The Design of Public Platform for Agricultural Products Packaging in Hunan-Jiangxi Border Area of New Era

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Abstract

This paper addresses the following research questions: How can agricultural product sales in the Hunan-Jiangxi border area be increased through packaging design that is both aesthetically pleasing and practical? How can the market competitiveness of agricultural products in the Hunan-Jiangxi border area be enhanced through systematic brand design and promotion strategies? How can a public platform with comprehensive functions and an optimized interface be designed to meet the diverse and personalized needs of farmers and consumers?

The objectives of this research are as follows:

1. To investigate and develop packaging design solutions that align with market demand and environmental protection requirements, introduce innovative design concepts, and enhance the aesthetics and practicality of agricultural product packaging, thereby increasing sales in the Hunan-Jiangxi border area.

2. To formulate systematic brand design and promotion strategies for agricultural products to improve their market competitiveness in the Hunan-Jiangxi border area.

3. To analyze user needs and usage habits, optimize the platform interface and functions, and create a comprehensive public platform that meets the diverse and personalized needs of farmers and consumers.

The sample for this study includes farmers, consumers, packaging design companies, and agricultural product dealers. Data collection was carried out through the distribution of questionnaires, and the data analysis was conducted using SPSS, Excel, and other data analysis analysis software. Statistical analyses, including frequency analysis, reliability analysis, validity analysis, confirmatory factor analysis, t-tests, and regression analysis, were employed to explore patterns and relationships in the data.

Conclusion: The design of agricultural product packaging that meets market demand and environmental protection requirements has a significant impact on the sales volume of agricultural products in the Hunan-Jiangxi border area. Systematic brand design and promotion strategies significantly enhance the market competitiveness of these agricultural products. Additionally, a public platform for agricultural products, featuring an optimized interface and quick functions, effectively meets the strong demand from both farmers and consumers.

Keywords: Design; Public Platform; Agricultural Products Packaging; Hunan-Jiangxi Border Area; New Er

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Introduction

In the context of the new era, the rapid development of information technology and e-commerce has brought new opportunities and challenges to the agricultural industry. The packaging of agricultural products in the Hunan-Jiangxi border area lacks visual design. The text, graphics, and colors are relatively random, and the packaging patterns are relatively straightforward and single. Generally, product photos are used directly, lacking innovation and aesthetics. The entire packaging lacks cultural heritage and regional advantages, and cannot highlight the characteristics of agricultural products. The main reason is that the economy in rural areas is relatively backward, there is a shortage of professional talents, and packaging design and brand awareness are relatively low (Qu Ruyun, 2020).In the era of rapid development of commodity economy, consumers' cultural quality and aesthetic ability are constantly improving, and the design requirements for agricultural product e-commerce packaging are getting higher and higher. The previous low-grade packaging has been difficult to integrate with the social market. Different agricultural products use different materials, structures and processes in packaging, which will show different effects (Liang Shiwei, Zhou Miaolong, Zhang Bangyu, Li Yuji, 2021).

How to improve the packaging level of agricultural products in the Hunan-Jiangxi border area, integrate regional cultural elements, and promote brand image by designing an efficient public platform has become an important issue that needs to be solved.The agricultural product packaging design platform is based on the Internet and is committed to integrating the information of various design companies, providing packaging design, sales and other services to various agricultural product producers, wholesalers and sellers, and providing design companies with agricultural product information, local cultural characteristics and the growing environment of agricultural products. It enables design companies to use ecological and environmentally friendly materials to produce agricultural product packaging based on agricultural product information, integrate design factors such as illustrations and heartwarming copywriting, and form a brand culture to promote the marketing and sales of agricultural products and build a platform framework (Ren Ke, Huang Changmin, Shang Yun, Zheng Di, Zhang Yang, 2019). such a public platform can not only increase the sales volume of agricultural products, but also enhance farmers' market awareness and brand recognition,

improve the market competitiveness of agricultural products, and promote regional agricultural modernization and regional economic development.

The Hunan-Jiangxi border area is located in 24 counties (cities, districts) at the junction of Hunan and Jiangxi provinces, with a total area of 50,500 square kilometers (Hunan Provincial Government,2019). (See Figure 1)

Figure 1: Distribution map of the Hunan-Jiangxi border area

Source:Hunan Provincial Department of Agriculture and Rural Affairs official website

This study focuses on the design of a public platform for agricultural product packaging in the Hunan-Jiangxi border area in the context of the new era, aiming to solve three key problems: How to increase the sales of agricultural products in the Hunan-Jiangxi border area through packaging design that is both beautiful and practical? How to enhance the market competitiveness of agricultural products in the Hunan-Jiangxi border area through systematic brand design and promotion strategies? How to design a public platform with complete functions and optimized interface to meet the diverse and personalized needs of farmers and consumers?

Research Objectives

1.To research and formulate packaging design solutions that meet market demand and environmental protection requirements, introduce innovative design concepts, and improve the aesthetics and practicality of agricultural product packaging. increase the sales volume of agricultural products in the Hunan-Jiangxi border area.

2.To formulate systematic agricultural product brand design and promotion strategies to improve the market competitiveness of agricultural products in the Hunan-Jiangxi border area.

3.To analyze user needs and usage habits, optimize the platform interface and platform functions, and create a comprehensive public platform that meets the diverse and personalized needs of farmers and consumers.

Literature Review

Excellent agricultural product packaging design helps stimulate purchasing desire and promote agricultural product sales. With the improvement of the public's aesthetic ability, the traditional "extensive" agricultural product packaging method can no longer meet the demands of contemporary consumers. In the context of the new era, it is extremely urgent to innovate agricultural product packaging design.Improve the sales capacity of local specialty agricultural products from three perspectives: optimizing packaging design structure, rationally selecting materials and processes, and carefully refining visual elements to meet the diverse and personalized needs of consumers (Zhang Haihong, Huang Lianji, 2024). Assist in the construction and upgrading of traditional agricultural product brands. From the perspective of how to save costs for enterprises and how to create agricultural product brands that are different from traditional consumer concepts, solve the problems that current agricultural product brands have in the contemporary consumer market. At the same time, add the design of online mini-programs to increase consumer convenience, enhance online store experience, and expand the brand's market competitiveness and publicity channels(Li Jingyi, 2023).Packaging design is only presented in simple forms such as images and texts, which can no longer provide users with a good experience. In this development situation, interactive packaging design has gradually emerged. The interactive presentation of packaging design not only focuses on the expression of the product's "function", but also pays more attention to the product's "experience" or "emotional" function. Such an interactive relationship makes users pay more attention to the packaging, thereby achieving the purpose of attracting users (Saniya, Zhang Xinyou, 2022). As food safety issues become increasingly prominent, the quality traceability of specialty agricultural products has become an issue that needs to be addressed urgently. The traceability system can effectively record the entire process of agricultural products from production and processing to sales, greatly improving the immutability and traceability of data. The use of blockchain technology can increase the market's trust in specialty agricultural products, provide consumers with real and reliable product information, and provide new technical means for the quality management of agricultural products (Zhang Qian. 2024). Agricultural product packaging designers should deeply explore local cultural characteristics and create differentiated brands to better help agricultural products stand out in the fierce market competition. Agricultural product packaging designers can incorporate regional stories into agricultural product packaging design, and establish emotional connections between agricultural products and consumers by telling historical stories, origins, development history, and production processes related to agricultural products, so as to enhance consumers' recognition of agricultural product brands. (Wang Lei, 2024).

Research Conceptual Framework

Figure 2: Conceptual framework
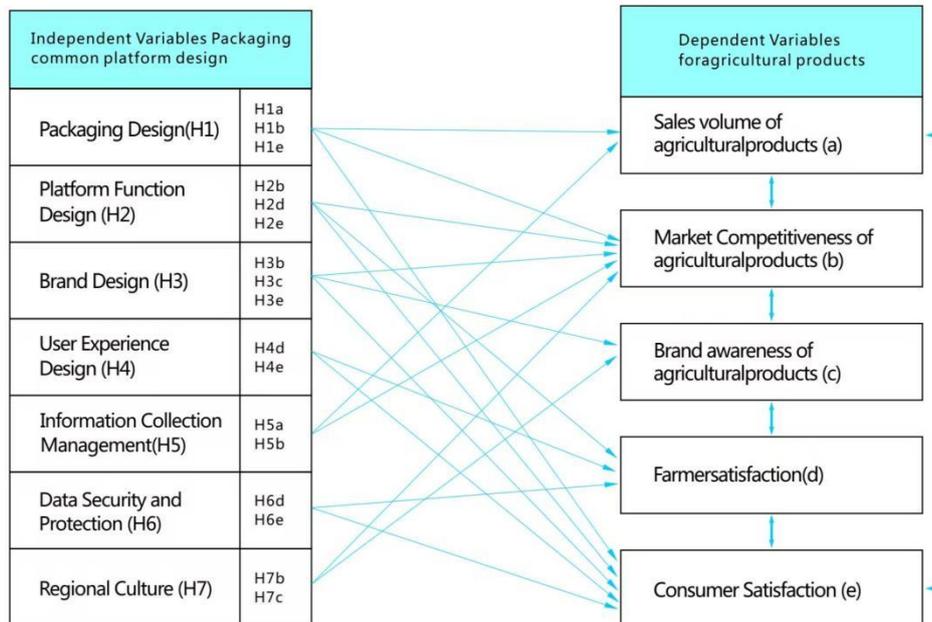
Source: drawn by the author

Logical relationship

1. Packaging design affects consumer satisfaction, agricultural product market competitiveness and agricultural product sales.

2. Platform function design affects farmer satisfaction, agricultural product market competitiveness and consumer satisfaction.

3. Brand design affects agricultural product market competitiveness, agricultural product brand awareness and consumer satisfaction.

4. User experience design affects farmer satisfaction and consumer satisfaction.

5. Information collection and management affects agricultural product market competitiveness and agricultural product sales.

6. Data security and protection affect farmer satisfaction and consumer satisfaction.

7. Regional culture affects agricultural product brand awareness and agricultural product market competitiveness.

Based on the independent variables and dependent variables with correlation in this paper, this study made a reasonable predictive judgment and hypothetical explanation for the facts that have appeared in the study but have not yet been proven. Finally, the seven research hypotheses of this study were summarized and refined, which are:

H1a: High-quality packaging design significantly increases the sales volume of agricultural products.

H2b: Perfect platform function design significantly improves the market competitiveness of agricultural products.

H3b: Creative and attractive brand design significantly improves the market competitiveness of agricultural products.

H4e: Good user experience design significantly improves farmers' satisfaction.

H5b: Effective information collection and management significantly improves the market competitiveness of agricultural products.

H6d: Strong data security and protection measures significantly improve consumer satisfaction.

H7c: Packaging design that integrates regional culture significantly improves agricultural product brand awareness.

Research Methodology

This paper primarily employs quantitative research methods, also known as quantitative studies, which involve testing hypotheses formed around the research question to derive results with generalizable significance. The quantitative research in this study mainly gathers research data through questionnaires. The data collected from the questionnaires is then statistically analyzed using analytical software.

1. Data source:

The data comes from a questionnaire survey. A detailed questionnaire with 36 questions was designed based on the independent variables and dependent variables, covering the basic information of the participants and the agricultural products they are exposed to in their area. The questionnaire included aspects such as packaging requirements, design preferences, brand design, platform functions, user experience, information collection, receipt security, regional culture, and satisfaction.

2. Population and sampling:

The sample range is Hunan Province and Jiangxi Province in the border area of Hunan and Jiangxi, as well as Guangdong Province, which has the most packaging companies and packaging talents (Hunan University of Technology, 2021). 525 copies in each province, a total of 1575 copies. The population includes farmers, consumers, packaging design companies, agricultural product dealers, and others. The respondents in each province are mainly: 105 farmers, 105 consumers, 105 packaging companies, 105 agricultural product dealers, and 105 others. According to different research questions, different categories of populations that need to be investigated are sampled, including specific object sampling, semi-random sampling, and completely random sampling. The total number of measurement items of the structural equation model calculated in this study is 41, so a total of 1575 questionnaires were distributed in the official survey of this study, and 1510 valid questionnaires were collected, with a recovery rate of 95.87%. see Table 1.

Table1 Sample demographic characteristics

gender	Male781	Female729
age	Under 18 18-25 26-35 36-45 46 and above	
identity	Farmer Consumer Agricultural product distributor Packaging company Other (please specify)	
your region	Hunan Province Jiangxi Province Guangdong Province	
Agricultural products contacted	Fruits Vegetables Grains Livestock products Other (please specify)	

Source: drawn by the author

3. Data Collection:

Data were collected using the questionnaire developed in the first and second phases. The design of the research questions was based on the discussion of the relationship between the latent variables in the main model and was created based on the research hypotheses. In the first part of the questionnaire, respondents were asked about their gender, age, identity, region, and agricultural products they were exposed to, with a total of five questions. The second part used a Likert five-point scale, 7 independent variables, and 5 dependent variables. Therefore, the questionnaire (two parts) for this study contained a total of 41 questions. Each factor was measured on a 5-point scale. 5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, and 1 = strongly disagree.

4. Data analysis:

The completed survey results were loaded into the statistical program SPSS. The first step was to conduct a descriptive analysis of the data. The descriptive analysis of this study includes the descriptive part of the statistical results of the demographic characteristics of the respondents and the questionnaire variables; the description of the demographic characteristics selected frequency, percentage, and cumulative percentage to numerically and intuitively reflect the results of the overall sample in order to understand the basic background information of the respondents. The questionnaire items were evaluated using a five-point Likert scale. If the respondents agreed more with the questionnaire items, the value of the item was higher, indicating that the item was closer to the subjective views of the respondents; if the respondents agreed less with the questionnaire items, the value of the item was lower, which was contrary to the subjective views of the respondents.

Reliability is a measure of the accuracy of the characteristics being examined based on the consistency or stability of the test scale results, rather than the test or scale itself (McLeod, S,2013). When the results of a study are evaluated multiple times with the same response and show a strong positive correlation, it is considered reliable.

Validity refers to the validity of the questionnaire results, which tests whether the questionnaire actually detects the content being measured (N. golafshai, 2003), including convergent validity (CV) and discriminant validity (DV). First, AMOS 24.0 was used to obtain factor loadings and average variance extracted (AVE) to test convergent validity.

Research Conceptual Framework

The framework of this study is divided into five chapters. The first chapter is the introduction, which includes the research background, problem statement, research questions, research objectives, conceptual framework and hypothesis, research significance, research scope, and definition of terms. The second chapter studies in detail the concepts and theories related to this study and past studies related to this study. Similarly, the third chapter deals with the research methodology, including research design, population, sampling, data collection procedures, and data analysis. Similarly, the fourth chapter deals with analyzing and presenting the data collected in the specific process. Finally, the fifth chapter presents the research summary, conclusions, and recommendations. As shown in Table 2:

Table 2: Research Conceptual framework

	• Background
	• Statement of the problem
	• Research questions
	• Objective of the study
Chapter I	• Conceptual framework
Introduction	• Hypothesis
	• Significance of the study
	• Scope of the study
	• Definition of the term
Chapter II	• Theories /Concepts
Literature Review	• Past Studies
	• Research Design
Chapter III	• Population and Sample
Research Methodology	• Data collection Procedure
	• Analysis of data
Chapter IV	
Finding and Discussion	• Analysis and Presentation of Data
	• Summary
Chapter V	• Conclusion
Conclusion and Recommendation	• Recommendation

Source: drawn by the author

Research Results

The main purpose of this study is to design a public platform for agricultural product packaging in the Hunan-Jiangxi border area in the new era. Through quantitative quantitative analysis of questionnaire data, the impact of independent variables (packaging design, platform function design, brand design, user experience design, information collection management, data security and protection, regional culture) on dependent variables (agricultural product sales, agricultural product market competitiveness, agricultural product brand awareness, farmer satisfaction, consumer satisfaction) is evaluated. Descriptive analysis, reliability analysis, validity analysis, difference analysis, correlation analysis, regression analysis and other methods are used to test the validity of variables.

1. To research and formulate packaging design solutions that meet market demand and environmental protection requirements, introduce innovative design concepts, and improve the aesthetics and practicality of agricultural product packaging. increase the sales volume of agricultural products in the Hunan-Jiangxi border area.Research data shows that:Among the various predictive variables, the regression coefficient of packaging design is 0.13, the standard error is 0.033, the t value is 3.886, the p value is significantly less than 0.001, and the standardized coefficient is 0.105. This shows that packaging design has a positive and significant impact on the sales volume of agricultural products, and this impact is highly statistically significant. Good packaging design can effectively enhance the market appeal of agricultural products and promote sales.As shown in Table 3:

Table 3 Agricultural product sales

Predictor variables	coefficient	Standard error	t-value	p-value	Standardized coefficient
intercept	1.566	0.172	9.084	$< .001$	
Package Design	0.13	0.033	3.886	$< .001$	0.105
Platform function design	0.046	0.03	1.555	0.12	0.042
Information collection management	0.038	0.03	1.267	0.205	0.035
User Experience Design	0.094	0.037	2.52	0.012	0.078
brand design	0.177	0.031	5.718	$< .001$	0.154
Data security and protection	0.001	0.026	0.033	0.974	0.001
Regional Culture	0.106	0.03	3.547	$< .001$	0.098

Source: Data and information from this research

2. To formulate systematic agricultural product brand design and promotion strategies to improve the market competitiveness of agricultural products in the Hunan-Jiangxi border area.Research data shows that:The regression coefficient of brand design is 0.119, the standard error is 0.03, the t value is 3.997, the p value is significantly less than 0.001, and the standardized coefficient is 0.106, showing that brand design has a positive and significant impact on the market competitiveness of agricultural products. Brand design is not only the external manifestation of product image, but also a symbol of quality and reputation. An excellent brand design can significantly improve the market recognition and consumer trust of the product, thereby enhancing market competitiveness.As shown in Table 4:

Table 4 Agricultural product market competitiveness

Predictor variables	coefficient	Standard error	t-value	p-value	Standardized coefficient
intercept	1.405	0.166	8.477	< .001	
Package Design	0.086	0.032	2.679	0.007	0.072
Platform function design	0.037	0.029	1.296	0.195	0.034
Information collection management	0.081	0.029	2.811	0.005	0.076
User Experience Design	0.175	0.036	4.893	< .001	0.15
brand design	0.119	0.03	3.997	< .001	0.106
Data security and protection	0.032	0.025	1.292	0.196	0.033
Regional Culture	0.106	0.029	3.67	< .001	0.1

Source: Data and information from this research

3. To analyze user needs and usage habits, optimize the platform interface and platform functions, and create a comprehensive public platform that meets the diverse and personalized needs of farmers and consumers.Research data shows that:The regression coefficient of user experience design is 0.118, the standard error is 0.044, the t value is 2.712, the p value is 0.007, and the standardized coefficient is 0.087, indicating that user experience design has a significant positive impact on farmers' satisfaction. Good user experience design can improve consumers' overall purchasing experience, thereby significantly improving their satisfaction. This shows the importance of optimizing user experience design in improving farmers' satisfaction;The regression coefficient of platform function design is 0.074, the standard error is 0.035, the t value is 2.099, the p value is 0.036, and the standardized coefficient is 0.058. This result shows that platform function design has a significant positive impact on consumer satisfaction. A functional and easy-to-use platform can enhance consumers' purchasing experience and operational convenience, thereby enhancing their satisfaction.As shown in Table 5、Table 6:

Table 5 Farmer satisfaction

Predictor variables	coefficient	Standard error	t-value	p-value	Standardized coefficient
intercept	1.889	0.202	9.349	< .001	
Package Design	0.087	0.039	2.215	0.027	0.062
Platform function design	-0.014	0.035	-0.41	0.682	-0.011
Information collection management	0.051	0.035	1.451	0.147	0.041
User Experience Design	0.118	0.044	2.712	0.007	0.087
brand design	0.122	0.036	3.352	< .001	0.093

	0.014	0.03	0.457	0.648	0.012
Data security and protection					
Regional Culture	0.072	0.035	2.04	0.042	0.058

Source: Data and information from this research

Table 6 Consumer satisfaction

Predictor variables	coefficient	Standard error	t-value	p-value	Standardized coefficient
intercept	1.652	0.204	8.082	< .001	
Package Design	0.138	0.04	3.471	< .001	0.097
Platform function design	0.074	0.035	2.099	0.036	0.058
Information collection management	0.015	0.036	0.428	0.668	0.012
User Experience Design	0.064	0.044	1.455	0.146	0.046
brand design	0.14	0.037	3.806	< .001	0.106
Data security and protection	0.041	0.031	1.316	0.188	0.035
Regional Culture	0.04	0.035	1.142	0.254	0.032

Source: Data and information from this research

Discussion

High-quality packaging design significantly affects the sales volume of agricultural products; this is consistent with the previous literature, emphasizing the importance of improving the sales ability of local specialty agricultural products from three perspectives: optimizing packaging design structure, rationally selecting materials and processes, and carefully refining visual elements, and meeting the diversified and personalized needs of consumers (Zhang Haihong, Huang Lianji, 2024).

The perfect platform function design did not reach the significant level on the market competitiveness of agricultural products, and the impact was not significant;

Creative and attractive brand design significantly affects the market competitiveness of agricultural products; this supports previous research, emphasizing the necessity of helping the construction and upgrading of traditional agricultural product brands and expanding the sales and promotion channels of brands (Li Jingyi, 2023).

Good user experience design significantly affects farmers' satisfaction; this is consistent with the research framework, indicating that interactive packaging design is gradually emerging. Compared with traditional packaging design, interactive design research on agricultural product packaging from the perspective of user experience and farmers' needs can pay more attention to their needs in many aspects (Saniya, Zhang Xinyu, 2022).

Effective information collection and management significantly affects the competitiveness of agricultural products in the market; these findings are very important for the competition in the agricultural product market. The traceability system can effectively

record the information of the entire process of agricultural products from production and processing to sales, greatly improving the immutability and traceability of data. Providing consumers with real and reliable product information has enhanced the significance of market competitiveness (Zhang Qian. 2024).

Strong data security and protection did not reach a significant level on consumer satisfaction, and the impact was not significant;

Agricultural product packaging that integrates regional culture significantly affects agricultural product brand awareness; these findings are of great significance to the differentiation of agricultural products. Studies have shown that agricultural product packaging designers can also incorporate regional stories into agricultural product packaging design, and establish emotional connections between agricultural products and consumers by telling historical stories, origins and development history, and production processes related to agricultural products, thereby enhancing consumers' recognition of **Conclusion**

In the figure below, the solid arrow indicates a significant positive impact, and the dotted arrow indicates an insignificant impact. (Figure 3)

The research results show that: beautiful and practical agricultural product packaging design can significantly improve the market position and sales of agricultural products in the Hunan-Jiangxi border area; systematic agricultural product brand design and creative promotion strategies have significantly improved the market competitiveness of agricultural products in the Hunan-Jiangxi border area; creating a multifunctional agricultural product public platform with experience design as the focus has significantly met the needs of farmers and modern consumers. At the same time, the development of the platform has driven the development of related industrial chains, increased farmers' income, created a large number of employment opportunities, and promoted the overall improvement of the Hunan-Jiangxi border economy. In the future, the platform should continue to optimize and innovate, further improve its efficiency and influence, and make greater contributions to the modernization and sustainable development of agriculture in the Hunan-Jiangxi border area.

Figure 3: Research validates results
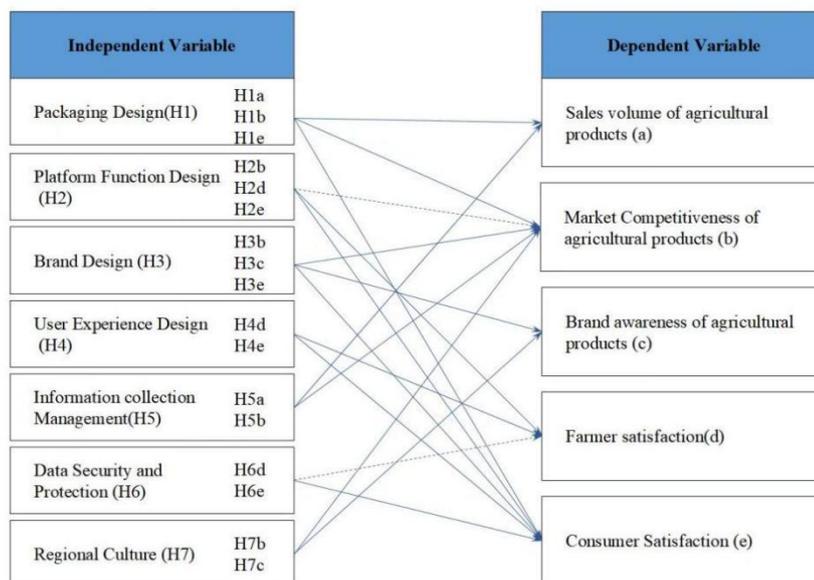
Source: drawn by the author

Model analysis shows that: beautiful and practical packaging design significantly affects the sales volume of agricultural products; perfect platform function design has not yet reached a significant level on the market competitiveness of agricultural products, and the impact is not significant; creative and systematic brand design has a significant impact on the market competitiveness of agricultural products; good user experience design has a significant impact on consumer satisfaction; effective information collection and management have a significant impact on the market competitiveness of agricultural products; the impact of data security and protection on farmers' satisfaction has not yet reached a significant level, and the impact is not significant; agricultural product packaging that incorporates regional culture significantly affects the brand awareness of agricultural products.

Future research directions and improvement suggestions

1. Interdisciplinary cooperation and innovation

Future research should strengthen interdisciplinary cooperation, combine theories and methods of multiple disciplines such as packaging design, marketing, information technology and social economy, and conduct comprehensive and systematic research. Through interdisciplinary innovative research, promote the theoretical and practical development of agricultural product packaging public platform design.

2. Expand the scope and sample size of data collection

Future research should expand the scope and sample size of data collection, cover more regions and populations, and enhance the representativeness and universality of data. At the same time, a variety of data collection methods, such as big data analysis and field research, can be used to obtain more comprehensive and detailed data.

3. Verify the wide applicability of the theoretical model

Future research should verify the applicability and effectiveness of the theoretical model in different regions and market environments, and explore its application possibilities and adjustment strategies in other regions or countries. Through cross-regional and cross-national research, further improve and optimize the theoretical model to make it have a wider application value.

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