVE value for Ecological Symbiosis being 0.474.Average Variance Extracted (AVE) is higher than 0.5 but we can accept 0.4. Because Fornell and Larcker said that if AVE is less than 0.5, but composite reliability is higher than 0.6, the convergent validity of the construct is still adequate (Fornell & Larcker, 1981)。 Therefore, all dimensions have good convergent validity and combinatorial validity. The specific results are shown in Table 5.

Table 5 Validation Factor Measurement Model

Path relationship			**Estimate**	AVE	CR
ES4	<---	Ecological Symbiosis	0.66	0.474	0.7821
ES3	<---	Ecological Symbiosis	0.764		
ES2	<---	Ecological Symbiosis	0.649		
ES1	<---	Ecological Symbiosis	0.675		
T4	<---	Production Technology	0.78	0.6602	0.8858
T3	<---	Production Technology	0.821		
T2	<---	Production Technology	0.866		
T1	<---	Production Technology	0.78		
PD6	<---	Product Design	0.853	0.632	0.9113
PD5	<---	Product Design	0.827		
PD4	<---	Product Design	0.77		
PD3	<---	Product Design	0.813		
PD2	<---	Product Design	0.737		
PD1	<---	Product Design	0.764		

In this discriminant validity test, the Pearson correlation coefficient test was performed, and the standardized correlation coefficients between each pair of variables were all below 0.85, indicating that there is no collinearity among the variables and good discriminant validity. The P-values for the dimensions of each variable were all less than 0.01, showing a significant positive correlation. The specific results are shown in Table 6.

Table 6 Correlation test results of various dimensions of the scale

Variable	1	2	3
1. Ecological Symbiosis	1		
2. Production Technology	0 .692**	1	
3. Product Design	0. 525**	0.453 **	1

** At the 0.01 level (two tailed), the correlation is significant.

Based on correlation analysis, it is found that there is a significant correlation between Ecological Symbiosis, Production Technology, and Product Design. Further investigation is needed to examine the impact of Ecological Symbiosis and Production Technology on Product Design. Using regression analysis, as the survey questionnaire is a Likert five component scale with continuous numerical variables, linear regression analysis was chosen, with Ecological Symbiosis and Production Technology as independent variables and Product Design as dependent variable. The model has a good fit, with the adjusted R-squared value being 0.646. The closer the R-squared value to 1, the better the fit. The impact of the independent variables on the dependent variable in this regression analysis reached 64.6%, indicating that 64.6% of the change in the dependent variable was caused by the dimensions of the two independent variables. Specific results are shown in Table 7.

Table 7 Results of Linear Regression Analysis

	B	Beta	T	P	VIF
(Constant)	1.531		7.487	0.000	
Ecological Symbiosis	0.451	0.406	7.151	0.000	1.917
Production Technology	0.181	0.172	3.020	0.003	1.917
R^2			0.288		
F			86.392		
P			＜0.001		
DW			1.924		

The linear regression model of this study is significant, with F=86.392 and P<0.001<0.05. Therefore, at least one of the two independent variables can significantly affect the dependent variable, and the test of the regression coefficients of the two independent variables can ultimately obtain:

Ecological Symbiosis can significantly positively affect product design, with an impact coefficient of 0.406 (T=7.151, P=0.000<0.05), indicating that the higher the value of Ecological Symbiosis, the higher the value of product design. The quantitative relationship between the two is that for every 1 point increase in the value of Ecological Symbiosis, the value of product design increases by 0.406 points.

Production Technology can significantly positively affect product design with an impact coefficient of 0.172 (T=3.020, P=0.000<0.05), indicating that the higher the value of Production Technology, the higher the value of product design. The quantitative relationship between the two is that for every 1 point increase in the value of Production Technology, the value of Product Design increases by 0.172 points.

Finally, the linear regression equation can be obtained as follows:

Product Design=1.531+0.406×Ecological Symbiosis +0.172×Production Technology

In linear regression, if all the VIF values for both independent variable dimensions are less than 5, it indicates that there is no multicollinearity between the dimensions, thus passing the multicollinearity diagnostics. With a Durbin-Watson (DW) value of 1.924, which is very close to 2, there is no sequence correlation between the independent variable dimensions, thus passing the sequence correlation diagnostics.

Finally, the SEM model path relationship hypothesis test results for the influencing factors of product design were obtained. In this study's path hypothesis relationship test, the P value was less than 0.05 for all pairs of variables. All paths H1-H3 were confirmed, indicating a significant positive impact. Specific results are shown in Table 8, and see figure 8.

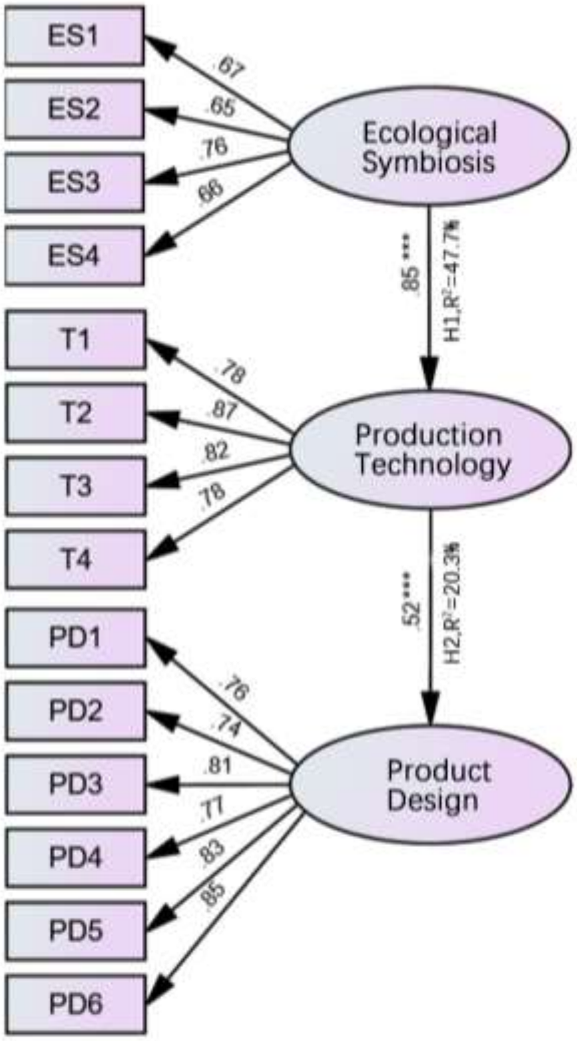
Table 8 Hypothesis test results of SEM model path relationship for product design influencing factors

Path Sequence Number	Path relationship			Estimate	S.E.	C.R.	P	R^2
H1	Production Technology	<---	Ecological Symbiosis	0.851	0.086	11.822	***	47.7%
H2	Product Design	<---	Production Technology	0.525	0.066	9.852	***	20.3%

Product Design	<---	ES1	0.171	0.055	3.011	0.003
Product Design	<---	ES2	0.117	0.04	2.086	0.037
Product Design	<---	ES3	0.063	0.055	0.996	0.319
Product Design	<---	ES4	0.208	0.054	3.761	***
Product Design	<---	T1	-0.003	0.062	-0.053	0.958
Product Design	<---	T2	0.045	0.068	0.596	0.551
Product Design	<---	T3	0.064	0.058	0.926	0.354
Product Design	<---	T4	0.088	0.064	1.328	0.184

*** At the 0.001 level (double tailed), * *. at the 0.01 level (double tailed), and *. at the 0.05 level (double tailed), the correlation is significant.

Figure 8 Structural Model (Author Draw by AMOS)



The specific items represent different dimensions within variables. From the model results, it appears that Production Technology does not have a direct impact on product design, but rather influences it under the influence of ecological symbiosis theory. In ES1 (order ecology), ES2 (simple mechanical ecology), ES3 (high-tech ecology), and ES4 (ethnic cultural ecology), high-tech has a minor impact on product design. In terms of production techniques, silver product design is only influenced by simple mechanical production. The exploration of new processes, materials, technologies, and concepts within the Production Technology dimension has a minimal impact on silver product design.

DISCUSSION

Xinhua Village, as the evacuation site for silver product manufacturing in China, is always looking for better ways to integrate production technology and promote the healthy development of silver product design, ensuring the sustainable growth of silver product manufacturing skills. The existing literature on silver product design primarily studies from the perspectives of production technology or intangible cultural heritage development. It has never been attempted before to draw on ecological theory to study the development environment of silver products. This study is an exploratory attempt to integrate ecology, production technology, and product design across disciplines, exploring whether new production technologies will have an impact on the design of silver products.

Thus, the purpose of this study is to develop a theoretical model for silver product design, grounded in the ecological symbiosis theory and production technology theory. Through daily silver product design practices, we aim to validate the feasibility of silver product strategies that are based on these hypothetical models. The results of this study indicate that there is a significant positive impact on the three hypothetical relationships between the concepts constructed in the earlier part of the article, thus the overall validity of the research model.

Our model suggests that if the development of production technologies related to silver products is selected and integrated through the lens of ecological symbiosis theory, then the silver products would have been influenced by the theory of ecological symbiosis and the production techniques, and a strong correlation exists. However, the various elements of production technology have a minor impact on the overarching dimensions of product design, which explains why the independent impact of the production technology dimension on silver product design is minimal. Therefore, through model regression verification, it is found that, among the three dimensions of ecological symbiosis theory, production technology, and product design, it is only the ecological symbiosis theory that has the strongest influence on silver product design.

From the content of the question, it can be discovered that in the dimension of ecological symbiosis theory, factors such as order demand, cultural demand, and simple mechanical production technology exert a significant influence on silver product design. However, it is generally believed that the development of high technology has no impact on silver product design. In the dimension of production technology, producers believe that new processes, technologies, materials, and concepts have no impact on the design of silver products.

Therefore, product design should place more emphasis on understanding the demand and reflecting culture.

Our research results indicate that, while the high-tech items in the ecological symbiosis dimension and all items in the production technology have no direct impact on product design, overall, the theories of ecological symbiosis and production technology have a significant positive impact on the final design of products. Based on the silver product design strategy practices that take into account this model, 65.3% of the products are purchased by consumers.

AUTHOR’S CONTRIBUTION

Throughout the research process, Wei Jinye was responsible for planning, product design, analyzing data, and writing all content except for the data interpretation section. Pastraporn Thipayasothorn was responsible for writing the data interpretation section, and Thanate Piromkan was responsible for developing and writing survey questionnaires based on the literature review.

ACKNOWLEDGEMENTS

During the research process of this paper, I received a lot of help from people. The author expresses gratitude to Li Jinfu, the producer of silver products who participated in product production, and expresses gratitude to Mu Binglin (inheritor of national intangible cultural heritage representative projects), Cun Fabiao (inheritor of national intangible cultural heritage representative projects), and Li Jinfu (inheritor of provincial-level intangible cultural heritage representative projects) who participated in product design review. Thank you to everyone who participated in the survey. This study also received support from King Mongkut's Institute of Technology Ladkrabang, Nanning University, and Yunnan Arts and Crafts Association.

Bibliography

1. Laila Abdullah Khudair Han,L. (2022). Research on Countermeasures for Product Homogenization in the Perspective of Product Design. Tiangong (27), 26-28
2. Cheng,H. (2019). Research on the Causes of "Homogenization" in Museum Cultural and Creative Products. Art and Design (Theory) (04), 95-97
3. Lu,S. (2005). The product has truly become "homogenized". Commodity and Quality (29), 15
4. Bary,A.(1879).Die Erscheinung der Symbiose : Vortrag. Verlag von Karl J. Trübner, Strassburg
5. Lynn,A.M.(1970).The Origin of Eukaryotic Cells: A Microbial Record, Hypothesis, and Critique. Cambridge University Press

6. Yuan,C.(1998). Symbiosis Theory :A Discussion on Small Economies. Economic Science Press
7. Rawson, J.(1984).Chinese Ornament. Trustees of the British Museum by British Museum Publications Limited
8. Fu, L. (2021). Master's thesis on the design and research of handmade silver pots based on traditional silverware techniques in Xinhua Village, Yunnan Province. Hebei University of Technology.
9. Chen, Y. (2017). Research on the Core Techniques of Silver and Copper Handmade Carving of the Bai Ethnic Group in Xinhua Village, Heqing, Yunnan. Art Education (Z6), 255-256
10. Sato,M.,&Kato,T.(2016).A survey on evolutionary design. Advances in Evolutionary and Deterministic Methods for Design, Optimization and Control in Engineering and Sciences,305-335.
11. Goldberg,D.E. (1989) .Application of Genetic Algorithm in Search, Optimization, and Machine Learning
12. Hatchuel, A. & Weil, B. A new approach to innovative design: an introduction to C-K 310theory. Proceedings of ICED 03, the 14th International Conference on Engineering 311Design 109–110 (2003).
13. Castle, S. D., & Gorochowski, T. E. (2023, August 31). Engineering is evolution: a perspective on the biological design process. https://doi.org/10.31219/osf.io/urq9w
14. Berger, J.(1973) Ways of Seeing.Viking Press.309
15. Chen， Y.(2013). Research on Silver and Copper Handicraft Skills of the Bai People in Xinhua Village, Heqing, Dali, Yunnan (Doctoral Dissertation).China National Academy of Art.
16. Zhou,X.(2016). An Analysis of the Hazards and Countermeasures of Product Homogenization. Modern Industrial Economy and Information Technology (06),13-14.
17. Zhao,L.,&Li,Y.(2023).From"Traveling to the Barbarians" to Traveling Everywhere.Worker's Daily(05-28).
18. Almeda, J. V., Capistrano, T. G., & Sarte, G. M. F. S. (2010). Elementary statistics. University of the Philippines Press.