

Wooden Door Preferences Based on Lifestyle Theory and Consumer Behaviour Theory

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This paper analyses users with different lifestyles and consumer behaviour, and then segments wooden door users with different consumer preferences, to inspire wooden door companies in their product design and further research on wooden doors. In this paper, a wooden door user research questionnaire was created based on Lifestyle Theory and Consumer Behaviour Theory, and data collection was completed at Nanjing Forestry University. The collected data were analysed using cluster analysis, factor analysis, cross-over analysis, and other analysis methods. The Statistical Package for the Social Sciences (SPSS) was used to simplify the analysis model and process the data, and finally the wooden door users were divided into four categories. The categories were trendy home users, budget-conscious sensible users, basic needs users, and impulsive enjoyable users. Male users were found to be more likely to be "trendy home users" and "impulsive enjoyable users," while female users were more likely to be "budget-conscious sensible users" and "trendy home users." For the number of users, the "trendy home users" were the most numerous, followed by the "budget-conscious sensible users." The age of wooden door users in this study was mainly distributed between 21 to 30 years old, of which "freelancers" accounted for the highest percentage.

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INTRODUCTION

It is known that product differentiation has become progressively more difficult with the increase in the degree of industrial intensification (Pan *et al.* 2022). Whether the colour, material, surface decoration, and function of the product can make consumers happy has become an important factor for consumers to decide to buy and use the product (Oh *et al.* 2014). With the gradual segmentation of the wooden door market and the gradual development of new retail, the vast amount of consumer information and user demand has posed a serious challenge to wooden door companies (Wang *et al.* 2021a). Therefore, accurate access to the emotional needs and usage preferences of users with different lifestyles and consumption characteristics, and the successful translation of this information into design elements for wooden doors, are important factors in improving the success rate of product development (Wang *et al.* 2021b). With the advent of the Industry 4.0 era, Computerized Numerical Control (CNC), 3D printing, digital intelligence production, and as other high-tech technologies become mature (Shi and Ling 2022), customised production becomes possible. While some traditional wooden door enterprises

still retain the "enterprise production, what consumers buy" thinking, it is difficult to seize the rapidly changing market opportunities (Tafesse and Shonde 2016). Therefore, the transformation of wooden door enterprises is imminent, using more flexible production methods to respond to market changes and more accurate user pain points to capture the increasingly segmented market (Song *et al.* 2022). This transformation is also gradually gaining the full attention of companies and product designers. For decision-makers, it is crucial to accurately target the preferences of different consumer groups. If valuable information can be obtained in the early stages of product development, it will be more beneficial for companies to make favourable decisions (Ren and Xiong 2022). At the same time, if designers have a statistically categorised design guide to follow that contains a breakdown of consumer preferences for different lifestyles and consumption characteristics, it can help designers quickly adapt existing designs or develop new products based on feedback from big data (Parsad *et al.* 2019).

Lifestyle is a collection of elements that reflect the state of life, thoughts, interests and more of the consumers. The consumption behaviour of the consumers is also influenced by these elements. Therefore, consumer lifestyle and consumer behaviour are mutually influential. Therefore, the lifestyle and behaviour of the consumers are mutually influential (Mridanish 2013). Wijaya (2021) analysed the association between the consumption behaviour and lifestyle of urban youth, the main consumers of 24-hour branded cafes in small, medium, and large cities in Indonesia. The study found that these urban youths often gather here to work, chat, and spend time. Such a lifestyle expresses these urban youth's desire for worldly pleasures and success. Brunkwall *et al.* (2019) found that high consumption of sugary drinks (SSB), artificially sweetened beverages (ASB), fruit juices, tea, and coffee were associated with dietary habits of people (low-fat diet or high-fat diet). These studies demonstrate the close link between lifestyle and consumer behaviour, with lifestyle partly determining consumer behaviour, which in turn influences consumer lifestyle. Therefore, the study of consumers' preferences for different wooden doors can start with their lifestyle and consumption behaviour.

Consumers in different living environments and cultural backgrounds have vastly different purchasing criteria for products, hence the need to segment the market. Market segmentation refers to the division of products produced by companies to face different consumer groups according to the different life patterns and consumption habits of different consumers in the market (Ourania *et al.* 2021). Market segmentation can help consumers to purchase the products they need at a reasonable price, and also help enterprises to grasp the target market and target users in a targeted manner, highlight the advantages of product differentiation, and maximize the use of resources for product development. Zhu *et al.* (2010) investigated whether product attributes influence how consumers perceive a product or service to be relevant to their needs. Using field research on the mobile charging needs of consumers in the Chinese mobile phone market, they verified that the preferences of consumers for product attributes are significantly related to their lifestyle and explore the importance of segmenting the market based on lifestyle. Song (2016) categorised wine consumers according to their food-related lifestyle patterns and used the categorisation to identify variations in wine choice attribution. Ultimately, they suggest the need to develop a wine marketing strategy that differentiates wine according to consumer lifestyles. The above studies all show the importance of segmenting the consumer market based on lifestyle and consumer behaviour. This approach to product design is becoming increasingly popular with companies and the market because of its humanistic design approach and diverse product lines, which are oriented towards life forms and combined with analysis of consumer behaviour and market segmentation. This

approach to product design is an integrated human (user)-machine (product)-environment (natural and social environment) design approach that highlights the principle of human-centred design, starting with planning the human form of existence for product design. In the past, consumer research in the design world did not start by systematically considering the life form of the consumer but often started with an isolated product or part of it (Andreoni *et al.* 2012). Today, the study of life forms has matured and is widely used in product development to segment markets by consumer lifestyles rather than by traditional levels of technology (Huang 2014). Therefore, this paper examines wooden door users based on life and consumer behaviour theories and segments wooden door user groups, and thus discusses the differences in consumer behaviour and needs of different segments.

In recent years, global research on wooden doors has focused on a review of wooden door consumer trends and research on the wooden door manufacturing processes, as well as physical and chemical properties, with less research on wooden door design and almost no research on wooden door users. Zhu *et al.* (2021) proposed an innovative method for reinforcing wooden door frames with channel steel and diagonal bracing to prevent the wooden door frames of traditional rural houses from jamming due to deformation during earthquakes and to improve the seismic resistance of rural houses. Cobut *et al.* (2015) proposed an ecological design strategy based on alternative scenario generation and assessment based on the results of previous life cycle assessment (LCA) studies on interior wooden doors, by improving the three steps in the manufacturing of wooden doors - particleboard components, transportation, and end-of-life - for ecological design purposes. Xiong *et al.* (2021) investigated the use of group technology to standardise the production of children's solid wood furniture parts. Based on the principle of similarity in processing and technology, the authors grouped furniture parts of similar dimensions and established a children's solid wood furniture parts family, which greatly improved the standardisation of solid wood parts. Jiang *et al.* (2020) investigated the influence of young children's colour preferences on furniture selection and concluded a positive correlation, but the extent varied by furniture category and by furniture in different functional spaces. Yu *et al.* (2021) used a combination of eye-tracking techniques and subjective evaluations to investigate preferences for rosewood and wenge wood of different shades and lightness values. Hu *et al.* (2020a) summarised the current development status and problems of the traditional wood dyeing process and the induced colour change process and proposed colour improvement with photonic crystal structures—a clean and pollution-free ecological biomimetic colouring technology.

In practice, user groups have different preferences for materials, structures, colours, and styles for the same type of product because of the subtle differences in body structure and life experiences. Therefore, consumers with different lifestyles and consumer preferences will have different choices for wooden doors. However, there is a lack of research on the preferences of different consumers for wooden doors in existing studies. Therefore, based on the theory of user life form and the relationship between consumer behaviour and market segmentation, this paper conducts research on wooden door users and uses cluster analysis, factor analysis, and cross-tabulation analysis to process the data, to generally summarise a wooden door user profile suitable for different life forms and consumption preferences, so as to effectively improve the theoretical and engineering applicability of wooden door design.

EXPERIMENTAL

This paper uses the questionnaire method to collect data on wooden door users. The first step was the theoretical research and data collection on lifestyle theory, consumer behaviour theory, wooden door users, and the market, as a basis for questionnaire design. The design of the questionnaire was based on the Values and Lifestyle Survey (VASL) scale (the VASL scale is a lifestyle model proposed by the Stanford Research Centre in 1978). During the questionnaire design process, the opinions of actual users and experts and scholars were extensively solicited, and 3 predetermined proposals were finalised after several revisions. After comprehensive scoring by experts and scholars, the one with the highest rating was selected as the final questionnaire for extensive information collection. After a one-month research process, the data collected were first analysed and collated. Then they were analysed using various analytical methods such as cluster analysis, factor analysis, and cross-over analysis. This made it possible to finally segment wooden door users according to their lifestyle and consumption characteristics and analyse the wooden door preferences of different consumer groups, to form an academic study of the wooden door industry, wooden door companies, wooden door users, and wooden door design. The research results are of high importance and value to the wooden door industry, wooden door companies, wooden door users, and academic research on wooden door design. The basic research line is shown in Fig. 1.

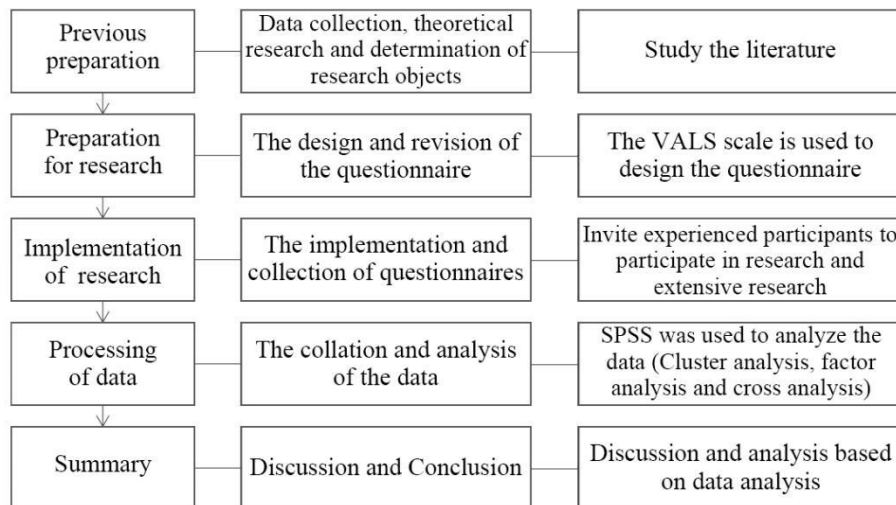


Fig. 1. Basic research approach

Questionnaire Design

This paper was based on the lifestyle theory and consumption behaviour, and conducts a questionnaire survey on wooden door users to obtain information about their lifestyle and consumption behaviour characteristics, such as their basic information, values, and wooden door consumption tendencies, to consider the consumption characteristics and actual needs of different wooden door user groups for wooden door products to provide a basis for market segmentation and product positioning for wooden door enterprises to design products.

The research was based on the VALS scale and the Likert five-step method for questionnaire design (Aren and Yildirim 2019). The questionnaire was divided into 3 parts (Table 1) to collect information from wooden door users, in the order of basic information

about wooden door users, life patterns of wooden door users, and product preference characteristics of wooden door users. The second and third parts of the questionnaire were filled in using the Likert five-step scale, with scores ranging from 1, 2, 3, 4, and 5. The respondents needed to score each question. The score on the left was 5, so a higher score to the left indicates that the question was more in line with the thoughts of the respondents. The score on the right was 1, so a core further to the right indicated that the question was far from the thoughts of the respondents.

Table 1. Wooden Door Users Survey Questionnaire

	Feature	Content
Part one	Basic information	The collection of age, gender, profession, industry, and other information of consumers
Part two	Questions about lifestyle	Collection of information about lifestyles, values, interests, and consumption habits of consumers
Part three	Questions about preferences for wooden doors	Collection of information about preference for wooden door brands, appearance, materials, and functions of consumers

Questionnaire Implementation and Recovery

One aim of this study was to analyse the wooden door preferences of users with different lifestyles and consumption behavior. The idea was to avoid too many subjects with no concept or experience of wooden door consumption participating in the study. Another aim was to collect as comprehensive information as possible from subjects with different lifestyles and consumer behavior. This study used a combination of inviting subjects and widely distributed questionnaires to collect data from members of the community.

To reduce the interference of external environmental factors to obtain more objective and accurate experimental data, the experiment was conducted in a controlled variable format by inviting subjects to the laboratory at Nanjing Forestry University. The laboratory conditions required were daytime, good lighting conditions, quiet area, and suitable temperature and humidity. A total of 35 subjects, all of whom were faculty members, postgraduates, and undergraduate students from the College of Furnishings and Industrial Design at Nanjing Forestry University, were involved in the experiment. The subjects were therefore either actual purchasers of wooden doors or had specialist knowledge of wooden doors. The subjects all had normal colour discrimination (no colour blindness or colour weakness) and a corrected visual acuity of 5.0 in both eyes and participated in the experiment voluntarily. The subjects were required to sit still in the test environment for 10 min before starting the experiment, and after they had sufficiently acclimatised to the test environment, they began the experiment. The experiment began with a chaotic display of four wooden door scenes in the styles of “natural ecology”, “simple modern”, “trendy fashion”, and “light luxury modern”. The purpose of the experiment was to help the subjects construct an impression of the wooden doors and to adapt quickly to the experiment. The images were created by the authors and selected by expert academics to cover as many styles of wooden doors on the market as possible. Each image was displayed for 10 s, a blank image was displayed for 2 s at the end of each image, and the questionnaire was filled in after all the images had been displayed. The questionnaire was widely distributed within Nanjing Forestry University and on the online platform while conducting the experiment inviting subjects to participate. The main targets audience of the questionnaire were the faculty members and students of Nanjing Forestry

University, their families, and the surrounding residents. A total of 130 questionnaires were eventually completed, of which 123 were valid, with an effective rate of 94.62% and a total of over 27,000 pieces of useful data obtained. The data are shown in Table 2.

Table 2. List of All Valid Items

	Ordinal Number	Serial Number	Item
Part 1	1	U11	Sense of belonging
	2	U12	Sense of excitement
	3	U13	Sense of achievement
	4	U14	Sense of security
	5	U15	Respect oneself
	6	U16	Enjoy life
	7	U17	Self-gratification
	8	U18	Respect from others
Part 2	9	U21	Like colourful life
	10	U22	Pursue quality of life, pay attention to the brand
	11	U23	Be willing to try new brands and products
	12	U24	Shop around for products
	13	U25	Always buy products on sale
	14	U26	Spend a lot of money on products you like
	15	U27	Buying things gives you satisfaction
	16	U28	When you see something you like, you make an impulse purchase
	17	U29	Think product price and quality should be directly proportional
	18	U210	Pay attention to home fashion trends
	19	U211	Use big brands to boost your social status
	20	U212	Criticize and complain about purchased products
	21	U213	Price is the main factor in buying things
	22	U214	Always use products of your favourite brand
	23	U215	Like to participate in friends or classmates reunion
	24	U216	It's important to have fun and enjoy life
	25	U217	Prefer popular products over practical ones
	26	U218	Pay attention to your appearance
	27	U219	Be willing to make new friends
	28	U220	Feel different and have unique tastes
	29	U221	Like to stay at home
	30	U222	Study and work give you a sense of accomplishment
	31	U223	Be willing to buy only what you think is important
	32	U224	Do things on a whim
	33	U225	You search for product information before you buy something
Part 3	34	U31	The colour of wooden door
	35	U32	The material of wooden door
	36	U33	The mould of wooden door
	37	U34	The price of wooden door
	38	U35	The brand of wooden door
	39	U36	The function of wooden door
	40	U37	The overall effect of wooden door on the interior
	41	U38	The overall interior effect of wooden door
	42	U39	The environmental friendliness of wooden door

Methods of Analysis

A description of the user's lifestyle and consumer behaviour dimensions and variables is numerous, and the complexity of the relationship between the variables and to

qualitative description or analysis of the data is difficult, so in this paper, cluster analysis, factor analysis, cross-over analysis, and other analysis methods were adopted to analyse survey data. The software SPSS 26.0 (IBM, Armonk, NY, USA) was used to simplify and analyse these data. Then, the preferences of different wooden door users were summarised.

Cluster Analysis

Cluster analysis is a data processing process that classifies a collection of multiple groups of data into different clusters consisting of similar groups, with strong similarities between the same clusters and large differences between different clusters (Heinz *et al.* 2020). This paper used systematic cluster analysis to analyse the data, and the process of clustering and the results are visually presented in the form of a tree genealogy diagram. The serial numbers of the lifestyles have been numbered in Table 2, using 1-42 for U11-U39. This facilitates the presentation of pictures and tables later in this discussion. Questions U38 and U39 in the questionnaire were removed from the analysis, as there was no survey respondent selection. So in Fig. 2, only ordinal numbers 1 to 40 are available, missing 41 and 42, the corresponding U38 and U39. Figure 2 shows the results of the cluster analysis of the wooden door user data. Making a vertical line from the quantified value of 5 allows the variables to be grouped into 6 categories, with the classification and characteristics of each category described as follows.

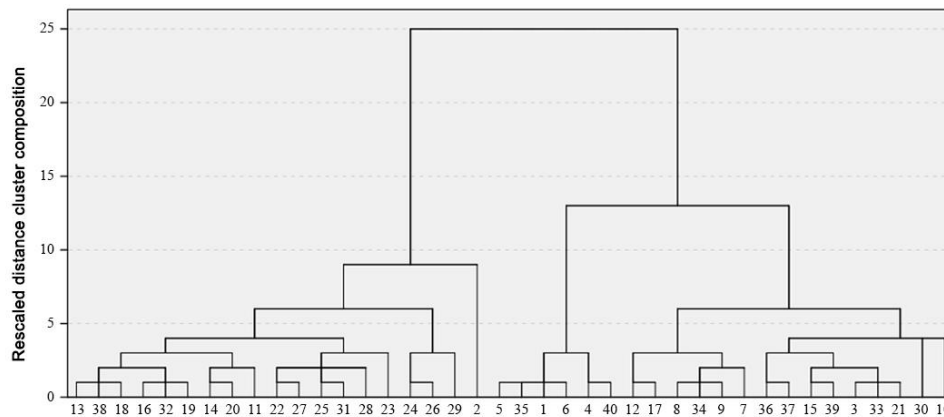


Fig. 2. Cluster analysis of user's lifestyle

The main characteristics of the first type of user can be summarized as “fashion forward and overspending”. This type of user is mainly characterised by an outgoing personality, a willingness to socialise and make friends, a passion for trends and fashions, a love of trying new things, a bold and avant-garde outlook on consumption, and a tendency to consume impulsively and excessively.

The main characteristics of the second type of user can be summarized as “love of life and enjoy the home”. This type of user is happy to enjoy the fun of life, pay attention to self-image, and prefer home life.

The third type of user has only a “sense of excitement” as a separate variable, which can be analysed as an outlier and clustered with the first and second types in the clustering process.

The main characteristics of the fourth type of user can be summarized as “focus on the whole, seeking a sense of belonging”, mainly focusing on self-respect, the pursuit of a sense of belonging, a sense of security values, concern for the material of wooden door products and the overall effect of the interior.

Table 3. List of All Valid Items

	Description of Features	Serial Number	Questionnaire Content
First type of user	Fashion forward, overspending	U25	Always buy products on sale
		U35	The brand of wooden door
		U210	Pay attention to home fashion trends
		U28	When you see something you like, you make an impulse purchase
		U224	Do things on a whim
		U211	Use big brands to boost your social status
		U26	Spend a lot of money on products you like
		U212	Criticize and complain about purchased products
		U23	Be willing to try new brands and products
		U214	Always use products of your favourite brand
		U219	Be willing to make new friends
		U217	Prefer popular products over practical ones
		U223	Be willing to buy only what you think is important
		U220	Feel different and have unique tastes
U215	Like to participate in friends or classmates reunion		
Second type of user	Love of life, enjoy the home	U216	It's important to have fun and enjoy life
		U218	Pay attention to your appearance
		U221	Like to stay at home
Third type of user	Sense of excitement	U12	Sense of excitement
Fourth type of user	Focus on the whole, seeking a sense of belonging	U15	Respect oneself
		U32	The material of wooden door
		U11	Sense of belonging
		U16	Enjoy life
		U14	Sense of security
		U37	The function of wooden door
		U33	The mould of wooden door
Fifth type of user	Quality of life, seeking a sense of achievement	U34	The price of wooden door
		U27	Buying things gives you satisfaction
		U36	The function of wooden door
		U13	Sense of achievement
		U225	You search for product information before you buy something
		U213	Price is the main factor in buying things
		U222	Study and work give you a sense of accomplishment
Sixth type of user	Colourful life, cautious shopping	U22	Pursue the quality of life, pay attention to brand
		U24	Shop around for products
		U29	Think product price and quality should be directly proportional
		U18	Respect from others
		U31	The colour of wooden door
		U21	Like colourful life
		U17	Self-gratification

The main characteristics of the fifth type of user can be summarized as “quality of life, seeking a sense of achievement”, manifested as concern for the shape, price, and function of wooden door products, the purchase of products focused on price, brand, quality, and products to bring their own sense of achievement and satisfaction, will be rational consumption through analysis and consideration.

The main characteristics of the sixth type of user can be summarized as “colourful life, cautious shopping”, which shows that they like to live a colourful life and are more concerned about the cost performance and colour of wooden door products, and will purchase cautiously through multiple comparisons, expecting to gain respect from others and self-satisfaction. The characteristics of wooden door users are described in Table 3.

Factor Analysis

Factor analysis is a method of statistical analysis that takes the study of the internal relationships of variables as a starting point. It reduces a large number of intricate variables into a few common factors of multiple variables. In the same group of variables composed of public factors, the similarity and correlation between variables are high, and the variables differ significantly between different groups of public factors (Wang *et al.* 2022). Through conducting factor analysis on the raw data of different wooden door users' lifestyles and consumption behaviour, the public factors were extracted and analysed to make the relationship between users' life patterns and wooden door consumption preferences clearer and more concise.

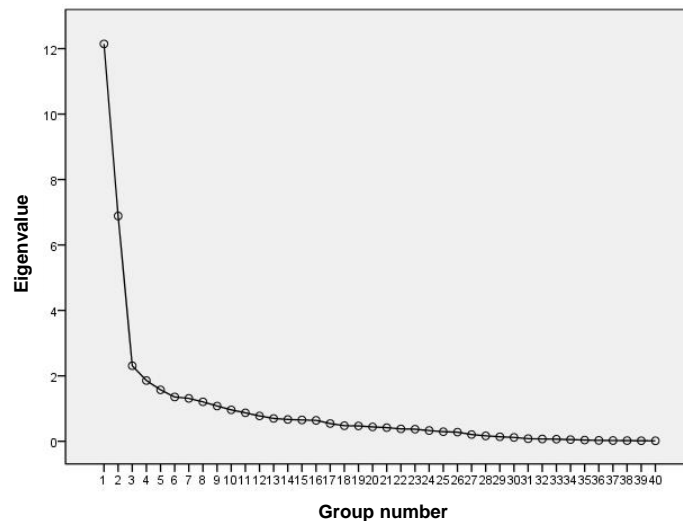


Fig. 3. Gravel diagram of the common factor

Table 4 shows the total variance explained before and after rotation of the factor analysis, where the eigenvalues of the first 9 public factors are greater than 1 and the eigenvalues after the fifth public factor are extremely small. As can be seen from Fig. 3, the curve gradually slopes from the 3rd and 4th factors and tends to zero after the 5th factor. The first 9 common factors were therefore extracted and their interpretation named. The factor loading values of each common factor after rotation were ranked from largest to smallest, and the factor with the higher loading value was extracted to yield the descriptive statistics of the 9 common factors as shown in Table 4.

User features with large factor loadings (factor loadings > 0.5) were retained, so U21, U29, U211, U35, and U36 were removed and the remaining 35 user preferences were categorised. According to Table 5, public factor 1 is the factor with the highest loadings. The main characteristics of users of this factor are “always use products of your favourite brand”, “be willing to buy only what you think is important”, “feel different and have unique tastes”, “be willing to make new friends”, “prefer popular products over practical ones”, and “do things on a whim”, *etc.* It can be seen that these users have certain economic

power and social status, they focus on the pursuit of quality, enjoy life, and are sociable. This is why this group of users, represented by public factor 1, is named “pursue quality, enjoy life”.

Table 4. Total Variance Explained

Fac- tor	Initial Eigenvalue			Extract the Sum of Squared Loads			Sum of Squares of Rotational Loads		
	Total	Variance (%)	Accumulation	Total	Variance (%)	Accumulation	Total	Variance (%)	Accumulation
1	12.145	30.363	30.363	12.145	30.363	30.363	12.100	30.250	30.250
2	6.886	17.215	47.578	6.886	17.215	47.578	3.207	8.019	38.269
3	2.308	5.770	53.348	2.308	5.770	53.348	3.054	7.634	45.903
4	1.855	4.638	57.986	1.855	4.638	57.986	2.494	6.236	52.139
5	1.571	3.928	61.914	1.571	3.928	61.914	2.388	5.970	58.109
6	1.355	3.387	65.301	1.355	3.387	65.301	2.016	5.040	63.149
7	1.311	3.277	68.578	1.311	3.277	68.578	1.582	3.954	67.103
8	1.205	3.013	71.591	1.205	3.013	71.591	1.445	3.612	70.715
9	1.078	2.694	74.285	1.078	2.694	74.285	1.428	3.570	74.285
10	.961	2.402	76.687						
11	.870	2.176	78.862						
12	.774	1.936	80.798						
13	.699	1.747	82.545						
.....									
40	.014	.035	100.000						

According to the public factor 2, the main characteristics of users of this factor are “sense of achievement”, “sense of belonging”, “the colour of wooden door”, “the material of wooden door”, “the overall effect of wooden door on the interior”, *etc.* It can be seen from this type of user to pursue a sense of security and belonging in life, the colour, material, and overall effect of the wooden door products are more important. Therefore, this type of characteristic of the user is named “secure home, pay attention to the whole”.

According to the public factor 3, the main characteristics of users of this factor are “be willing to try new brands and products”, “pursue quality of life, pay attention to the brand”, “pay attention to home fashion trends”, *etc.* It is clear from this that these users are brand and fashion-conscious, willing to use brands to enhance their quality of life, and happy to follow trends and fashionable home products. This is why the authors named this category “be willing to experiment, follow trends”.

According to the public factor 4, the main characteristics of users of this factor are “when you see something you like, you make an impulse purchase”, “buying things gives you satisfaction”, “spend a lot of money on products you like”, *etc.* It is clear from this that these users are happy to shop, and willing to get pleasure and satisfaction from shopping, and when they come across products they like, they lose some of their rationality and are prone to impulsive spending. This is why this group of users is named “love shopping, impulse spending”.

According to the public factor 5, the main characteristics of users of this factor are “enjoy life”, “self-gratification”, and “respect oneself”, so the users of this factor are named “enjoy life, be satisfied with yourself”.

According to the public factor 6, the main characteristics of users of this factor are “sense of excitement”, “sense of achievement”, and “respect from others”, so the users of this factor are named “stimulate achievement, others respect”.

According to the public factor 7, the main characteristics of users of this factor are

“the price of wooden doors” and “the mould of wooden door”, so the users of this factor are named “price dominance, focus on appearance”.

According to the public factor 8, the main characteristics of users of this factor are “shop around, the pursuit of benefits”.

According to the public factor 9, the main characteristics of users of this factor are “criticize and complain about purchased products”, so the users of this factor are named “shopping evaluation”.

Table 5. Statistical Collation and Descriptive Naming of Common Factor

Factor	Description of Factors	Eigen-value	Variance Contribution	Serial Number	Questionnaire Content	Factor Loading
Common factor1	Pursue quality, enjoy life	12.145	30.363	U213	Price is the main factor in buying things	.953
				U214	Always use products of your favourite brand	.972
				U215	Like to participate in friends or classmates reunion	.954
				U216	It's important to have fun and enjoy life	.955
				U217	Prefer popular products over practical ones	.962
				U218	Pay attention to your appearance	.951
				U219	Be willing to make new friends	.962
				U220	Feel different and have unique tastes	.968
				U221	Like to stay at home	.962
				U222	Study and work give you a sense of accomplishment	.958
				U223	Be willing to buy only what you think is important	.969
				U224	Do things on a whim	.962
				U225	You search for product information before you buy something	.950
Common factor2	Secure home, pay attention to the whole	6.886	17.215	U14	Sense of security	.757
				U11	Sense of belonging	.581
				U31	The colour of wooden door	.591
				U32	The material of wooden door	.620
				U37	The function of wooden door	.677
Common factor3	Be willing to experiment, follow trends	2.308	5.770	U23	Be willing to try new brands and products	.728
				U22	Pursue the quality of life, pay attention to brand	.695
				U210	Pay attention to home fashion trends	.693
Common factor4	Love shopping, impulse spending	1.855	4.638	U28	When you see something you like, you make an impulse purchase	.825
				U27	Buying things gives you satisfaction	.676

				U26	Spend a lot of money on products you like	.661
Common factor5	Enjoy life, be satisfied with yourself	1.571	3.928	U16	Enjoy life	.728
				U17	Self-gratification	.725
				U15	Respect oneself	.511
Common factor6	Stimulate achievement, others respect	1.355	3.387	U12	Sense of excitement	.807
				U13	Sense of achievement	.785
				U18	Respect from others	.539
Common factor7	Price dominance, focus on appearance	1.311	3.277	U34	The price of wooden door	.829
				U33	The mould of wooden door	.549
Common factor8	shop around, the pursuit of benefits	1.205	3.013	U25	Always buy products on sale	.707
				U24	Shop around for products	.630
Common factor9	Shopping evaluation	1.078	2.694	U212	Criticize and complain about purchased products	.730

However, the number of categories was still too large and the characteristics of each category were not clear enough, so the 9 categories of public factors were subjected to K-means cluster analysis. After the K-means cluster analysis, the users were classified into 4 types, and the 4 types were named “trendy home users”, “budget-conscious sensible users”, “basic needs users”, and “impulsive enjoyable users” according to the characteristics of the factor components in each type. This grouping is shown in Table 6.

The first type, “trendy home users” has a sample size of 38 people, accounting for 38.9% of the total number of people. This type scored high on the factors of “be willing to experiment, follow trends”, “secure home, pay attention to the whole”, and “price dominance, focus on appearance”. The main characteristics of this group are a willingness to try new things and to follow trends, as well as a focus on the overall appearance and value for money of the home.

The second type, “budget-conscious sensible users” have a sample size of 37 people, accounting for 30.1% of the total number of people. This type scored high on the factor of “shop around, the pursuit of benefits”, which indicates that this type tends to be sensible shoppers, shopping for bargains and comparing prices.

The third type, “basic needs users” have a sample size of 15 people, accounting for 12.2% of the total number of people. This type has the highest negative scores for the factors “enjoy life, be satisfied with yourself” and “stimulate achievement, others respect”, which indicates that this type of user has minimal concern for self-satisfaction, needs, and respect and achievement from the outside world, and is therefore classified as the user of a basic need.

The fourth type, “impulsive enjoyable users” have a sample size of 33 people, accounting for 26.8% of the total number of people. This type scored high on the factors of “love shopping, impulse spending”, “pursue quality, enjoy life”, and “shopping evaluation”. The main characteristics of this group are that they are passionate about shopping, are prone to impulsive spending, pursue a high quality of life, and love to share their shopping experiences and reviews.

Table 6. The Score of Cluster Analysis Factors

	Types of Cluster Analysis			
	1	2	3	4
Factor1	-.24322	-.12766	.22263	.32202
Factor2	.60647	-.73312	-.26182	.24263
Factor3	.69054	-.36653	.19759	-.47402
Factor4	-.16556	-.39973	.37130	.47005
Factor5	.34218	.32035	-1.49707	-.07272
Factor6	.20886	.09512	-.96211	.09017
Factor7	.42232	-.39933	-.27750	.08757
Factor8	.19116	.42893	.27378	-.82549
Factor9	-.28337	.27076	-.78627	.38012

Cross-over Analysis

Cross-over analysis is a method of analysing data horizontally and vertically, based on three-dimensional cross-thinking. It is a method of analysis that moves from the shallow to the deep, from the low to the high level. Cross-over analysis is also known as three-dimensional analysis (Fan *et al.* 2022).

The cross-over analysis of wooden door users' lifestyles and consumer behaviour is shown in Table 7. In terms of gender, male users are more likely to be "trendy home type" and "impulsive enjoyable type", while female users are more likely to be "budget-conscious sensible type" and "trendy home type". In terms of the number, the largest number of "trendy home" users, followed by "budget-conscious sensible" users, are mainly in the 21-30 age group. In terms of industry, the largest proportion of users is "freelance".

Table 7. Cross-over Analysis of User Lifestyle and Population Variables

Population Characteristics		Type 1	Type 2	Type 3	Type 4	Total
Gender	Male	16	14	0	13	43
	Female	22	23	15	20	80
Age	Under 20 years	10	12	10	3	35
	Age 21 to 30 years	18	10	10	26	64
	Age 31 to 40 years	3	2	1	1	7
	Age 41 to 50 years	3	2	1	0	6
	Age more than 50 years	4	3	0	4	11
Education background	Junior college and below	10	5	2	9	26
	Undergraduate college	20	18	15	10	63
	Master/Doctor or above	8	6	5	15	34
Profession	Public officials of state organs, enterprises and institutions	1	0	1	1	3
	Technical professionals (teachers, doctors, lawyers, etc.)	1	4	3	3	11
	Entrepreneurs or individual industrial and commercial households	2	3	0	1	6
	An employee of an enterprise or company	6	4	2	7	19
	Agricultural, forestry, animal husbandry, fishery water conservancy production workers	5	2	1	2	10
	Freelancer (self-employed, designer, artist, etc.)	20	15	15	18	68
	Student	3	1	0	2	6

DISCUSSION

This paper uses cluster analysis, factor analysis, and cross-over analysis to analyse the research data of wooden door users, and in turn, classify the wooden door users. This will not only form a guide for wooden door companies and designers when innovating product design for different market segments but also has important implications for scholars of wooden door research.

Firstly, most wooden door enterprises rely on the personal experience of designers and past production experience for product design. Today, in the face of the new retail market, multi-channel information, and a more segmented market demand make it difficult for management and designers to rely on experience to accurately capture the changes in the market (Xiong *et al.* 2023). Secondly, most previous studies on the consumer characteristics of wooden door users have presented their arguments by reviewing past literature or summarising social phenomena and are consequently highly subjective in terms of the factors that influence users' willingness to use them. Therefore, this paper conducts a survey on the population's preference for wooden doors through a questionnaire designed based on the VALS scale and conducts cluster analysis, factor analysis, and cross-tabulation analysis on the collected data respectively to explore the wooden door consumption preferences of different life forms and consumer behaviour groups in a systematic and scientific manner. The whole research process was objective and complete, providing a certain reference for wooden door design-related business personnel and researchers.

In the next section, based on the research above and combined with an analysis of current trends in visual art and surface materials for home and wooden doors, the authors summarise the different preferences for colour, material, surface decoration, and function of wooden doors for trendy home users, budget-conscious users, basic needs users, and impulsive enjoyable users.

Trends in the Visual Art of Wooden Doors

Because the colour and surface decorative textures of wooden doors are inseparable, this paper unites the visual art of wooden doors together as the visual art of wooden doors. A study has shown that humans recognise an object by its colour first, followed by its shape. In the first 20 seconds of contact with an object, colour accounts for 80% of the impression (Wang 2007). Therefore, the overall visual art of wooden doors has a high proportion of influence on the overall effect of the home space and is a factor that consumers attach importance to. In the colour preference of wooden doors, there are many factors that influence the colour perception of the users, from psychological factors to conditioned reflexes, from the identity of the users to fashion. Fashion is in turn influenced by the identity of the users, and an important factor in determining the identity of the users is the form of life. Under the influence of globalisation and the spread of media, such as the Internet, fashion has become an increasingly important influential factor in shaping the purchase behaviours of consumers (Aras 2018). The choice of colour in the home environment can clearly reveal the tastes, interests, and lifestyles of the consumers, so consumers are more sensitive to colour when purchasing wooden doors for long-term use. Wooden door companies need a quantitative system of colour selection based on a non-sensational and standardised approach to meet the needs of consumers. This system should include a segmentation of the wooden door consumer base and give companies advice on appropriate colour choices based on this. This approach facilitates product development and upgrading for wooden door companies, allowing them to efficiently produce products

that meet consumer needs (Zhou *et al.* 2022).

There has been little research on the global trends in colour and surface decorative patterns on the wooden doors, so the authors combined the analysis of recent home trends exhibitions and research on wooden door products to summarise and predict visual trends such as wooden door surface colour and textures. The forecast of Pantone for the year ahead is based on international trends and major events. The predicted colour of Pantone for 2022 is Very Peri, in 2021 it was Illuminating and Ultimate Gray, 2020 was Classic Blue, and in 2019 it was Living Coral. This shows a general feeling of unease, helplessness, and fear for the future in 2020 under the impact of the novel coronavirus epidemic and the appearance of the Illuminating expresses some hope. Very Peri demonstrates the confidence and daring curiosity of being at ease, symbolising people embracing a future full of possibilities. It expresses the determination to live with the novel coronavirus epidemic and the hope for the future in the post-epidemic era (Kodžoman *et al.* 2022). This popular colour is reflected in the home furnishing sector, with a number of leading international furniture companies bringing beautiful new colour ranges to the 2022 Milan Furniture Fair. The famous Dutch brand Moooi presents Hortensia, a petal armchair designed by Andrés Reisinger and Júlia Esqué, with a pink "petal" wrapped around the armchair to show the beauty of nature. Cassina brings to the "Fungi Forest" collection of B&B Italia, a collaboration with British fashion designers, featuring armchairs with hand-painted patterns. Its dynamic floral pattern and soft shape, it embodies full of energy.

In summary, the current and future colour palette for interiors is dominated by bright, warm colours. The colour palette is either a combination of warm and cold colours to create a youthful and energetic atmosphere in the home, or a low-purity grey shade of Morandi as the base for the interior to add a sense of sophistication to the space. With the normalisation of epidemics, people have become more eager to get closer to nature. The theme of nature has been the focus of many international home shows in recent years. Bringing a refreshing break from nature to people who have been stuck at home for a long time has become a popular home environment for many.

Trends in the Materials of Wooden Doors

In recent years, with the improvement of people's living standards and the improvement of the production process of wooden doors, consumers have put forward higher requirements for wooden doors. The requirements of people for wooden doors are not only a partition between two spaces but also the pursuit of their physical and chemical properties and good feedback for their sensory perception and emotional satisfaction (Hu *et al.* 2020b). The analysis of materials in the wooden door market in recent years can be summarised as the trend of environmental protection of wooden door materials, the intelligence of wooden door production, and the diversification of wooden door surface decoration materials.

In recent years, as income levels and living standards of people have increased, so has their concern for physical and mental health on the one hand, and for the environmental friendliness of their lifestyle on the other. Formaldehyde-free interior decoration, green furniture materials, recyclable household products, and efficient and low energy consumption of the manufacturing process are popular among consumers (Li *et al.* 2022). Therefore, wooden door enterprises need to pay attention to the changes in the market, proactively change the original production methods, the use of green production materials, and environmentally friendly production processes (Xiong *et al.* 2020). In recent years, the market has seen the use of aldehyde-free decorative paper, aldehyde-free wood panels, aldehyde-free glue, and other aldehyde-free environmentally friendly materials to produce

wooden doors favoured by consumers (Chrobak *et al.* 2022). With the depth of research and development in recent years, problems such as high cost, poor mechanical properties and difficulty in construction of water-based paints have been solved one by one, and their green and environmentally friendly characteristics are gradually accepted by the market and welcomed by consumers (Yan and Peng 2021). In recent years, in addition to green environmental protection by consumers, the physical and chemical properties of wooden doors, such as sound insulation, fire protection, moisture resistance, and heat preservation have also gradually been brought to the attention of consumers.

With the advent of the Industry 4.0 era, CNC, 3D printing, digital intelligence production, and other high-tech technologies that are used in the production of wooden doors. On the one hand, large-scale industrial production has enabled large numbers of wooden doors with excellent physical and chemical properties to enter the market, reducing the sales price of wooden doors and lowering the purchase threshold of high-end wooden doors (Varun *et al.* 2022). On the other hand, the customized production model matches the diversified market demand, which makes the demand for intelligent production increase for wooden door enterprises. At the same time, customised production can also bring more profits for enterprises, because as consumers' consumption levels and spending power increase, personalised and customised products are more popular with consumers (Ying *et al.* 2020).

As those born in the 90s/00s (gen Z) gradually enter the workplace and start a family, the group will gradually become a major consumer of wooden doors. Wooden door enterprises need to pay more attention to the research of the product development of this user group. Millennial consumers are more conscious of the style, design, personalisation, experience, and service of their products (Hur and Faragher-Siddall 2022). Therefore, companies and designers should accurately grasp the industry trends and future direction. Products to achieve the organic combination of surface treatment process and design, become in line with the new generation of consumer groups differentiation, humanization, and high aesthetic needs. Doing so will enable enterprises to rise from the *status quo* of serious homogenisation, thus achieving a significant increase in corporate profits.

Wooden Door User Preference Analysis

According to the above analysis, the number of “trendy home users” was the largest, followed by “budget-conscious sensible users”, with “basic needs users” and “impulsive enjoyable users” being smaller. The number of “basic needs users” and “impulsive enjoyable users” was smaller. Therefore, designers should make more reference to the preferences and consumption characteristics of “trendy home users” and “budget-conscious sensible users” when designing popular products. According to cross-over analysis, male users are more likely to be “trendy home users” and “impulsive enjoyable users”, while female users are more likely to be “budget-conscious sensible” and “trendy home users”. The number of “trendy home users” and “budget-conscious sensible users” is higher, so it can be inferred that in the design of wooden doors, consumption of female users' opinions need to be taken seriously.

The design of wooden doors can be evaluated in three dimensions: colour, material, and surface decoration. Colour can be divided into cool and warm colours. Warm-coloured wooden doors can bring a personal, warm, and comfortable feeling, while cool-coloured wooden doors can give a somber and heavy feeling. Wooden door materials are available in solid wood and man-made panels. Solid wood is expensive, but it has good structural strength, sound insulation, and beautiful natural patterns; man-made panels are generally inexpensive and require surface decoration at a later stage (Sang *et al.* 2022). Surface

decoration mainly has clear water paint, muddy water paint, technology wood veneer, *etc.* Most users pursue the natural wood grain texture, but technology wood veneer and thin wood parquet bring a sense of fashion and retro feel and are also now what many young people are pursuing (Bekhta *et al.* 2022).

“Trendy home users” are more likely to enjoy trying new things and following trends, while focusing on the overall appearance and cost-effectiveness of the home. Therefore, designers can consider using a variety of materials, attractive textures, and modern or minimalist decorative patterns when designing wooden doors. “Budget-conscious sensible users” tend to be sensible shoppers, shopping around multiple places when they shop, pursuing affordable prices. Therefore, designers in the design of wooden doors should give more consideration to the practicality of the material itself, the texture, and decorative patterns of the wooden doors should be designed as simple, elegant, and close to nature. The “basic needs users” have very little concern for self-satisfaction, needs and respect from the outside world, achievement, and so on. Therefore, the basic needs of users classified as basic needs in wooden door consumption needs and “budget-conscious sensible” users have part of the overlap, the difference is that the type of users pays more attention to the functionality and cost of wooden doors. Thus, the designer should focus on these two aspects, more materials with man-made panels while ensuring sufficient sound insulation and ease of use. “Impulsive enjoyment users” are keen on shopping, prone to impulsive consumption, in pursuit of a high quality of life, and love to share shopping experiences and reviews. This type of user is easily attracted by the exaggerated design and at the same time in terms of cost performance is not excessive, are willing to pay for the design. Designers should therefore pay more attention to the design of textures and decorative patterns when designing wooden doors.

CONCLUSIONS

1. This paper segments the different types of users in the wooden door market based on lifestyle theory and consumer behaviour theory. Firstly, the authors conducted a questionnaire survey of different types of wooden door users. Secondly, according to the results of the research, the wooden door users were classified into four major groups through cluster analysis and factor analysis: trendy home users, budget-conscious users, basic needs users, and impulsive enjoyable users. Trendy home users are willing to try new things and follow trends, while focusing on the appearance and value for money of their home environment. Budget-conscious sensible users tend to spend sensibly and shop around before shopping for a good deal. Basic needs users pay little attention to self-satisfaction, needs, external respect, and achievements, *etc.*, and will only purchase items that meet their own basic needs. Impulsive enjoyable users demonstrate a passion for shopping and impulsive spending, as well as a desire for a high quality of life, and love to share their shopping experiences, and reviews. Thirdly, cross-over analysis of the research results concluded that among the four categories of users, more male users are “trendy home users” and “impulsive enjoyable users”, while more female users are “budget-conscious sensible users” and “trendy home users”. The number of users in each of the four categories was highest for the “trend home users”, followed by the “budget-sensible users”. The main age group of the survey respondents was between 21 and 30 years old and their main occupation was freelance.

2. Based on data analysis and current trends in wooden doors, the authors have analysed the wooden door preferences of trendy home users, affordable sensible users, basic needs users, and impulsive enjoyment users. Corporate designers should make more reference to the wooden door preferences and consumption characteristics of “trendy home” and “affordable sensible” users when designing wooden doors. The “trendy home” user prefers a wide range of materials, gorgeous textures, and modern or minimalist styles. The “affordable and sensible” user prefers practical materials and functions, and a simple style. “Basic needs” users focus on the cost effectiveness and functionality of wooden doors, without excessive pursuit of style and decoration. “Impulsive enjoyment” users prefer exaggerated and personalised decoration and style, and like a ‘bright’ feeling door.

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