

Study on Consumers' Purchase Intention of 3D-Printed Deformable Women's Clothing and Its Influencing Factors

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Abstract. Against the backdrop of consumption upgrading and technological innovation, 3D-printed transformable clothing, as an emerging clothing category, has attracted attention from both academic and industrial circles. This study comprehensively adopts methods such as literature research, questionnaire survey, and the Value-Attitude-Behavior (VAM) model to conduct an in-depth exploration of consumers' purchase intention toward such clothing and its influencing factors. Theoretically, based on the VAM model and consumer behavior theory, a conceptual framework is constructed to analyze dimensions including individual characteristics, product attributes, social influences, and environmental factors. The empirical results show that consumers' individual traits—such as consumer innovativeness, fashion sensitivity, and environmental awareness—and product attributes—including the degree of personalized customization, functional innovation, material comfort, and price rationality—have a significant impact on purchase intention. Meanwhile, social factors such as reference group attitudes and social fashion trends, as well as environmental factors like macro-policy orientation and economic environment stability, also play a moderating role in the purchase decision-making process. This study provides a theoretical basis and practical guidance for expanding the 3D-printed clothing market and promoting industrial innovation and development, helping clothing enterprises accurately grasp market demand and optimize product design and marketing strategies.

Keywords: 3D-Printed Clothing; Deformable Clothing; Purchase Intention; Influencing Factors

1. Introduction

In contemporary society, the diversification of consumers' aesthetic preferences and demand patterns has given rise to a pronounced shift toward personalized consumption. Rather than passively following homogenized fashion trends, consumers increasingly seek to articulate their values and identities through apparel distinguished by unique design concepts and clearly defined stylistic features ^[1]. Against the backdrop of excessive clothing consumption within the fashion industry, transformable clothing offers a meaningful response. It not only addresses the functional needs of modern consumers but also embodies emotional, economic, and ecological value. As a category of apparel that integrates practicality with innovation, transformable clothing must satisfy two fundamental criteria. First, it should preserve the comfort and ease of wear associated with conventional garments. Second, it must incorporate at least two distinct forms or functions that are mutually convertible. Importantly, after each transformation, the garment should remain capable of reverting to its original state, ensuring reversibility and sustained usability. From the perspective of materials science, transformation can be understood as a reversible change in the form, function, or appearance of matter. Applied to transformable clothing, this concept refers specifically to reversible alterations in the physical properties of garments. A defining characteristic of such transformation is the absence of material loss during the process, allowing the garment to cycle repeatedly among multiple configurations. Unlike the notion of “one garment worn in multiple ways,” transformable clothing is defined by genuine structural or functional transformation rather than variations in styling alone. Its scope extends beyond changes in silhouette or appearance, enabling garments to be converted into objects with functional or decorative roles in everyday life. In essence, transformable clothing represents an innovative apparel form that integrates multifunctionality, interactivity, aesthetic expression, and technological application. From a

consumer perspective, transformable apparel directly addresses the demand for “achieving stylistic diversity without purchasing additional garments,” thereby offering differentiated options within the market. Existing studies indicate that transformable design can generate substantial competitive advantages for retailers. By effectively responding to consumers’ desire for variety and novel experiences, such innovative product strategies have the potential to serve as a new driver of economic growth within the apparel industry ^[2]. In the context of China’s garment industry, although sustainable fashion has a relatively short development history, it has already made notable progress. Nevertheless, survey data reveal that while domestic consumers’ environmental awareness has increased, only a small proportion are willing to pay a price premium for sustainable products. This discrepancy suggests that the market for sustainable fashion in China has yet to reach full maturity and requires further cultivation ^[3]. Osmud Rahman, in his study *Sustainable Practices and Transformable Fashion Design: Chinese Professional and Consumer Perspectives*, employed in-depth interviews to examine the feasibility of industrializing transformable clothing within the Chinese market. His research extended beyond the production process to systematically evaluate the suitability of sales channels, while also identifying both positive public responses and prevailing consumer concerns. Building on this line of inquiry, the present study conducted an interactive online questionnaire survey to systematically collect consumer attitudes across different genders toward mass-customized apparel and transformable garments. In addition, professional perspectives from industry practitioners in China were gathered regarding the design and production of transformable clothing. The findings indicate that Chinese consumers’ acceptance of transformable apparel exhibits a dualistic pattern, with the balance between aesthetic appeal and transformable functionality emerging as the key influencing factor. When transformable features are perceived to compromise the aesthetic qualities of garments, consumers’ willingness to adopt such products declines markedly ^[4]. Batista, in the research report *New Business Models Driven by Digital Technologies*, emphasized that digital technologies such as 3D printing, virtual reality, the Internet of Things, and big data are profoundly reshaping the business ecosystem of the apparel industry ^[5]. This industry analysis further demonstrates that, in the context of the rapid advancement of 3D printing technologies, business model innovation has become an unavoidable trend for apparel enterprises.

Against this backdrop, drawing on the user value acceptance model and uncertainty reduction theory, this study develops a framework to examine the factors influencing consumers’ purchase intention toward 3D-printed transformable clothing products. A questionnaire survey was administered to users of the Wenjuanxing platform, followed by empirical analysis, to systematically explore the determinants of purchase intention. The purpose of this study is to provide insights that may support functional optimization of such products and enhance consumers’ willingness to purchase.

2. Organization of the Text

2.1 Research Hypotheses and Model Construction

2.1.1 User Value Acceptance Model

With continuous technological advancement and the expansion of application contexts, Kim and colleagues conducted a pioneering empirical study in 2007 that systematically investigated the key drivers and underlying mechanisms influencing consumers’ adoption of mobile internet services. Based on customer perceived value theory (CPV) and the technology acceptance model (TAM), they proposed the user value acceptance model (VAM) ^[6]. Their findings indicate that consumers’ adoption intentions are primarily determined by perceived value, which emerges from the combined effects of perceived benefits and perceived costs.

2.1.2 Uncertainty Reduction Theory

Uncertainty reduction theory was first systematically proposed by Berger and Calabrese in the field of interpersonal communication. The theory suggests that when individuals lack sufficient knowledge about an object or are unable to anticipate the consequences of their actions, they are motivated to seek information from various sources to reduce uncertainty. In a consumption context, this information-seeking process enables consumers to mitigate perceived risks associated with unfamiliar products, thereby reducing decision uncertainty and maximizing the perceived value of the final purchase outcome^[7].

2.1.3 Model Construction

Drawing on prior research and considering the technological context and characteristics of the emerging business environment, this study adopts the user value acceptance model as its theoretical foundation. Perceived benefits and perceived costs are specified as the core independent variables, while perceived value is incorporated into the research framework as a mediating variable^[8]. Perceived benefits are further conceptualized as a multidimensional construct comprising perceived usefulness, perceived ease of use, and perceived quality. Perceived costs are defined as a composite of perceived expense and perceived risk. Together, these dimensions constitute the key evaluative components of customer perceived value. On this basis, the present study investigates consumers' purchase intention toward 3D-printed transformable clothing products and the factors influencing that intention. The conceptual model employed in this research is illustrated in Figure 1.

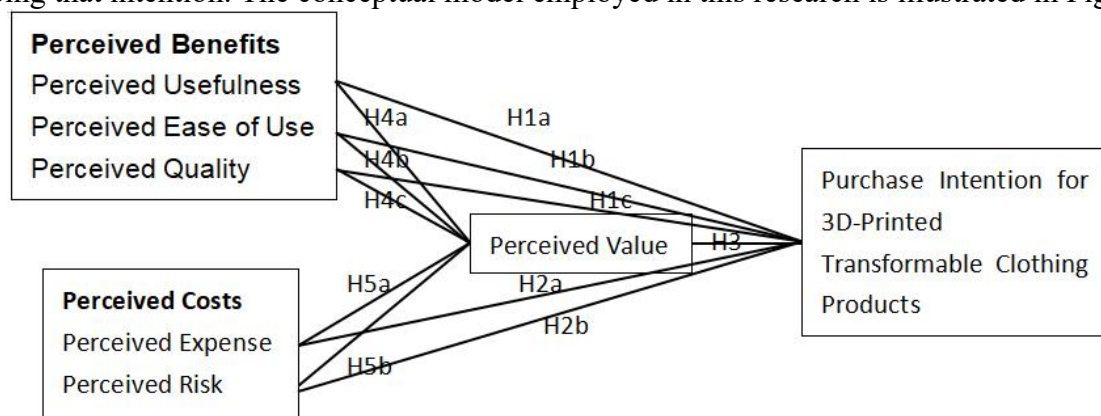


Fig. 1 Research Model of This Study

Based on the proposed theoretical framework, a total of eleven research hypotheses are formulated as follows. Users' perceived benefits of 3D-printed transformable clothing have a significant positive effect on purchase intention.

H1a: Users' perceived usefulness of 3D-printed transformable clothing products has a significant positive effect on their purchase intention (+).

H1b: Users' perceived ease of use of 3D-printed transformable clothing products has a significant positive effect on their purchase intention (+).

H1c: Users' perceived quality of 3D-printed transformable clothing products has a significant positive effect on their purchase intention (+).

Users' perceived costs of 3D-printed transformable clothing have a significant effect on purchase intention.

H2a: Users' perceived expense of 3D-printed transformable clothing products has a significant negative effect on their purchase intention (-).

H2b: Users' perceived risk of 3D-printed transformable clothing products has a significant negative effect on their purchase intention (-).

There is a significant positive relationship between perceived value and purchase intention for 3D-printed transformable clothing.

H3: Users' perceived value of 3D-printed transformable clothing products has a significant positive effect on their purchase intention (+).

Users' perceived benefits of 3D-printed transformable clothing have a significant positive effect on perceived value.

H4a: Users' perceived usefulness of 3D-printed transformable clothing products has a significant positive effect on perceived value (+).

H4b: Users' perceived ease of use of 3D-printed transformable clothing products has a significant positive effect on perceived value (+).

H4c: Users' perceived quality of 3D-printed transformable clothing products has a significant positive effect on perceived value (+).

Users' perceived costs of 3D-printed transformable clothing have a significant effect on perceived value.

H5a: Users' perceived expense of 3D-printed transformable clothing products has a significant negative effect on perceived value (-).

H5b: Users' perceived risk of 3D-printed transformable clothing products has a significant negative effect on perceived value (-).

2.2 Questionnaire Design and Data Collection

Data for the empirical analysis were collected using the Questionnaire on Consumer Preferences for 3D-Printed Transformable Clothing, which was administered to adult and late-adolescent female consumers. To ensure the reliability and validity of the measurement of core constructs, a structured questionnaire was developed using a five-point Likert scale, ranging from 1. The questionnaire comprised measurement items across three categories: independent variables, a mediating variable, and a dependent variable. The specific measurement dimensions and corresponding items for each construct are presented in Table 1.

Table 1. Measurement Items for the Influencing Factors of Purchase Intention toward 3D-Printed Transformable Apparel Products

Measurement Variable	Measurement Dimension	Measurement Items	Reference Source
Independent Variable	Perceived Usefulness	Q7. My personal values motivate me to purchase 3D-printed transformable clothing. Q8. Purchasing 3D-printed transformable clothing can help reduce waste generation. Q9. Purchasing 3D-printed transformable clothing has social value. Q10. Purchasing 3D-printed transformable clothing has environmental value.	Zhang Mengqi ^[9]
	Perceived Ease of Use	Q11. Given my financial resources, available time, and accessible purchasing channels, I am able to purchase 3D-printed transformable clothing. Q12. 3D-printed transformable clothing offers a wide variety of styles and high selectivity. Q13. The purchasing channels for 3D-printed transformable clothing are convenient. Q14. Promotional and advertising information about 3D-printed transformable clothing is sufficient and easy to identify.	Zheng Hui ^[10]

	Perceived Quality	Q15. 3D-printed transformable clothing offers high value for money. Q16. 3D-printed transformable clothing provides product or service information tailored to my preferences. Q17. During the purchasing and usage process, my inquiries can receive timely responses from sellers. Q18. 3D-printed transformable clothing provides products and services that meet my expectations.	Liu Jia (2021) ^[11]
	Perceived Expense	Q19. Purchasing 3D-printed transformable clothing requires a considerable amount of time. Q20. Purchasing 3D-printed transformable clothing increases my financial burden, such as through potential impulsive consumption. Q21. Purchasing 3D-printed transformable clothing consumes a large amount of my energy. Q22. Purchasing 3D-printed transformable clothing requires substantial physical effort.	Cheng Senle (2019) ^[12]
	Perceived Risk	Q23. When purchasing 3D-printed transformable clothing, I worry about the potential leakage of my personal information. Q24. When purchasing 3D-printed transformable clothing, it is difficult to assess the quality of products or services recommended by online users. Q25. I am concerned that using location-based features on shopping platforms may expose my whereabouts. Q26. I worry that my purchase records for 3D-printed transformable clothing may reveal my level of consumption.	Wang Haibo (2018) ^[13]
Mediating Variable	Perceived Value	Q34. Purchasing 3D-printed transformable clothing contributes to environmental protection and sustainability, and I believe it is worthwhile. Q35. Purchasing 3D-printed transformable clothing enables me to realize a personalized lifestyle, and I believe it is worthwhile. Q36. Although it is a niche product, I believe that purchasing 3D-printed transformable clothing is worthwhile. Q37. Overall, 3D-printed transformable clothing is useful to me and has high value.	Hu Hui (2020) ^[14]

Dependent Variable	Purchase Intention	Q38. I believe that 3D-printed transformable clothing is worth purchasing. Q39. Within my affordable price range, I am willing to purchase 3D-printed transformable clothing. Q40. Positive recommendations from friends or relatives on social networks would encourage me to purchase 3D-printed transformable clothing. Q41. Even without recommendations from others, I would still consider purchasing 3D-printed transformable clothing. Q42. I am willing to purchase 3D-printed transformable clothing because I support sustainable and personalized lifestyles.	Butler ^[15]
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2.3 Data Collection

Data were collected through an online survey administered over a 15-day period. A total of 352 questionnaires were submitted during this time. Following data screening, 32 responses with unusually short completion times (less than 50 seconds) were removed to improve data reliability. The final dataset consisted of 303 valid responses, corresponding to an effective response rate of 90.45%.

3. Statistical Analysis

3.1 Descriptive Statistics

The descriptive statistics show that respondents aged 34–43 years constituted the largest age group, with 148 individuals accounting for 42.05% of the total sample. This distribution suggests that young and middle-aged adults may represent an important potential consumer segment, as they tend to exhibit a relatively high level of acceptance of new products and technologies. With respect to educational background, respondents holding a bachelor's degree formed the most prominent group, with 181 participants representing 51.42% of the sample. This pattern indicates that consumers with higher educational attainment may demonstrate stronger interest in, and greater cognitive readiness for, innovative products such as 3D-printed transformable clothing. In terms of regional distribution, urban consumers accounted for 59.09% of the sample, totaling 208 respondents, while county-level and rural consumers numbered 144, representing 40.91%. The higher proportion of urban consumers may be associated with factors such as stronger economic conditions, more efficient information dissemination, and a more developed consumption environment in urban areas, which provide greater opportunities for consumers to access and become familiar with emerging products such as 3D-printed transformable clothing. Regarding average monthly income, respondents were relatively evenly distributed across income groups. Consumers with monthly incomes between 6,000 and 10,000 yuan constituted the largest proportion, accounting for 39.20% of the sample, suggesting that this group shows comparatively strong interest in 3D-printed transformable clothing and possesses a certain level of purchasing power. With respect to occupational distribution, consumers employed in the service sector and other related categories represented the largest share, with 62 individuals accounting for 17.61%. This was followed by respondents working in commerce and finance, with 59 individuals representing 16.76%, and manufacturing, with 58 individuals accounting for 16.48%.

The results of the survey on awareness of 3D-printed transformable clothing indicate that scores across all indicators ranged from 1 to 5, with mean values between 2.602 and 2.866. Overall, respondents' attitudes tended to be neutral. Among the evaluated indicators, recognition of the timeliness of merchants' responses and satisfaction with products and services recorded the highest mean value at 2.866. In contrast, indicators related to value-driven purchase motivation, waste reduction, and personal purchasing capability received comparatively lower evaluations. Median

values were predominantly 2 or 3, while standard deviations ranged from 1.351 to 1.447, suggesting a moderate degree of variation in respondents' perceptions without extreme dispersion.

The analysis of consumers' concerns regarding the purchase of 3D-printed transformable clothing shows that the mean values of all concern-related indicators ranged from 2.528 to 2.724, indicating the presence of concern at a moderate level rather than an extreme one. Among these factors, concern over personal information leakage received the highest mean value at 2.724, reflecting a relatively high level of attention. Concerns related to physical effort expenditure and reluctance to disclose personal whereabouts through location-based check-in functions both recorded mean values of 2.619, indicating notable salience. Mean values for increased monetary costs, energy consumption, and difficulty in assessing the quality of products recommended by online users were relatively similar, ranging from 2.568 to 2.577. Although concerns related to time consumption and the disclosure of consumption records were comparatively lower, they nonetheless indicate that such issues remain relevant for a segment of consumers.

The analysis of consumers' perceived experiences when purchasing 3D-printed transformable clothing indicates that the mean values of all indicators ranged from 2.656 to 2.770, reflecting an overall neutral to slightly positive evaluation of the purchasing experience. Among these indicators, the statement "Overall, 3D-printed transformable clothing is very useful to me, and I believe it has high value" recorded the highest mean value of 2.770, suggesting that consumers generally acknowledge the practical value of this type of clothing.

The results related to consumers' purchase intention toward 3D-printed transformable clothing products show that the mean values of all intention-related indicators ranged from 2.696 to 2.793. This distribution indicates that consumers exhibit a certain willingness to purchase such products, although the level of intention is not particularly strong. Among the indicators, the statement "Within my affordability range, I will purchase 3D-printed transformable clothing" obtained the highest mean value of 2.793. This finding suggests that price affordability plays an important role in shaping consumers' purchase intentions, as purchasing decisions are closely linked to alignment with consumers' expected price levels.

3.2 Reliability Analysis

Reliability is a key criterion for assessing the dependability of a measurement instrument, as it reflects the consistency and stability of measurement results. In this study, Cronbach's alpha coefficient was employed to evaluate the reliability of the questionnaire. As shown in Table 2, the Cronbach's alpha coefficient for the overall scale reached 0.900, indicating that the measurement instrument demonstrates excellent internal consistency.

Table 2. Three Scheme comparing

	N	Cronbach's Alpha
Overall Scale	352	0.900

3.3 Validity Analysis

Validity is a key criterion for evaluating the accuracy and appropriateness of a measurement instrument. Assessment of validity commonly relies on a combination of the Kaiser–Meyer–Olkin measure of sampling adequacy and Bartlett's test of sphericity. Together, these two tests provide an effective means of determining whether the data structure is suitable for factor analysis and whether the measurement instrument meets established standards of structural validity.

3.4 Validity Testing

To confirm that the structural validity of the research data satisfies statistical requirements, both the Kaiser–Meyer–Olkin measure and Bartlett's test of sphericity must meet acceptable thresholds.

Table 3. KMO and Bartlett's Test

KMO Measure of Sampling Adequacy		0.882
Bartlett's Test of Sphericity	Approximate Chi-Square	3 571.653
	Degrees of Freedom	630
	Significance	0.000

As shown in the table above, $KMO = 0.882 > 0.600$ and the significance level of Bartlett's test of sphericity is $p < 0.001$, indicating that the scale has good structural validity.

Table 4. Table of Variance Explained

Factor Number	Eigenvalue		
	Eigenvalue	Percentage of Variance Explained%	Cumulative Percentage
1	8.133	22.591	22.591
2	1.913	5.314	27.905
3	1.756	4.878	32.784
4	1.654	4.594	37.378
5	1.528	4.244	41.623
6	1.440	4.001	45.624
7	1.409	3.914	49.538
8	1.325	3.682	53.219
9	1.071	2.974	56.194
10	1.020	2.834	59.027
11	0.891	2.474	61.502
12	0.874	2.429	63.930
13	0.808	2.245	66.176
14	0.781	2.171	68.347
15	0.747	2.074	70.421
16	0.717	1.993	72.414
17	0.711	1.976	74.390
18	0.663	1.842	76.232
19	0.639	1.775	78.007
20	0.605	1.681	79.688
21	0.594	1.650	81.338
22	0.563	1.565	82.903
23	0.547	1.519	84.423
24	0.545	1.513	85.935
25	0.533	1.481	87.417
26	0.515	1.430	88.847
27	0.483	1.342	90.189
28	0.476	1.323	91.512
29	0.447	1.242	92.753
30	0.433	1.202	93.956
31	0.409	1.135	95.091
32	0.393	1.093	96.184
33	0.390	1.084	97.268
34	0.361	1.001	98.269
35	0.340	0.945	99.214
36	0.283	0.786	100.000
Factor Number	Variance Explained Before Rotation		
	Eigenvalue	Percentage of Variance Explained%	Cumulative Percentage
1	8.133	22.591	22.591
2	1.913	5.314	27.905

3	1.756	4.878	32.784
4	1.654	4.594	37.378
5	1.528	4.244	41.623
6	1.440	4.001	45.624
7	1.409	3.914	49.538
8	1.325	3.682	53.219
9	1.071	2.974	56.194
10	1.020	2.834	59.027
11-36	-	-	-
Factor Number	Variance Explained After Rotation		
	Eigenvalue	Percentage of Variance Explained%	Cumulative Percentage
1	2.892	8.032	8.032
2	2.629	7.303	15.335
3	2.480	6.890	22.225
4	2.316	6.434	28.659
5	2.313	6.424	35.083
6	1.976	5.489	40.573
7	1.889	5.246	45.819
8	1.877	5.214	51.033
9	1.488	4.134	55.167
10	1.383	3.842	59.009
11-36	-	-	-

As presented in Table 4, a total of 10 factors were extracted in the analysis, each with an eigenvalue greater than 1. After rotation, the variance explained by these factors was 8.032%, 7.303%, 6.890%, 6.434%, 6.424%, 5.489%, 5.246%, 5.214%, 4.134%, and 3.842%, respectively. The cumulative variance explained after rotation reached 59.009%.

3.5 Correlation Analysis

Pearson correlation analysis was conducted using SPSS 26.0 to examine the pairwise relationships among the study variables. This analysis was employed to identify the strength and direction of associations between purchase intention and the key perceptual variables included in the research model. The results of the correlation analysis are presented in Table 5 using a triangular matrix format.

Table 5. Pearson Correlation - Triangular Matrix Format

	Purchase Intention	Perceived Cost	Perceived Risk	Perceived Value	Perceived Risk	Perceived Cost	Perceived Quality	Perceived Ease of Use	Perceived Usefulness
Purchase Intention	1	-	-	-	-	-	-	-	-
Perceived Cost	-0.244**	1	-	-	-	-	-	-	-
Perceived Risk	-0.280**	0.248**	1	-	-	-	-	-	-
Perceived Value	0.327**	-0.268*	-0.342*	1	-	-	-	-	-
Perceived Risk	0.280**	-0.248*	-1.000*	0.342*	1	-	-	-	-
Perceived Cost	0.244**	-1.000*	-0.248*	0.268*	0.248*	1	-	-	-

Perceived Quality	0.393**	-0.228*	-0.267*	0.393*	0.267*	0.228*	1	-	-
Perceived Ease of Us	0.441**	-0.210*	-0.282*	0.376*	0.282*	0.210*	0.417*	1	-
Perceived Usefulness	0.333**	-0.206*	-0.375*	0.320*	0.375*	0.206*	0.263*	0.441*	1

As shown in the table, purchase intention is negatively correlated with both perceived cost and perceived risk, indicating inverse relationships between these variables. Prior research has consistently demonstrated that consumers' perceptions of privacy and security risks exert a negative influence on consumption decisions. Perceived risk is widely regarded as a critical determinant in consumer decision-making processes, with higher levels of perceived risk corresponding to lower levels of purchase intention. In other words, perceived risk and purchase intention are negatively related, as noted by Yao Qian in 2012. Conceptually, perceived risk reflects consumers' assessments of potential uncertainties and adverse outcomes associated with a purchase. Existing studies further suggest that perceived risk constitutes a major barrier to online purchasing behavior, significantly constraining consumers' willingness to buy, as evidenced by Yang and Lin in 2024. In contrast, purchase intention is significantly and positively correlated with perceived value, with a correlation coefficient of 0.327. Additional correlation analysis indicates that purchase intention is positively associated with all benefit-related dimensions. Among these factors, perceived ease of use exhibits the strongest association with purchase intention, with a correlation coefficient of 0.441, corresponding to a moderate level of correlation. The remaining variables, ordered by the magnitude of their correlation coefficients, are perceived quality, perceived usefulness, perceived risk, and perceived cost, with coefficients of 0.393, 0.333, 0.280, and 0.244, respectively. These relationships indicate relatively weak but consistent associations between the explanatory variables and purchase intention.

3.6 Regression Analysis

The results of the linear regression analysis are presented in Table 6.

Table 6. Results of Linear Regression Analysis($n=352$)

	Unstandardized Coefficients		Standardized Coefficients	<i>t</i>	<i>p</i>	Collinearity Diagnostics	
	<i>B</i>	Std. Error	<i>Beta</i>			VIF	Tolerance
Constant	1.066	0.160	-	6.678	0.000**	-	-
Perceived Usefulness	0.135	0.047	0.148	2.878	0.004**	1.253	0.798
Perceived Ease of Use	0.261	0.052	0.276	5.053	0.000**	1.412	0.708
Perceived Quality	0.224	0.048	0.239	4.711	0.000**	1.222	0.819
<i>R</i> 2	0.265						
Adjusted <i>R</i> 2	0.259						
<i>F</i>	<i>F</i> (3, 348)=41.822, <i>p</i> =0.000						
D–W value	1.995						
Note: Dependent variable = Purchase intention							
* <i>p</i> <0.05 ** <i>p</i> <0.01							

Using SPSS 26.0, this study applied linear regression analysis to verify the causal relationships among variables. As shown in Table 6, perceived usefulness, perceived ease of use, and perceived quality all have significant positive effects on purchase intention.

Table 7. Model Summary (Intermediate Process)

<i>R</i>	<i>R</i> ²	Adjusted <i>R</i> ²	RMSE	DW	AIC	BIC
0.515	0.265	0.259	0.840	1.995	884.434	899.888

The empirical results indicate that the three independent variables—perceived usefulness, perceived ease of use, and perceived quality—collectively account for 26.5% of the variance in purchase intention. This level of explained variance suggests that these perceptual factors exhibit meaningful explanatory power with respect to consumers' purchase decision behavior. Overall, the model demonstrates a satisfactory fit and provides empirical support for the relevance of benefit-related perceptions in shaping purchase intention.

Table 8. ANOVA Table (Intermediate Precess)

	Sum of Squares	<i>df</i>	Mean Square	<i>F</i>	<i>p</i> -value
Regression	89.610	3	29.870	41.822	0.000
Residual	248.545	348	0.714		
Total	338.154	351			

The F-test results show that the overall model passes the significance test ($F = 41.822$, $p = 0.000 < 0.05$), indicating that the model construction is statistically significant and suitable for subsequent analysis.

4. Summary

This study investigates the factors influencing consumers' purchase intention toward 3D-printed transformable women's clothing. Based on the empirical findings, perceived usefulness emerges as the most influential factor among the variables affecting perceived value and purchase intention. This result highlights the central role of functional benefits in shaping consumers' evaluations of innovative apparel products. The analysis further reveals a significant negative relationship between consumers' perceived effort during the process of acquiring products or services and their purchase intention. However, perceived effort does not exert a significant direct effect on perceived value. As consumers accumulate experience and familiarity with the product, their perceived value increases, thereby attenuating the influence of perceived cost on perceived value. Despite this attenuation effect, perceived cost remains a salient consideration in consumer decision-making and continues to exert a significant negative impact on purchase intention. This finding underscores the persistent role of cost-related perceptions in shaping consumers' behavioral intentions, even in the context of innovative and experiential products. Finally, perceived value demonstrates a clear positive effect on purchase intention. When consumers' needs and expectations are adequately satisfied and they obtain favorable usage experiences, higher levels of perceived value are formed. This enhanced perceived value, in turn, serves as an important driver of consumers' intention to purchase 3D-printed transformable women's clothing.

Given the limitations of the present study, several directions for future research can be identified. First, existing research relies predominantly on quantitative methods and lacks in-depth qualitative exploration of both consumers and industry practitioners. Future studies could incorporate offline fieldwork and semi-structured interviews with diverse participant groups to obtain first-hand qualitative data. Integrating qualitative insights with quantitative findings would allow future research to capture overall behavioral patterns while also addressing individual differences and practical considerations. Such an approach would contribute to more comprehensive and actionable recommendations for fashion brand marketing strategies and sustainable transformation initiatives. Second, the current research primarily adopts conventional consumer psychology measurement approaches, with purchase motivation assessed mainly through self-reported data. This reliance limits the ability to capture subconscious psychological responses that may influence consumer decision-making. Future studies could incorporate psychophysiological measurement techniques to complement traditional questionnaires, thereby enabling a more objective and precise investigation of purchase motivations. For example, eye-tracking technology could be employed to examine consumers' visual attention to transformable design features, while electroencephalogram data could be used to assess sensitivity to price-related information. These methods would provide

scientific support for optimizing product design and pricing strategies. Third, although existing studies consider factors such as consumer lifestyles and personal identity, they offer limited guidance on targeted market segmentation for enterprises. Future research could develop more refined segmentation strategies tailored to specific consumer groups. For instance, for consumers identified as followers of sustainable fashion, emphasizing the advantages of 3D printing technology in terms of material efficiency and low-carbon production may enhance alignment between product attributes and the values of target segments.

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References

- [1] EUROMONITORINTERNATIONAL.Apparel and Footwear Global[R]. London, United Kingdom: Euromonitor International, 2018.
- [2] KARL C. The State of Fashion 2018[R]. England and Wales: BoF Team and McKinsey& Company, 2017.
- [3] HONG P. AhilOne Consumer Survery: Marketing Personalization Personalization Preferences of Shoppers Worldwide[R].Sunnyvale, USA:AgilOne,2014.
- [4] Lei Yaqiao. Innovative Design Research on Multifunctional Transformable Clothing Based on Sustainable Fashion [D]. Shanghai: Donghua University, 2022: 4.
- [5] BATISTA L.New business mosels enabled by digital technologies:a perspective from the fashion sector[R].Norfolk:University of East Anglia,2013.Fangfang. Research on power load forecasting based on Improved BP neural network. Harbin Institute of Technology, 2011.
- [6] HEE-WOONG KIM,HOCK CHUAN CHAN,SUMEET GUPTA.Value-based Adoption of Mobile Internet:An empirical investigation[J].Decision Support Systems,2007,43(1):111-126.
- [7] BERGER CR,CALABRESE RJ.Some Explorations in Initial Interaction and Beyond: Toward a Developmental Theory of Interpersonal Communication [J].Human Communication Research,1975,1(2): 99-112.
- [8] Ma Liting, & Chen, Yunxing. Factors influencing purchase intention of cultural tourism products: The moderating role of online reviews. Journal of Xi'an University of Electronic Science and Technology (Social Science Edition), 2025, 35(2): 54.
- [9] Zhang, Mengqi, Chen, Caixia, & Li, Min. Factors influencing apparel consumers' continuous purchase intention in live-streaming commerce. Wool Textile Journal, 2023, 51(7): 76–82.
- [10] Wang, Hongfeng, Zhang, Yunhe, & Zhu, Xiaoyu. Factors influencing acceptance intention of fashion sharing under the background of sustainable development. Journal of Shanghai University of Engineering Science, 2024, 38(1): 101–110.
- [11] Liu, Jia, Zou, Yunjie, & Liu, Zexi. Analysis of factors influencing purchase intention of tourism products in e-commerce live streaming based on the SEM model. Statistics and Decision, 2021, 37(7): 94–97.
- [12] Cheng, Senle. A Study on Factors Influencing College Students' Intention to Use Sports Apps from the Perspective of Perceived Value Theory: A Case Study of Universities in Nanchang [D]. Nanchang: Jiangxi University of Finance and Economics, 2019: 54–56.
- [13] Wang, Haibo. A Study on Factors Influencing College Students' Intention to Use Shopping Apps Based on the Value Acceptance Model [D]. Qinhuangdao: Yanshan University, 2018: 55–57.
- [14] Hu, Hui. Research on Users' Purchase Decision Behavior on Third-Party Review Websites for Daily Consumption under the Background of Consumption Upgrading [D]. Wuhan: Wuhan University of Technology, 2020: 94–96.

- [15] Chunmin Lang, Bingyue Wei. Convert one outfit to more looks: factors influencing young female college consumers' intention to purchase transformable apparel. *Fashion and Textiles*, 2019: 26.