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A Study on Needs for Automotive Interiors Based on Lifestyle Characteristics of Taiwanese Female Office Workers

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Abstract: With the transformation of social patterns, the proportion of female office workers has increased and women have seen a huge increase in purchasing power in the consumer market due to economic independence. From the perspective of the automotive industry, whose main customers were male customers, nowadays, it has changed to designing smaller models, which are more suitable for women to drive. When it comes to a car, men are more focused on horsepower and speed, while women pay more attention to its storage, safety, and easy operation. For female office workers, a car is not only a transportation tool for commutes, but also an assistant that can accompany them shopping and travelling. Therefore, if automotive interiors can meet the usage needs of females, meaning practicality and safety, they can make female drivers feel intimate and comfortable. In order to understand the real needs of female office workers for automotive interiors, in the first phase, this paper adopted case interviews to determine female car-purchasing trends in best-selling automobile manufacturers, as well as their opinions on needs for automotive interiors, which were used as the basis for the questionnaire design. In the second phase, the questionnaire method was used to discuss the life characteristics and needs of female office workers for automotive interiors, and the statistical software SPSS was employed to analyze the differences in needs for automotive interiors among female office workers of different types; and finally, a design principle suitable for this consumer group was concluded. Regarding the results of this paper, automotive interiors are divided into five factors, which are functional storage, spatial aesthetics, digital devices, comfortable feeling, and safety and cleanness. Female office workers are divided into the three groups: (1) The discerning and intellectual pleasure seekers; (2) The regular and easy-going-life seekers; and (3) The modern information seekers. The results show that there are differences in the needs for automotive interiors among female office workers of different types. To be specific, group 1, the discerning and intellectual pleasure seekers, who are engaged in the medical and electronics industries, pay the most attention to safety, cleanliness, and digital device needs. Group 2, the regular and easy-going-life seekers, who are engaged in public education, the financial industry, and traditional industries, pay most attention to the needs of comfortable feeling. Group 3, the modern information seekers, who are engaged in service and design industries, pay most attention to the needs of functional storage, spatial aesthetics, digital devices, safety, and cleanliness.

Keywords: female office workers; life characteristics; automotive interiors; needs; differences

1. Introduction

1.1. Research Background and Motivation

With the transformation of higher social status, rising highly-educated proportion, and economic independence of women, the proportion of women in the labor market has increased. As shown in the observations of the ages of women's labor participation, and with the promotion of higher education, the peak age of women's labor participation had been extended to 25–29 in 2000 to 2010 from 20–24 in 1980 to 1990 [1]. Therefore, it can be inferred that more attention has been paid to female consumers after they obtain economic independence, and products that mainly focused on male consumers have noticed business opportunities in female consumers.

From the perspective of the contemporary automobile market, strategies that mainly targeted male consumers have gradually transferred to female consumer groups, and all automobile brands have begun to design car models exclusively for women, according to needs of female groups. Jane Cunningham and Philippa Roberts mentioned in 2007: "Women have become the most important consumer group in the world, almost having 80% rights of consumption decision-making. Women are almost the decision-makers of purchasing consumer goods, which includes more than just the consumption of household and female products. In fact, over 60% of computers and cars are purchased by women." From References [2,3], it can be seen that the automobile market has female consumers included as one of the important groups for design. Many contemporary automobile manufacturers have released car models exclusively for women. The largest difference between the male automobile market and the female automobile market is that not all women would like the same car, and there are differences in their preferences based on different ages, occupations, and identities [4].

There are great differences between females and males in choosing to buy a car, as women are more likely to have different needs and impressions according to different groups that fit in with them. For males, the overall comfort of automotive interiors and driving safety are uppermost considerations, while women are more focused on the design of automotive interiors; thus, automobile manufacturers are more likely to make interior designs closer to household feelings, in order to follow up the awareness of consumers. Automobile manufacturers have noticed that consumers are focused on the comfort of automotive interiors, and have realized that interiors are the part mostly exposed to consumers, as they tend to spend a long time inside the car; therefore, more detailed design has been added to automotive interiors, regardless of the redesign of car models or special editions. For example, the car model Nissan Tiida TK, which was redesigned in October 2013, has increased interior space for female drivers to store more goods. For another example, the special Cerise edition of the Nissan March, as launched in September 2013, in addition to the design of multiple spaces for the storage of small objects, has added a cosmetic mirror to the visor in the front seat to meet the cosmetic needs of women in a car, and matched the contour with the interior automotive design to create a different visual feeling in the car.

The market has noticed that a common point when women purchase a car is that women tend to purchase SUVs (Sport Utility Vehicles) and small hatchbacks, as both of these cars can meet the needs of placing more goods and their backseats can be unfolded to place large-sized articles, which indicates the characteristics of both storage and carrying passengers. Therefore, these car models have become the first choice of female transportation tools. However, automotive interior designs targeted at females are not widely applied and are mainly composed of original interior outfits. Since the mental feelings of females can change due to atmosphere in a certain environment, when purchasing a car, priorities shall be given to the convenience of commuting, shopping, and travelling. Specifically, there are great differences between single women and married women with children. Moreover, women are not just focused on details: they also consider levels besides function. They hope that the environment of a car is not just helpful, but is also a place that is attractive and safe in which people would feel comfortable physically and mentally [3].

Therefore, regarding the design of automotive interiors, the needs of users must be taken into consideration. In addition, in terms of the interior design of different functions, attention shall be paid to the overall visual feelings and usage experience, as they will influence the first impression and driving comfort when women are choosing to buy a car. Female office workers possess strong independence in consumption, carefully consider products to buy, and think over whether the products are in conformity with their own needs; thus, their consumption consciousness is based on the judgment of self-value. Thus, the purpose of this paper is to explore Taiwanese female office workers' needs and choice preferences for the functions of automotive interiors, compare and study female office workers by dividing their lifestyles into several groups, and finally, reach a conclusion and suggestions, in order that the interior designs and development principles for female office workers can be concluded as a reference base and their usage needs for automotive interiors can be met.

1.2. Research Purpose

This paper uses case interviews to conclude manufacturers' opinions of needs for automotive interiors. Then, the questionnaire method is used to discuss the needs and mental feelings of female office workers for automotive interiors. Finally, interior need factors suitable for female office workers are put forward, as based on the integrated research results, in order to provide female office workers with a reference direction for automotive interiors. In view of the abovementioned reasons, the key objectives of this study are, as follows:

- Investigate the lifestyle characteristics of female office workers through collecting relevant literature information, conducting interviews with manufactures, and AIO questionnaires (Activity, Interest and Opinion).
- Conclude the needs of female office workers for automotive interiors, as based on the research results of the questionnaires, and analyze the differences in the usage needs for automotive interiors of female office workers of different types.
- Put forward the design factors of female office workers' needs for automotive interiors by integrating the conclusions of interviews and the questionnaire analysis results for the consideration and reference of the automobile industry in designing automotive interiors.

1.3. Research Scope and Limitations

1.3.1. Research Scope

- As a result of changes in social structure, women's access to higher education and career is increasing in proportion, thus giving them the right to economic independence. Therefore, this study focuses on the group of female office workers to explore the characteristics of their lifestyle.
- It aims to understand the elementary requirements of this group for interiors by discussing the views and needs of female office workers regarding automotive interiors.
- This paper takes the original interiors of Taiwanese best-selling females' car models and the commonly used additional interiors in the current market as the basis for discussing the cases of interiors.

1.3.2. Research Limitations

- This paper takes full-time female office workers as the research objects, and those of 20–65 years of age are chosen as the targets of the sample survey, according to the Labor Standards Law that requires the working age of 65 for retirement.
- Considering that there is a wide range of automotive interiors, this paper only focuses on the interiors frequently applied by drivers.
- This paper's scope of car models is limited to nonprofit self-use small cars with a displacement of less than 2000 cc (inclusive). Business cars and self-use pick-up trucks are not within the scope of this paper since they have specific purposes.

2. Literature Review

2.1. Attributes of Automotive Interior Products

Interior outfitting is considered when modern people are choosing a car. Although the contour of a car is the first impression of general purchasers, the interior space of a car is the part that is exposed to drivers for the longest time, as drivers and passengers sit in the interior space no matter whether commuting, on an outing, or shopping; thus, the interior space is an important consideration factor for drivers. The interior spaces of a car can vary according to different needs and preferences, and the original meaning of the so-called automotive outfit refers to all components that can be used and seen in the interior space, such as the steering wheel, instrument panel, center console, seats, door trim, and so forth. Automotive interior functions can provide users with good comfort, safety, and operability, and can provide users with adequate traffic information, as well as functions of ornamental, beautification, and practicality to improve the value of a car [5–19]. Based on the aforementioned information, it can be learnt that the functions of automotive interiors can be divided into practical and decorative functions. Specifically, practical functions can help drivers to achieve easy operation and understand the usage of different components in the interior space of a car, while decorative functions can beautify the interior space of a car to allow drivers to enjoy delighted and self-style feelings, both in vision and mentality, apart from meeting the usage needs for the operational functions. Unfortunately, many studies have failed to truly classify the functions and characteristics of automotive interiors in detail; therefore, the purpose of this study is to classify automotive interiors into two types, practical functions and decorative functions, as shown as Table 1.

| | Item of Interior | Function |
|--------------|--------------------------|--|
| | Center console | This function is the core of the overall operation of a car, and all equipment that controls the direction of a car and information equipment are on the center console, such as the steering wheel, instrument panel, acoustic and cooling equipment, etc. It varies according to different car models, and different materials can be chosen as decoration according to different preferences. |
| | Steering wheel | It is the most important design factor for controlling a car, as it provides the direction of motion of the car body for drivers and allows a car to run within the range of visibility of drivers. |
| | Instrument panel | It is a display and control panel that allows drivers to know vehicle speed, mileage, and fuel tank status of cars. At present, there are two types of instrument panels, which are traditional indicators and digital panels. |
| | Saddle of center console | It is mounted in the center of the entire interior space, between the driver's seat and the passenger's seat, and is equipped with a handbrake and shift lever. It has different design forms according to different models, and it can contain small items and drinks. |
| | Sun visor | It is installed overhead, in front of the driver's seat and the passenger's seat, to provide shade from the sun and store cards, and currently, some car models have been designed with a mirror that facilitates putting on makeup. |
| Practicality | Rear-view mirror | It allows a driver to clearly see traffic behind and helps a driver to see objects in the rear when reversing. |
| | Door panels | They are installed in the doors in the front and back seats. Usually, there are handles in them to close or open car windows, and with the flute design, they can store small items. |
| | Roof | It is to achieve heat insulation and protection in the entire interior space. At present, open-type roofs are designed, which can adjust the interior space to allow air to circulate. |
| | Door handles | They are mounted in door panels. At present, in consideration of differences in habits of opening the car doors, door handles are designed with different materials. |
| | Seats | They are an important design for drivers to sit in a car, as they provide comfort and safety when driving. Moreover, the heights and distance between the front and back seats can be adjusted according to different heights of passengers, and different materials can be matched to provide comfort and safety for drivers and passengers. |
| | Locker | It is usually installed beneath the center console and beside the driver's seat. It can store private belongings and is easily used. |
| | Information devices | They are supplementary multimedia devices inside a car, such as sound equipment, GPS satellite navigation system, etc., to provide auxiliary information functions for drivers. |

Table 1. Design classification table of automotive interiors.

| Gear panel Base of the shift level and its material and color capreferences. Door trim panel Safety belts are installed to provide safety for drive a decorative effect. Decoration Armrest trim panels They are installed in door panels, and according to matched with different materials to make drivers for the panels | be changed according to different 3 and passengers, and they can have |
|---|--|
| Door trim panel Safety belts are installed to provide safety for drive a decorative effect. Decoration Armrest trim panels They are installed in door panels, and according to matched with different materials to make drivers for the panels. | 3 and passengers, and they can have |
| Decoration Armrest trim panels They are installed in door panels, and according to matched with different materials to make drivers f | |
| | preferences of drivers, they can be el more comfortable. |
| Shutter It is used to shelter the back of a car and can be not function of beautifying the storage space at the back | ed and adjusted; thus, it has the seats. |
| Vehicle mat Vehicle mat It is placed on the floor spaces of a car to keep then chosen according to the preferences of users; thus, interior of the car. | clean, and different materials can be has the function of beautifying the |

Table 1. Cont.

(Sources: [5–19]).

2.2. Female Consumptive Attitude

2.2.1. Psychological Needs in Female Consumption

Females have taken up an important role in the current consumer market. Unlike the traditional concept of "men make houses, women make homes", social patterns have shown the trend of higher education, and women generally accept enough education to enter into the practice and competition of the workplace. Regarding their consumption needs, females are more focused on spiritual enrichment, while males are focused on material abundance. In other words, females are more focused on psychic gratification than material satisfaction.

After women entered this part of society, they affected the development of many relevant industries, and such transformation also indirectly affected the change of the market. According to the purchasing decision survey on household consumption in 2006, as conducted by Chen-Hai Li, more than 70% of market sales volume and purchasing rights were led by females [20]. Therefore, more attention shall be paid to commodity development for female groups and no industry shall ignore female consumers, as they are the market blueprint for the future.

In fact, what makes female consumption needs special are inner feelings, which are affected by the aforementioned economic and social status and psychological factors. In addition, purchasing intention and usage experience are correlated with the five senses of women; that is, sight, hearing, taste, smell, and touch. Women's five senses are heightened; thus, they tend to be particular when shopping, and will usually choose products that "feel right" on the whole. Moreover, Taiwanese women devote particular care to changes in products [21], meaning that women will consider multiple factors when shopping. For example, women will consider whether the product is practical, whether it is easy to operate, and whether the shape and color of a product is unique or meets their aesthetic feelings.

In 2007, Fang-Yu Kuo put forward that the psychological characteristics of female consumption were the appearance, practicability, detail in design, creativity, and convenience of goods for life, and that women were brave in pursuing self-value and personalized lives with enhancement in the independent consciousness of women [20]. The following content offers details of this:

- Women consumers pay special attention to the emotional factors transmitted by products, and their purchasing motivation can be affected by the appearance, shape, and color of a product. In addition, their purchasing intention can be formed when they are attracted to unique appearances and multiple color styles with mental feelings, such as warm and romantic feelings created by atmosphere.
- Women are attentive; thus, when they are buying a product, they will focus on detail in designs, measure the value of a product by comparing it with other products, and tend to spend a longer time on comparing product characteristics with specific benefits; thus, a good product shall provide women with a tangible experience service.

• Not all women have much time of their own. For example, some married female employees need to sacrifice their time for their families. Therefore, products with easy operation are closer to the needs of women. In fact, women like to pursue changes in stability, as it will promote freshness and creativity in their busy lives.

2.2.2. Definition and Characteristics of Female Office Workers

Although office workers are engaged in different work types due to gender differences, men and women already share equal rights, and there are no sexual differences or gender discrimination with current social trends and the rise in capitalism. Therefore, the basic definition of "office workers" are people who are engaged in full-time paying jobs, get paid a regular wage, and commute after they enter society.

The Japanese Hakuhodo Institute of Life & Living once showed the characteristics of married female office workers with the "7M" changes, which were Money, Mind, Movement, Marriage, Me-too, Material, and Market. Based on the 7M changes put forward by the Japanese Hakuhodo Institute of Life & Living and compiled by this paper, the following are factor details that affect the lifestyles of modern women [22].

- Money: The main influence in the changes of women's lifestyles comes from independence in money, as women own more opportunities to choose free lives for themselves with economic autonomy. In the automobile market, the proportion of female buyers is higher than in the past, as women no longer have to depend on men, but have enough economic ability to buy more expensive products.
- Mind: At present, no matter whether in Asian, European, or American countries, women tend to receive higher education than men, which promotes self-consciousness and social status and allows women to have more opportunities to achieve their ideals and goals. From the perspective of professional specialization, male workers comprise the majority in medicine and finance. However, under the circumstance of improved female education, women begin to be outstanding in these occupations, and there are more and more women employed as senior managers.
- Movement: With economic independence and the promotion of self-consciousness, women begin to expand their social circles and harness domestic and overseas travel to expand their horizons, and all such behaviors allow women to show their own confidence. In addition to their influence on the tourism market, women's mobility has a close relationship with purchasing behaviors. Consequently, tour operators try to create a scenario of a regional shopping paradise with advertisements to attract female consumers, and department stores have launched many activities related to anniversary celebrations to attract female consumers.
- Marriage: It has been a trend of social patterns that women change from being homemakers to career women, which may cause role overload for women when they have to fulfill multiple roles, which can cause many women who own economic autonomy and freedom of action to have no faith in marriage. As a result, the numbers of unmarried people and people who marry very late have significantly increased. There are great differences in marriage concepts for different women; as a result, some nouns, such as "single noble" and "loser dogs", have become popular. Therefore, apart from the targeted group of married women, the consuming abilities of single female consumers in the female market shall not be underestimated.
- Me-too: Due to the trend of female economic independence, many dealers have regarded women as their targeted consumer group. In their eyes, as women love to follow the latest trends, with the dissemination of advertising media, they can obtain recognition from many women. Taking female finery and cosmetics as an example, the most common means of dealers is to take advantage of spokeswomen to attract female consumers, which grasps the female mentality of worshipping perfection and trying to benchmark a certain icon.

- Material: Besides general clothing and fittings, the material needs of women have gradually transferred to durable products. Both household appliances and transportation tools are products that require long-time use to achieve familiarity; thus, durability and practicality are consideration factors for women.
- Market: With the change in social status of women in society, many market segments must be changed to meet current market demands. Therefore, if a company wants to receive recognition from consumers, it must continuously understand the needs of consumers and correct market segments to accurately reach the targeted market.

3. Research Method and Process

The purpose of this paper is to discuss the relevant theories of female consumption, as based on the literature. Next, the follow-up study is processed in three phases. In the first phase, case interviews are used to identify the purchasing status of female consumers. In the second phase, as based on results of the first phase, the questionnaire method is used to inquire about opinions of consumers, as well as the lifestyle characteristics of female office workers. Finally, based on integration and analysis, the results will focus on the design and development of automotive needs for female office workers. The study was conducted from 2014 to 2015.

3.1. Case Interview and Induction

After the discussion and integration of the literature, this study regards the results of integration as the structure of questions for the interviews and survey, and conducts in-depth interviews with the three best-selling automobile manufacturers in Taiwan, which are Toyota, Nissan, and Mitsubishi, in order. It can be learned from the interview information of the aforesaid automobile manufactures that the proportion of female consumers has gradually increased in the automobile market. It can also be learned that women who intend to buy a car usually have already obtained a stable economic base, and they buy a car mostly for their jobs. Of course, apart from investment in jobs, buying a car can also be seen as a symbol for promoting social status.

In addition, this paper finds that regarding automotive interiors, different from men, women are less concentrative in driving. Therefore, the top priority for automotive interiors shall be given to assisting driving safely, and secondly, the function of storage shall be considered. Regarding car models, women's favorite models are compact cars, minivans, and small hatchbacks, which provide better operation and parking for female drivers.

3.2. Analysis of Questionnaires for the Lifestyles of Female Office Workers

In the second phase of this study, questionnaires are used to understand the lifestyle characteristics of female consumers and their usage needs for automotive interiors. The main respondents are female office workers aged from 20–65 years old, who are not yet retired and have needs for minicars with displacement of less than 2000 cc. The scope of the survey is based in northern Taiwan, central Taiwan, and southern Taiwan. This paper issued a total of 280 questionnaires, and 266 questionnaires were recovered. After deleting 20 invalid questionnaires, 246 valid questionnaires were recovered.

3.2.1. Descriptive Analysis of Demographic Variables

The question items of the first part of the questionnaire are "basic data", which are composed by the six items of: "age", "educational level", "marital status", "occupation", "personal income", and "residence". By the table of frequency distribution in statistical analysis, the purpose of this study is to understand the overview of the basic data of respondents. The descriptions for numerical analysis and data specifications are, as follows:

• The respondents are mostly aged between 25–34 years old, with 93 persons in total, accounting for 38% of respondents; followed by 35–44 years old, 79 persons in total, accounting for 32%;

45–54 years old, 43 persons in total, accounting for 17%; 55–65 years old, 16 persons in total, accounting for 7%; 20–24 years old, 15 persons in total, accounting for 6%.

- Regarding the frequency distribution result of the "educational level" of respondents, university degrees take up the largest sample number of the questionnaire, with 171 persons in total, accounting for 70% of respondents; followed by master's degrees, 32 persons in total, accounting for 13%; followed by senior high school degrees, 30 persons in total, accounting for 12%; doctoral degrees, 10 persons in total, accounting for 4%; junior high school (inclusive) degrees below, 3 persons in total, accounting for 1%.
- Regarding the frequency distribution result of the "marital status" of respondents, married women with children take up the largest sample number of the questionnaire, with 132 persons in total, accounting for 54% of respondents; followed by unmarried women, 90 persons in total, accounting for 37%; finally, married women without children, 24 persons in total, accounting for 10%.
- Regarding the frequency distribution result of the "occupation" of respondents, the service industry takes up the largest sample number of the questionnaire, with 53 persons in total, accounting for 22% of respondents; followed by the public education industry, 39 persons in total, accounting for 16%; followed by the financial industry, 36 persons in total, accounting for 15%; the design industry, 29 persons in total, accounting for 12%; traditional industries, 24 persons in total, accounting for 10%; the medical industry, 23 persons in total, accounting for 9%; other industries, 19 persons in total, accounting for 8%; the manufacturing industry, 16 persons in total, accounting for 7%; the electronics industry, 7 persons in total, accounting for 3%.
- Regarding the frequency distribution result of the "personal income" of respondents, NTD 30,001–NTD 40,000 takes up the largest sample number of the questionnaire, with 67 persons in total, accounting for 27% of respondents; followed by NTD 20,001–NTD 30,000, 60 persons in total, accounting for 24%; NTD 40,001–NTD 50,000, 56 persons in total, accounting for 23%; more than NTD 60,001, 30 persons in total, accounting for 12%; NTD 50,001–NTD 60,000, 1 person in total, accounting for 7%; less than NTD 20,000, 15 persons, accounting for 6%.
- Regarding the frequency distribution result of the "residence" of respondents, respondents living in southern downtown take up the largest sample number of the questionnaire, with 101 persons in total, accounting for 41% of respondents; followed by respondents living in central downtown, 50 persons in total, accounting for 20%; respondents living in southern suburbs, 32 persons in total, accounting for 13%; respondents living in northern downtown, 27 persons in total, accounting for 11%; respondents living in central suburbs, 19 persons in total, accounting for 8%; respondents living in northern suburbs, 17 persons in total, accounting for 7%.

3.2.2. Factor Analysis of Lifestyles and Reliability Test

Before this paper conducted analysis of the lifestyle factors, overall reliability analysis of the 32 questions was conducted to understand the reliability and validity of the questionnaire. The higher the reliability value in the questionnaire, the higher the reliability and validity of the questionnaire. When the Cronbach α coefficient is higher than 0.7, it means high reliability. When it is larger than 0.35, it means fair reliability. When it is lower than 0.35, it means low reliability [23]. The overall reliability of the questionnaire in this study is 0.827, which is higher than 0.7, and indicates that the questionnaire in this study is reliable.

Before conducting extraction of factor analysis, KMO sampling adequacy detection and Bartlett's test were conducted to judge whether factor analysis was applicable to the data. Kaiser believes that the value is between 0 and 1, and the larger the value, the more common the factors between variables and the more applicable to conducting factor analysis [24]. In addition, the KMO of the questionnaire in this paper had a value of 0.746, and the significance by Bartlett's testing was 0.000. Therefore, factor analysis is applicable to the data.

After the above tests were passed, principal component analysis (PCA) in factor analysis is used to extract the common factors. The value after rotation is selected as the total variance, and the sum of

an eigenvalue >1 is the screening condition. The total variance is 60.038% and the minimum eigenvalue is 1.539, which conform to the screening condition of the sum of the eigenvalue being >1. Finally, ten factor components are extracted.

According to the factor loading significance principle, as put forward by Hair et al., when factor loading reaches 0.4, the scope of acceptance is reached [25]. All questions in this paper conform to the principle, as shown in Figure 1.



Figure 1. Heatmap after rotation of PCA of the lifestyle questionnaire.

As shown above, 10 factors can be obtained from PCA after rotation. According to the implications contained in the obtained factors, this study names them Information-Sensitive, Brand Worship, Fashionable Popular, Early Adopters, Careful Concerns, Optimistic Outward, Conservative Nostalgia, Perceptual Subjective, Self-Centered, and Professional Dependent. The following are descriptions of the implications of the ten factors (see Table 2):

- Information-Sensitive: This factor includes the 30th, 11th, 31st, 8th, and 28th questions in the lifestyle question items: 5 questions in total. According to the numerical value of this factor, the respondents of this factor take delight in accepting opinions provided by different channels, understanding related current reports, and believing in their own sight and judgment.
- Brand Worship: This factor includes the 3rd, 4th, 7th, 5th, and 13th questions in the lifestyle question items: 5 questions in total. According to the numerical value of this factor, respondents of this factor tend to give priority to brands when they are purchasing products, repeatedly purchase products of the same brand, have faith in familiar brands, believe that brands with high reputation and high prices are better than ordinary brands, and believe that using them is more helpful to promote their social status. In addition, they frequently use their mobile phones to obtain the latest brand information.
- Fashionable Popular: This factor includes the 23rd, 29th, and 26th questions in the lifestyle question items: 3 questions in total. According to the numerical value of this factor, respondents of this factor would focus on their images of dressing properly, even if they do not have to go out to participate in parties or other activities, like purchasing cars of the same brands as their friends, and like purchasing fashionable products with high prices or with texture at department stores and boutiques.
- Early Adopters: This factor includes the 9th, 17th, and 16th questions in the lifestyle question items: 3 questions in total. According to the numerical value of this factor, respondents of this factor are featured by the characteristics of accepting new friends and challenges. Women of this type are easily motivated by novel and interesting things and work overtime from time to time.
- Careful Concerns: This factor includes the 21st, 19th, and 14th questions in the lifestyle question items: 3 questions in total. According to the numerical value of this factor, respondents of this factor are used to putting articles away, neatly placing them after use, and they efficiently use their time to complete goals through careful planning.

- Optimistic Outward: This factor includes the 24th, 25th, 22nd, and 27th questions in the lifestyle question items: 4 questions in total. According to the numerical value of this factor, respondents of this factor are fond of outdoor and social activities, love keeping pets, love planting trees and flowers, and beautify and decorate their own rooms. In conclusion, women of this type enjoy life, experience different activities, and happily face life during their spare time.
- Conservative Nostalgia: This factor includes the 1st, 10th, and 6th questions in the lifestyle question items: 3 questions in total. According to the numerical value of this factor, respondents of this factor highly trust their familiar and previously existing products; thus, they are more willing to use products that they have used before and believe that sturdy and durable products are better than popular products. In conclusion, they are very prudent in purchasing products and pay a great attention to the practicality of products.
- Perceptual Subjective: This factor includes the 20th, 12th, and 18th questions in the lifestyle question items: 3 questions in total. According to the numerical value of this factor, respondents of this factor are featured by the characteristic of emotion surmounting reason and their purchasing choices can be easily affected by advertising media. They also like to provide their opinions and suggestions to their friends.
- Self-Centered: This factor includes the 15th and 2nd questions in the lifestyle question items: 2 questions in total. According to the numerical value of this factor, respondents of this factor are mainly focused on their own ideas and do not care for ideas of others. With strong self-consciousness disposition, they are confident in their own judgment and prefer to determine their purchasing intention based on their own moods at the moment.
- Professional Dependent: This factor only includes the 32nd question in the lifestyle question items, but the coefficient value of this factor is up to 0.840; therefore, this factor is of great significance to this study. Respondents of this factor tend to leave the maintenance and repair of simple products to professionals. Therefore, the respondents of this type are very dependent on assistance from service staff, believe that their usage confusion can be solved, and the working conditions of products can be well maintained when they are in the hands of professionals.

| Factor | Name | Contents | Factor Loadings |
|----------|--------------------------|---|-----------------|
| | | 30. You listen to opinions from different people and find out the differences among all brands when buying a car. | 0.645 |
| | | 11. You like watching news or care about current affairs. | 0.629 |
| Factor 1 | Information Sensitive | 31. When an automobile manufacturer offers extra equipment, you are more willing to buy a car. | 0.551 |
| | | 8. You are confident of your own sight and taste. | 0.527 |
| | | 28. You will notice information and reports related to cars in newspapers, magazines, or on television media | 0.514 |
| | Brand Worship | 3. When buying products, you care most about brands, rather than the countries manufacturing the products. | 0.722 |
| | | 4. You often buy products of the same brand. | 0.539 |
| Factor 2 | | 7. You think products of brands with high reputation and high prices are good in quality. | 0.538 |
| | | 5. You think using famous-brand products can promote the user's social status. | 0.513 |
| | | 13. You are very dependent on your mobile phone, and it is a necessity in your life. | 0.419 |
| | | 23. You dress yourself up even if you are taking a rest in your own house. | 0.736 |
| Factor 3 | Fashionable | 29. You have bought cars of the same brand as most of your friends. | 0.704 |
| Factor 5 | Popular | 26. You love shopping and regularly go to department stores and boutiques. | 0.440 |

Table 2. Table of factor loadings of lifestyles.

| Factor | Name | Contents | Factor Loadings |
|-----------|---------------------------|---|-------------------------|
| Factor 4 | Early Adopters | You are sociable and like to make new friends. You like jobs with challenges and interesting jobs. You often work overtime. | 0.706 0.630 0.494 |
| | | 21. You will put used articles away and place them neatly. | 0.752 |
| Factor 5 | Careful Concerns | 19. You have strong working ability and are very cautious. | 0.672 |
| | concerns | 14. You can generally take efficient advantage of time. | 0.621 |
| | | 24. You like to participate in outdoor activities to enjoy nature. | 0.701 |
| | Omtimistic | 25. You keep pets or plant trees and flowers. | 0.594 |
| Factor 6 | Outward | Outward 22. You like to decorate your own room and place decorations to beautify the room. | |
| | | 27. You like to participate in social activities. | 0.525 |
| | | 1. You are a prudent purchaser and shop around for the best price. | 0.639 |
| Factor 7 | Conservative | 10. You like to use familiar products or previously existing products. | 0.639 |
| | Nostalgia | 6. Compared with fashionable products, you more like sturdy and durable products. | 0.604 |
| | | 20. You are more easily affected by emotion than reason. | 0.698 |
| Factor 8 | Perceptual Subjective | 12. You can be affected by advertising media when you are buying products. | 0.645 |
| | , | 18. You like to control the behaviors of friends and give your opinions to them. | 0.462 |
| Easter 0 | Salf Cambarra 1 | 15. You are very independent and do not care about the opinions of others. | 0.760 |
| Factor 9 | Self-Centered | 2. You will buy things that you like very much without hesitation. | 0.591 |
| Factor 10 | Professional Dependent | 32. You prefer to leave the maintenance and repair of products to professionals, even if they are very easy. | 0.840 |

Table 2. Cont.

3.2.3. Discussion on Lifestyle Clusters and Grouping of Occupations

This paper mainly uses "k-means clustering" to implement grouping [26]. After excluding 19 respondents whose occupations are in "other industries", 227 samples are regarded as the total samples of clustering. After analysis of lifestyle factors is conducted, those factors are transformed into variables to conduct clustering in this phase, and samples with similar square errors are included in the same cluster. This study partitions three lifestyle clusters of female office workers. Cluster values and the significance of the three clusters according to the ten factors of lifestyles can be seen in Table 3.

| Table 3 | . Table of | average v | alues of | lifestyle | clustering. |
|---------|------------|-----------|----------|-----------|-------------|
|---------|------------|-----------|----------|-----------|-------------|

| Eastor | Cluster 1 | Cluster 2 | Cluster 2 | E Value | n Value | 101 |
|-------------------------------|-----------|-----------|-----------|---------|----------------|---------|
| Factor | Cluster 1 | Clustel 2 | Cluster 5 | r value | <i>p</i> value | <u></u> |
| Information-Sensitive | 0.38290 | -0.26056 | 0.44004 | 13.714 | 0.000 | * |
| Brand Worship | 0.00209 | -0.43533 | 0.24416 | 4.247 | 0.015 | * |
| Fashionable Popular | 0.28858 | -0.54187 | -0.15884 | 18.280 | 0.000 | * |
| Early Adopters | -0.18035 | -0.99688 | 0.64205 | 36.141 | 0.000 | * |
| Careful Concerns | -0.02057 | 1.22236 | -0.42539 | 28.806 | 0.000 | * |
| Optimistic Outward | -0.03328 | -0.15601 | 0.01150 | 0.247 | 0.782 | |
| Conservative Nostalgia | -0.23372 | 0.46412 | 0.24957 | 12.728 | 0.000 | * |
| Perceptual Subjective | 0.14279 | -0.86919 | 0.05956 | 11.632 | 0.000 | * |
| Self-Centered | -0.27204 | 0.92268 | 0.35470 | 22.995 | 0.000 | * |
| Professional Dependent | -0.20414 | 0.72022 | 0.14801 | 10.257 | 0.000 | * |

Note: * attains significance level; *p* value < 0.05 refers to in conformity with significance.

Explanations for naming the lifestyle clusters are as follows:

• The discerning and intellectual pleasure seekers: It can be learned from Table 3 that cluster 1 and factors "Fashionable Popular" and "Perceptual Subjective" are positive values in the centroid locations of the cluster, while factors "Conservative Nostalgia", "Self-Centered", and "Professional

Dependent" are negative values in the centroid locations of the cluster, which shows that the higher the positive value of a factor, the more attention is paid to the factor; and the lower the negative value of a factor, the less attention is paid to the factor.

- The regular and easy-going-life seekers: It can be learned from Table 3 that cluster 2 and factors "Careful Concerns", "Conservative Nostalgia", "Self-Centered", and "Professional Dependent" are positive values in the centroid locations of the cluster, while factors "Early Adopters", "Fashionable Popular", and "Perceptual Subjective" are negative peaks in the centroid locations of the cluster.
- The modern information seekers: It can be learned from Table 3 that cluster 3 and factors "Information Sensitive", "Brand Worship", and "Early Adopters" are positive values in the centroid locations of the cluster, while the factor "Careful Concerns" is a negative peak in the centroid locations of the cluster.

Based on the aforementioned clustering results, the distribution of the population variables of different clusters, according to the grouping results of different occupations and their corresponding influence on the factors of lifestyles, can be seen in Table 4, which shows that there is a total of 30 persons in cluster 1, accounting for 13.2%; there is a total of 116 persons in cluster 2, accounting for 51.1%; there is a total of 81 persons in cluster 3, accounting for 35.6%. Among them, cluster 2, "The regular and easy-going-life seekers", takes up the largest sample number of the questionnaire.

| Cluster Name | Cluster 1 The Discerning and Intellectual Pleasure Seekers | Cluster 2 The Regular and Easy-Going-Life Seekers | Cluster 3 The Modern Information Seekers | |
|--------------------------------------|--|---|--|--|
| Influencing factors on lifestyles | Fashionable Popular, Perceptual Subjective | Careful Concerns, Conservative nostalgia, Self-Centered, Professional Dependent | Information-Aensitive, Brand Worship, Early Adopters | |
| Occupations | Medical and electronics industries | Public education, financial, manufacturing, and traditional industries | Service and design industries | |
| Ample Number | 30 | 116 | 81 | |
| Percentage | 13.2% | 51.1% | 35.6% | |

Table 4. Statistical results of lifestyle clusters and grouping of occupations.

Demographic conditions, such as age, educational level, marital status, personal monthly income, and current residence of each cluster can be learned from Table 4. The summary and detailed descriptions of the analysis results are as follows:

• Cluster 1: The discerning and intellectual pleasure seekers

The respondents of this cluster have keen insight regarding fashion, can be easily affected by advertising media, and mostly choose to consume at department stores and fashion boutiques. In addition, they have very high demands for living quality, no matter whether in household appliances, clothing, or cars. For them, products shall be high in quality and beautiful. Actually, money is never a top priority for this cluster, as they are more focused on quality and the symbols of social status. From the perspective of demographic variables, 35–44 years old, married and with children, whose degrees are university and master's degrees, with personal incomes of NTD 40,001–NTD 50,000 are in the majority of this cluster, and most of them live in southern downtown areas.

• Cluster 2: The regular and easy-going-life seekers

The respondents of this cluster are a group with careful concerns. Usually, they can efficiently use their time to deal with their jobs. In fact, they have strong working abilities and are very independent; thus, they trust themselves in determination and are glad to offer opinions to friends. Moreover, they

are highly disciplined. They carefully place all articles used in their daily lives and prefer to use familiar products. In addition, they are confident with practical things that can be used for a long time, and believe it is safest and most realistic to leave all product repairs to professionals. Occupations of this cluster include respondents from public education, financial, manufacturing, and traditional industries, and all respondents of these four industries are in conformity with the aforementioned lifestyle characteristics. As they have regular working hours, they are mainly focused on regularity and comfort in living quality. From the perspective of demographic variables, 35–44 years old, unmarried women, whose degrees are university (college) and master's, and with personal incomes of NTD 30,001–NTD 50,000 are in the majority of this cluster, and most of them live in central downtown and southern downtown areas.

• Cluster 3: The modern information seekers

The respondents of this cluster like television, newspapers, and media reports, and enjoy keeping up with current affairs and accepting new information at any time; therefore, they are dependent on information products, such as mobile phones. Regarding purchasing, they are more likely to purchase products of brands with high reputation, and that occur frequently in media reports and magazines, as they think the quality of such products is higher than brands, and such products can heighten their own style and show their unique taste. In addition, they like jobs with challenges and like to make new friends. Due to their strong enthusiasm for work and the characteristic of daring to challenge, they often work overtime, as they tend to forget the time. Occupations of this cluster include service and design industries, and the respondents of the both occupations are in conformity with the aforesaid lifestyle characteristics, as they have strong enthusiasm and offer services. In addition, while they are very independent, they do not have much time to go shopping due to long working hours; thus, they mainly depend on the internet, magazines, and media reports to purchase products. From the perspective of demographic variables, mature young women, whose degrees are senior high (vocational) school and university (college), and with personal incomes of NTD 20,001–NTD 30,000 are in the majority of this cluster, and most of them live in central downtown and southern downtown areas.

3.3. Automotive Interiors of Female Office Workers

3.3.1. Usage Needs of Automotive Interiors for Female Office Workers

This paper conducts analysis on the third part of the questionnaire, which contains 20 questions regarding the needs for automotive interiors in order to obtain the respondents' emphasis for automotive interiors. Firstly, frequency distribution of emphasis on the 20 questions of the questionnaire is conducted through statistical analysis. Detailed descriptions are as follows: Respondents think that the interior equipment of an event data recorder is very necessary, and the most important, 169 times in total, accounting for 69%, with an average of 4.66; followed by the top five pieces of equipment, which are: rear view camera, 132 times in total, accounting for 54%, with an average of 4.44; child safety equipment, 127 times in total, accounting for 52%, with an average of 4.45; satellite navigation, 127 times in total, accounting for 52%, with an average of 4.43; velometer, 122 times in total, accounting for 50%, with an average of 4.33; beverage storage equipment, 107 times in total, accounting for 43%, with an average of 4.37. Thus, it can be seen that for the respondents, it is most important to have safety equipment that can assist drivers. However, questions related to the spatial aesthetics of automotive interiors, meaning questions 17 to 20, also received average scores from 4.25 to 4.03, which indicates that the respondents care about the feelings of interior design, as it affects their driving mood and intention to purchase a car. Finally, pet placement in the third question received the lowest emphasis, with an average of only 2.73. The order of the least wanted functions are small hanger, small LCD screen, and shoebox, with averages of 2.88, 2.93, and 2.98, respectively.

This paper obtains the respondents' emphasis regarding their different needs for automotive interiors, and the common factors are extracted through PCA in this phase. The KMO of this part is 0.805 and significance testing by Bartlett's test is 0.000; therefore, factor analysis is applicable to the data [18] via KMO and Bartlett's test of needs for automotive interiors.

After the above tests were passed, PCA (principal component analysis) in factor analysis is used to extract the common factors. The values after rotation are selected as the total variance and sum of eigenvalues >1; 56.852% of the total variance is accounted for and the minimum eigenvalue is 1.563, which conforms to the screening condition of the sum of eigenvalues >1. Finally, the five components of the factors are extracted.

According to the factor loading significance principle, as put forward by Hair et al., when factor loading reaches 0.4, the scope of acceptance is reached [19]. All questions in this paper conform with the principle, as shown in Figure 2, which presents the sequence of factor loadings from high to low. ### means that the value is negative.

| Question number | | | | | | |
|---------------------------------------|-------|-------|-------|-------|-------|-----|
| Question number | 1 | 2 | 3 | 4 | 5 | |
| 5. Shoebox | 0.78 | 0.15 | -0.02 | 0.20 | -0.03 | |
| 4. Small hanger | 0.74 | 0.20 | -0.02 | 0.31 | -0.01 | |
| 9. Pet placement | 0.60 | -0.06 | 0.05 | -0.06 | 0.09 | |
| 1. Locker | 0.58 | 0.08 | 0.19 | 0.11 | 0.07 | |
| 7. Ash can | 0.52 | 0.09 | 0.13 | -0.14 | 0.43 | |
| 15. Small LCD screen | 0.52 | 0.02 | 0.38 | 0.07 | -0.38 | |
| 6. Cosmetic mirror | 0.44 | 0.34 | 0.02 | 0.03 | 0.11 | |
| 20. Influence of space design | 0.06 | 0.77 | 0.07 | 0.00 | 0.05 | |
| 18. Space vision beauty | 0.12 | 0.73 | 0.18 | 0.10 | 0.08 | |
| 17. Device operation | 0.04 | 0.72 | 0.18 | 0.13 | 0.08 | |
| 19. Influence of spatial equipment | 0.13 | 0.67 | 0.28 | 0.04 | 0.20 | |
| 16. Change of seat style | 0.36 | 0.44 | 0.07 | 0.32 | -0.12 | Leg |
| 14. Satellite navigation | 0.13 | 0.05 | 0.79 | 0.10 | 0.14 | 1 |
| 13. Rear view camera | 0.09 | 0.23 | 0.73 | 0.07 | -0.08 | C |
| 12. Velometer | 0.11 | 0.19 | 0.68 | 0.06 | 0.11 | C |
| 11. Event data recorder | -0.03 | 0.19 | 0.67 | 0.00 | 0.24 | 0 |
| 3. Neck pillow | 0.14 | 0.02 | 0.14 | 0.85 | 0.01 | (|
| 2. Back cushion | 0.12 | 0.21 | 0.06 | 0.83 | 0.10 | (|
| 10. Child safety equipment | 0.02 | 0.19 | 0.09 | -0.01 | 0.76 | |
| 8. Beverage storage equipment | 0.14 | 0.05 | 0.23 | 0.15 | 0.68 | |

Figure 2. Heatmap of differences between ages and usage needs for automotive interiors.

It can be learned from the above table that five factors can be obtained after the rotation of principal component analysis. In this part, the loadings of the 7th question in factor 1 and factor 5 are 0.522 and 0.425, respectively. Although its loading in factor 1 is high, its content is more suitable for the other questions of factor 5. Therefore, the 7th question is included in factor 5. In this study, the obtained factors are named: "Functional Storage", "Spatial Aesthetics", "Digital Device", "Comfortable Feeling", and "Safety and Cleanliness" (Table 5).

• **Functional Storage:** A total of 6 questions relating to automotive interiors are contained in this factor, and their contents are partial to functional interior equipment and storage equipment.

- **Spatial Aesthetics:** A total of 5 questions relating to automotive interiors are contained in this factor, and their contents are partial to relevant topics of interior space design and mental feelings of spatial aesthetics inside a car.
- **Digital Device:** A total of 4 questions relating to automotive interiors are contained in this factor, and their contents are mainly about the relevant digital devices for assisting drivers.
- **Comfortable Feeling:** A total of 2 questions relating to automotive interiors are contained in this factor, and their contents are about relieving fatigue and providing comfortable feelings for drivers.
- **Safety and Cleanliness:** A total of 2 questions relating to automotive interiors are contained in this factor, and their contents are about providing safety equipment for children and devices that maintain cleanliness in the car; if there are children, the situation that children can soil the interior space of a car shall be taken into consideration.

| Factor | Name | Contents | Factor Loadings |
|----------|---------------------------|--|-----------------|
| | | 5. You think placing a shoebox is helpful for storing and changing shoes. | 0.784 |
| | | 4. You think a small hanger can facilitate storage and a change of clothing. | 0.742 |
| Factor 1 | | 9. You think a pet placement area can make drivers feel at ease and also provide amusement when traveling with pets. | 0.595 |
| Factor 1 | Functional Storage | 1. You think placing a locker in the car is helpful for storing articles in the car. | 0.583 |
| | | 15. You think placing a small LCD screen can facilitate ease in driving, and playing videos can make drivers and passengers feel more at ease. | 0.521 |
| | | 6. You think a car must be equipped with a cosmetic mirror to allow drivers or passengers to fix their make-up during commutes. | 0.44 |
| | | 20. You think the design of interior spaces will affect the mental feelings of drivers when they are driving. | 0.767 |
| _ | Spatial Aesthetics | 18. You think the design of interior spaces must take visual aesthetics into consideration. | 0.73 |
| Factor 2 | | 17. You think devices in a car must consider the difficulty for women to operate and use. | 0.722 |
| | | 19. You think devices in a car can affect purchasing intention. | 0.673 |
| | | 16. You think changing seat style can beautify the space in a car. | 0.442 |
| | | 14. You think a GPS satellite navigation system can help drivers to find their destinations. | 0.789 |
| Factor 3 | Digital | 13. You think a rear-view camera can help drivers to solve the difficulty of parking. | 0.727 |
| Factor 3 | Device | 12. You think placing a velometer can remind drivers of safe driving speed. | 0.682 |
| | | 11. You think placing event data recorder can provide a guarantee of image recordings when driving. | 0.67 |
| | Comfortable | 3. You think interior auxiliary equipment, such as a neck pillow, can ease neck fatigue when driving. | 0.846 |
| Factor 4 | Feeling | 2. You think interior auxiliary equipment, such as a back cushion, can ease fatigue when driving. | 0.834 |
| | | 10. You think only a car with safety equipment for children can make drivers feel at ease when driving. | 0.757 |
| Factor 5 | Safety and Cleanliness | 8. You think beverage storage equipment in a car can maintain the cleanliness of a car. | 0.683 |
| | | 7. You think placing ash can in a car can maintain the cleanliness of a car. | 0.425 |

Table 5. Table of factor loadings of automotive interiors.

3.4. Variance Analysis of Usage Needs of Automotive Interiors for Female Office Workers

The purpose of this section is mainly to discuss whether there are differences in the usage needs of automotive interiors for female office workers, as based on results of Sections 3.2 and 3.3, and

to further understand the differences between the factor analysis results of needs for automotive interiors and demographic variables through analysis of variance (ANOVA), including occupation, educational level, marital status, personal monthly income, and current residence. Difference analysis of the aforesaid contents of the six questions is as follows:

3.4.1. Analysis of Differences between Usage Needs for Automotive Interiors and Ages

It can be seen from Table 6 that there are significant differences in "Comfortable Feelings" and "Safety and Cleanliness" from women of different ages. The 20–24-year-old respondents present the largest negative value in the factor "Safety and Cleanliness", which means they do not care about it at all. On the contrary, the 25–34-year-old and 35–44-year-old respondents present positive values in the factor "Safety and Cleanliness", which means they have need for it. Finally, 45–54-year-old and more than 55-years-old respondents present a positive value in the factor "Comfortable Feeling", which means the respondents of the two age groups care about comfortable equipment in the interior space of a car. The respondents 20–24 and 25–34 years old are most in need of "Digital Device", showing the passion of younger generations for digital devices. The respondents 35–44 years old and those above 55 years are most in need of "Comfortable Feeling", telling that the busy workers and the elderly hope that their car can be very comfortable. The respondents 45–54 years old have the most demand for "Functional Storage", indicating that they are most in need of storage devices.

| Type of Factor | 20–24 Years Old | 25–34 Years Old | 35–44 Years Old | 45–54 Years Old | Above 55 Years Old | F Value | p Value | <α |
|---------------------------|--------------------|--------------------|--------------------|--------------------|-----------------------|---------|---------|----|
| Functional Storage | 0.1969951 | -0.0559549 | 0.0235533 | 0.1151090 | -0.2850951 | 0.693 | 0.597 | |
| Spatial Aesthetics | -0.1633500 | -0.0660153 | 0.1434184 | 0.1332923 | -0.5294969 | 1.95 | 0.103 | |
| Digital Device | 0.2705095 | 0.1829882 | -0.1280502 | -0.1615942 | -0.2506892 | 1.93 | 0.105 | |
| Comfortable Feeling | -0.0903279 | -0.1676546 | 0.0550558 | 0.0482605 | 0.6576365 | 2.56 | 0.039 | * |
| Safety and Cleanliness | -0.5793088 | 0.1148817 | 0.1678719 | -0.2185576 | -0.3661421 | 3.29 | 0.012 | * |
| Sample Number | 15 | 93 | 79 | 43 | 16 | | | |

Table 6. Table of analysis of differences between usage needs for automotive interiors and ages.

Note: * attains significance level; p value < 0.05 refers to in conformity with significance.

3.4.2. Variance Analysis of Educational Levels and Usage Needs for Automotive Interiors

It can be seen from Table 7 that educational levels in this study only show significant differences in the factor "Comfortable Feeling", which indicates that there are not many differences in the factors of needs for automotive interiors. To be more specific, the respondents with education below junior high school and senior high school levels present positive values in "Comfortable Feeling", which means that they attach importance to this factor. However, the respondents of university, master's, and doctoral degrees present negative values in it, which means that they do not attach any importance to "Comfortable Feeling". Those below a junior high school level of education attach the most importance to "Digital Device". Master's degree respondents value the "Safety and Cleanliness" most, and the doctoral degree respondents attach the most importance to "Spatial Aesthetics".

| Type of Factor | Below Junior High School | Senior High School and Vocational School | College and University | Master's Degree | Doctoral Degree | F Value | p Value | <α |
|-------------------------|-----------------------------|---|---------------------------|--------------------|--------------------|---------|---------|----|
| Functional Storage | -0.8601484 | -0.0037088 | 0.0572675 | -0.1520454 | -0.2235580 | 1.00 | 0.405 | |
| Spatial Aesthetics | -10.056571 | 0.0904701 | -0.0204036 | 0.0464169 | 0.2459286 | 1.95 | 0.103 | |
| Digital Device | -0.4717988 | -0.3381039 | 0.1115281 | -0.1387513 | -0.3072744 | 1.97 | 0.099 | |
| Comfortable Feeling | 0.9663592 | 0.6315094 | -0.1131704 | -0.0403987 | -0.1199469 | 4.53 | 0.002 | * |
| Safety and Cleanness | -0.4716778 | -0.2486412 | 0.0106850 | 0.2042791 | 0.0510200 | 0.975 | 0.422 | |
| Sample Number | 3 | 30 | 171 | 32 | 10 | | | |

Table 7. Table of variance analysis of educational levels and usage needs for automotive interiors.

Note: * attains significance level; p value < 0.05 refers to in conformity with significance.

3.4.3. Variance Analysis of Marital Status and Usage Needs for Automotive Interiors

It can be seen from Table 8 that marital status in this study shows significant differences in the factors "Functional Storage" and "Digital Device", while there are no significant differences in other factors. Among them, the unmarried respondents present positive values in the factors "Functional Storage" and "Digital Device", which means that they attach great importance to the two factors. On the contrary, married respondents without children present negative values in both factors, which means that they do not attach any importance to them. However, married respondents with children present positive values in the factor "Functional Storage", which means that they attach significant importance to it, while they have negative values in the factor "Digital Device", which means that they do not attach any importance to it.

Table 8. Table of variance analysis of marital status and usage needs for automotive interiors.

| Type of Factor | Unmarried | Married without Children | Married with Children | F Value | p Value | <α |
|----------------------|------------|-----------------------------|--------------------------|---------|---------|----|
| Functional Storage | 0.3025906 | -0.5681369 | 0.1030141 | 9.28 | 0.000 | * |
| Spatial Aesthetics | -0.0136105 | -0.1741066 | 0.0409356 | 0.481 | 0.619 | |
| Digital Device | 0.2305702 | -0.2839131 | -0.1055864 | 4.20 | 0.016 | * |
| Comfortable Feeling | -0.0982135 | -0.2263647 | 0.1081209 | 1.83 | 0.162 | |
| Safety and Cleanness | -0.0444369 | 0.0768988 | 0.0163163 | 0.176 | 0.839 | |
| Sample Number | 90 | 24 | 132 | | | |

Note: * attains significance level; *p* value < 0.05 refers to in conformity with significance.

3.4.4. Variance Analysis of Personal Monthly Income and Usage Needs for Automotive Interiors

It can be seen from Table 9 that personal monthly income in this study only shows significant differences in the factor "Spatial Aesthetics", which indicates that personal monthly income does not have many differences in the factors of needs for automotive interiors. Among them, personal incomes of less than NTD 20,000, NTD 20,001–NTD 30,000, and more than NTD 60,001 show positive values in factor "Spatial Aesthetics", which means they attach importance to it. On the contrary, personal incomes of NTD 30,001–NTD 40,000, NTD 40,001–NTD 50,000, and NTD 40,001–NTD 50,000 present negative values in factor "Spatial Aesthetics", which means they attach by economic factors and that not just the respondents of higher income care about automotive interior equipment. For the respondents of lower income, while they may think it is necessary mentally, they cannot obtain it due to economic factors. Those with a personal income of NTD 30,001–NTD 40,000 are most in need of "Comfortable Feeling", and those of income of NTD 50,000 have the most demand for "Functional Storage".

| Type of Factor | Less than NTD 20,000 | NTD 20,001–NTD 30,000 | NTD 30,001–NTD 40,000 | NTD 40,001–NTD 50,000 | NTD 50,001–NTD 60,000 | More than NTD 60,000 | F Value | p Value | <α |
|-------------------------|-------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------|------------|------------|----|
| Functional Storage | -0.038408 | 0.1766420 | -0.089475 | 0.0020021 | 0.0806439 | -0.186373 | 0.714 | 0.614 | |
| Spatial Aesthetics | 0.2131187 | 0.2718996 | -0.211147 | -0.111029 | -0.316042 | 0.218085 | 2.47 | 0.033 | * |
| Digital Device | -0.069299 | 0.0991098 | 0.2363502 | -0.160394 | -0.096122 | -0.334342 | 1.90 | 0.094 | |
| Comfortable Feeling | 0.4581502 | 0.0195531 | -0.011246 | 0.0370421 | -0.041908 | -0.287065 | 1.15 | 0.332 | |
| Safety and Cleanness | 0.0768301 | -0.016473 | 0.1518594 | -0.050318 | -0.185938 | -0.139128 | 0.594 | 0.705 | |
| Sample Number | 15 | 60 | 67 | 56 | 18 | 30 | | | |

Table 9. Table of variance analysis of personal monthly income and needs for automotive interiors.

Note: * attains significance level; *p* value < 0.05 refers to in conformity with significance; NTD = New Taiwan Dolloar

3.4.5. Variance Analysis of Current Residence Income and Usage Needs for Automotive Interiors

It can be seen from Table 10 that current residence in this study only shows significant differences in factor "Functional Storage" of needs for automotive interiors, which indicates that current residence does not have many differences in the factors of needs for automotive interiors. Among them, only the respondents living in central downtown and southern downtown areas present positive values in the factor "Functional Storage", which means that they attach importance to it. On the contrary, all other respondents present negative values in the factor "Functional Storage", which means that they attach importance to it. On the contrary, all other attach any importance to it. Those living in the northern downtown areas have the most demand for "Spatial Aesthetics". Those living in the northern suburbs, central suburbs, and southern suburbs have the most demand for "Digital Devices". Those living in central downtown areas and southern suburbs are most in need of "Functional Storage".

Table 10. Table of variance analysis of current residence and usage needs for automotive interiors.

| Type of factor | Northern Downtown | Northern Suburbs | Central Downtown | Central Suburbs | Southern Downtown | Southern Suburbs | F Value | <i>p</i> Value | <α |
|-------------------------|----------------------|---------------------|---------------------|--------------------|----------------------|---------------------|------------|-------------------|----|
| Functional Storage | -0.264609 | -0.198396 | 0.551743 | -0.101161 | 0.115890 | -0.107595 | 4.19 | 0.001 | * |
| Spatial Aesthetics | 0.1921018 | -0.349992 | 0.1916097 | -0.025866 | -0.10576 | 0.0736443 | 1.25 | 0.285 | |
| Digital Device | 0.1386635 | 0.1980112 | 0.0677869 | 0.4551851 | -0.21763 | 0.0885503 | 2.12 | 0.063 | |
| Comfortable Feeling | -0.171927 | -0.210272 | 0.0649331 | -0.119969 | 0.105654 | -0.106928 | 0.701 | 0.623 | |
| Safety and Cleanness | 0.0166124 | -0.260820 | 0.0963762 | -0.074864 | 0.107749 | 0.1462708 | 0.615 | 0.688 | |
| Sample Number | 27 | 17 | 50 | 19 | 101 | 32 | | | |

Note: * attains significance level; *p* value < 0.05 refers to in conformity with significance.

3.4.6. Variance Analysis of Occupations Income and Usage Needs for Automotive Interiors

Variance analysis is conducted based on the analysis results of clustering and the factors of automotive interiors. It can be seen from Table 11 that different occupational clusters do show significant differences in needs for automotive interiors. Among them, in cluster 1 of occupations, meaning medical and electronics industries, the respondents present positive values in the average of "Safety and Cleanliness", "Digital Device", and "Safety and Cleanliness" factors. On the contrary, they present negative peaks in "Comfortable Feeling", which means that they do not attach any importance to it. In public education, financial, manufacturing, and traditional industries of cluster 2,

the respondents present positive peaks in the average of "Comfortable Feeling". On the contrary, they present negative peaks in "Digital Device", which means that they do not attach any importance to it. Finally, in the service and design industries of cluster 3, the respondents present positive values in the averages of "Functional Storage", "Spatial Aesthetics", "Digital Device", "Safety and Cleanliness", and "Spatial Aesthetics", which have positive peaks. On the contrary, they present negative peaks in "Comfortable Feeling", which means that they do not attach any importance to it.

| Type of Factor | Cluster 1 (Medical and Electronics Industries) | Cluster 2 (Public Education, Financial, Manufacturing, and Traditional Industries) | Cluster 3 (Service and Design Industries) | F Value | p Value | <α |
|------------------------|---|---|---|------------|------------|----|
| Functional Storage | -0.4278679 | -0.7133318 | 0.4773128 | 2.380 | 0.023 | * |
| Spatial Aesthetics | -0.1743082 | -0.2726202 | 0.5468624 | 2.911 | 0.006 | * |
| Digital Device | 0.0821610 | -0.9646342 | 0.5289532 | 2.509 | 0.017 | * |
| Comfortable feeling | -0.7434202 | 0.3807332 | -0.0719344 | 2.616 | 0.013 | * |
| Safety and Cleanliness | 0.5246725 | -0.5979415 | 0.1653035 | 2.979 | 0.005 | * |
| Sample Number | 30 | 116 | 81 | | | |

Table 11. Table of variance analysis of occupational clusters and needs for automotive interiors.

Note: * attains significance level; *p* value < 0.05 refers to in conformity with significance.

4. Conclusions and Suggestions

4.1. Conclusions

1. Through the collection of relevant literature, individual interviews were carried out to assess the industry's perception of demand for automotive interiors.

• According to the literature, it can be learned that the psychological influence factors of female consumption mentioned by scholars are related to economic, spiritual, and social influences. Through literature review and interviews with top three car sellers in Taiwan, that is, Toyota, Nissan, and Mitsubishi, we can see that automotive interiors are indeed under the influence of economy, spirit, and social hierarchy mentioned by various women's consumption theories. This paper believes that female consumers will purchase automotive products out of their basic physiological needs, and those basic interiors will be their first choice. Then, they would consider the automotive interiors for safety and practicality. If the economic condition permits, there can be more choices for the purchase of automotive interiors. For example, it may be required that the interiors of a car not only have a function, but also serve as a beautiful decoration, so that the interiors, both practical and decorative, can highlight personal style and become social symbols as well as a feeling of self-esteem.

2. Ten lifestyle factors and three clusters of female office workers are summarized after factor analysis and clustering.

- Ten lifestyle factors: (1) Information-Sensitive, (2) Brand Worship, (3) Fashionable Popular, (4) Early Adopters, (5) Careful Concerns, (6) Optimistic Outward, (7) Conservative Nostalgia, (8) Perceptual Subjective, (9) Self-Centered, and (10) Professional Dependent.
- Clusters of female office workers: (1) The discerning and intellectual pleasure seekers, including the occupations of medical and electronics industries; (2) The regular and easy-going-life seekers, including the occupations of public education, financial, manufacturing, and traditional industries; (3) The modern information seekers, including the occupations of service and design industries.

3. Five factors of automotive interiors are obtained after factor analysis of needs for automotive interiors in the third part of this questionnaire. In addition, further variance analysis of the results of the factors and demographic variables are conducted to determine the differences in needs for automotive interiors of female office workers, and six variance analysis results are obtained.

- Factors of needs for automotive interiors: (1) Functional Storage, (2) Spatial Aesthetics, (3) Digital Device, (4) Comfortable Feeling, (5) Safety and Cleanliness.
- Variance analysis of female office workers' needs for automotive interiors.
 - Occupational clusters and the five factors of automotive interiors "Functional Storage", "Spatial Aesthetics", "Digital Device", "Comfortable Feeling", and "Safety and Cleanliness" show significant differences.
 - (2) Age and the two factors of automotive interiors "Comfortable Feeling" and "Safety and Cleanliness" show significant differences.
 - (3) Educational level and the factor "Comfortable Feeling" of automotive interiors show significant differences.
 - (4) Marital status and the two factors of automotive interiors "Functional Storage" and "Digital Device" show significant differences.
 - (5) Personal monthly income and the factor "Spatial Aesthetics" of automotive interiors show significant differences.
 - (6) Current residence and the factor "Functional Storage" of automotive interiors show significant differences.

4. The purpose of this paper was to determine the needs and differences of female office workers for automotive interiors. The results of lifestyle characteristics, clusters, and needs for automotive interiors were obtained through interviews and questionnaires, which are summarized as follows:

• The discerning and intellectual pleasure seekers:

This cluster includes female office workers of medical and electronics industries, who are discerning in fashion, have high demands of living quality and self-image, and like to go shopping in shops with higher prices, such as boutiques and department stores. As female office workers of the two industries own good economic abilities, they think the real enjoyment is experiencing elegant lives. For them, "Safety and Cleanliness" and "Digital Device" are the most needed, while "Comfortable Feeling" draws the least attention from them. Regarding "Safety and Cleanliness", they think both beverage storage equipment and a small ash can maintain the cleanliness of the interior space of a car. Regarding "Digital Device", with a relatively strong budget, women of this cluster can install digital devices, such as a navigation system and rear-view camera to assist them in driving, as it makes them feel more at ease.

• The regular and easy-going-life seekers:

This cluster includes female office workers of public education, financial, manufacturing, and traditional industries, who are career women with careful concerns. They are very independent and would like to share their ideas. In work, they are very principled and good at using time to finish their jobs. In addition, they think products with practicality and familiarity are durable, and think it is the most reliable choice to have products maintained and repaired by professionals. For them, "Comfortable Feeling" of automotive interiors is most needed, while "Digital Device" draws the least attention from them. Regarding the "Comfortable Feeling" of automotive interiors, they think interior auxiliary equipment, such as neck pillows and back cushions, are better. After all, women of this cluster are very scrupulous and present substantial brains and physical strength in their jobs. Therefore, a comfortable design for automotive interiors, which can relieve their fatigue after a day's work and provide comfort in driving, can make them more comfortable when driving.

• The modern information seekers:

This cluster includes female office workers of service and design industries, who are willing to accept the challenges of fresh and current fashions. To obtain the latest information, they are very

dependent on information products, such as mobile phones. In addition, they are very passionate in serving people and think brands can display their own tastes and styles. Therefore, they pay constant attention to the reports of media and magazines, and they think they can only enjoy their lives by embracing freshness and change in their lives. For them, "Functional Storage", "Spatial Aesthetics", "Digital Device", and "Safety and Cleanliness" of automotive interiors are mostly needed, while "Comfortable Feeling" draws the least attention from them. Regarding "Spatial Aesthetics", they can accept automotive interiors with different style designs. Apart from the practical functions of automotive interiors, they also need decorative functions, as such items can make them feel happier when driving a car.

4.2. Future Work Suggestions

This paper is only based on the demand of automotive interiors, and no other automotive-related peripheral products are included in the research, so there are still many aspects that can be further improved and explored. As for the insufficiency of this paper, the following suggestions are proposed in this section as a reference for follow-up for researchers interested in this topic for reference.

- This paper aims to understand the demand of female consumers for automotive interiors. Due to practical considerations, only women with a fixed income and economic foundation have enough deposits to purchase cars and consider the interiors of their vehicles. Therefore, the paper mainly targets to the group of female office workers for its exploration. However, female office workers already belong to a specific group, so the number of subgroups in the study is not large enough. It is recommended that future researchers may define the objects in a more explicit way if they want to conduct a variance survey targeting to the female group for other industrial categories. For example, they can narrow down the objects to the white-collar group so that the research results can be more effective.
- Limited by factors such as time, manpower, and cost, although this study conducted questionnaire surveys for female office workers in northern, central, and southern Taiwan, there was still a gap between the questionnaire survey and the actual implementation. More copies of questionnaires should be collected, and the female consumers in the eastern Taiwan may be taken into account, or an in-depth survey can be conducted in a single area. Nonetheless, the research methods mentioned in the content may also be applied to other groups or studies on the differences in product requirements.
- In this paper, it can be seen that women do have an influence on the consumer market. This paper believes that the needs and feelings of female consumers should be taken seriously by the automotive industry and other industry categories. In this study, we can learn that different female office workers do have different needs for automotive interiors, and it will make the research more valuable if academic research results can be applied to the product practices in the future. For example, in response to the rise of smartphones and flat-panel displays, the requirements of automotive interiors can be included into the options of exclusive app software to allow consumers to customize their car interiors when purchasing a car. In this way, the user's needs can be clearly understood and the designs can truly help the users by increasing life convenience and safety. Only in this way can the purpose of designing for a better life be fulfilled.

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