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# Effects of Certain Factors on Individual Fashion Style

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**Abstract**

*The study investigates the influence of various personal factors on individual fashion style. A quantitative research approach was employed using a questionnaire survey conducted with 813 participants aged 18 to 60 in Bac Giang province, Vietnam. The data were analyzed using descriptive statistics and exploratory data mining techniques with the Random Forest algorithm. The examined factors include gender, age, weight, height, skin tone, hair color, marital status, lifestyle preferences, occupation, and income, among others. The results indicate that variables such as age, weight, height, income, and amount spent on fashion significantly influence personal fashion style. By integrating a large-scale consumer dataset with machine learning–based analysis in a specific local context, this study provides novel empirical evidence on the relative importance of personal factors shaping fashion style, which has not been previously reported in Vietnamese fashion research. The study contributes to building a scientific foundation for the development of fashion product strategies that better meet the needs of Vietnamese consumers.*

**Keywords:** Influencing factors, personal fashion style, predictive modeling, random forest model.

## 1. Introduction

Personal fashion style refers to a set of consistent characteristics that are directly perceivable by the eye, encompassing the visual diversity of fashion items worn by an individual [1]. Numerous factors influence personal fashion style, including individual attributes such as personality, preferences, gender characteristics, physical traits, psychological conditions, occupation, and lifestyle,…[2]. Identifying the influence of these factors on personal fashion style can offer significant benefits across multiple fields, particularly in fashion design, consumer research, and marketing strategy. However, existing studies have largely focused on describing these influencing factors independently, without quantitatively assessing their relative importance or combined effects in shaping personal fashion style.

Several studies have examined clothing consumption behaviors and fashion-related expenditures. Research has explored the characteristics of women's office fashion product consumption [3], as well as the amount spent on fashion by women in Hanoi and methods for predicting such expenditure [4]. Domestic fashion product consumption among customers of garment companies has also been investigated using clustering and expenditure analysis approaches [5, 6]. While these studies provide valuable insights into fashion consumption patterns and spending behavior, their primary focus lies in economic aspects of fashion consumption rather than in systematically explaining how personal attributes collectively shape personal fashion style as a multidimensional construct.

From a sociocultural perspective, Kim Johnson *et al.* examined the relationship between clothing, the body, and the self, demonstrating that clothing influences both social perception and self-perception [7]. Similarly, Kirsten van Lieshout *et al.* emphasized fashion as a means of expressing personal identity [8]. Age has also been identified as an important determinant of fashion preferences and consumption needs, suggesting that designers must account for life-stage differences when developing products [9]. Kim, H. *et al.* further revealed generational differences, showing that teenagers tend to follow celebrity fashion trends, whereas middle-aged and older adults prefer styles aligned with their personal lifestyle [10]. These studies contribute important theoretical and qualitative insights into the symbolic and psychological dimensions of fashion, yet they do not quantitatively rank or measure the relative influence of multiple personal attributes on fashion style formation.

Other research has highlighted the role of media and communication channels in shaping fashion preferences, particularly among younger consumers [11, 12]. Although these findings underline the importance of external influences, they do not directly address how intrinsic personal attributes such as age, body characteristics, education, or expenditure

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capacity interact to define personal fashion style in real-world consumer populations.

In recent decades, artificial intelligence and soft computing techniques have been increasingly applied in the textile and fashion sectors [13], particularly for sales forecasting [14], demand prediction, and trend analysis [15-17]. These studies demonstrate the effectiveness of machine learning models in improving operational efficiency and market responsiveness. Nevertheless, the application of advanced machine learning techniques to quantitatively analyze and rank personal attributes influencing individual fashion style - especially using large-scale consumer survey data - has not yet been conducted, particularly in the context of developing countries such as Vietnam**.**

The aforementioned studies have addressed several aspects related to personal fashion style and consumer demand; however, most of them tend to examine individual factors in isolation, rely on qualitative assessments, or lack large-scale empirical validation in specific local contexts. Consequently, the relative importance of personal attributes in shaping individual fashion style remains insufficiently clarified, particularly in emerging fashion markets such as Vietnam. To address this gap, this study systematically examines the influence of multiple personal attributes on personal fashion style using a large-scale quantitative survey of 813 participants in Bac Giang province, Vietnam, combined with data-driven analysis. To the best of our knowledge, this study is among the first to quantitatively identify and compare the relative importance of personal factors in defining fashion style within a Vietnamese consumer context. The findings contribute to building a scientific foundation for understanding and designing fashion products that better meet consumer needs, enhance customer experience, optimize marketing strategies, and support sustainable development in the textile and fashion industry.

## 2. Methods

This study was conducted with survey data collected from September to November 2024 among adults aged 18 to 60 in Bac Giang province. The respondents were in normal health and voluntarily participated in the study. A qualitative method was applied to preliminarily identify individual-related factors influencing personal fashion style through in-depth interviews with 10 experts in the garment and fashion industry who are knowledgeable about the Hanoi market.

The results of the qualitative study indicate that factors related to the survey participants are believed to influence personal fashion style, and provide recommendations for collecting information including: gender, age, weight, height, skin color, hair color, occupation, education level, family status, place of residence, lifestyle, self-assessed attractiveness, annual income, and personal fashion spending. Categorical variables (*gender, skin, hair, level, occ, mar, local, char, life, style, and act*) are encoded and measured using corresponding scales appropriate to their possible levels. Continuous variables (*age, weight, height, inc, out*) are determined directly through the survey.

Based on the results of structured interviews and previous overview studies [2, 3], the questionnaire was developed to comprehensively survey the attributes and personal fashion style of the participants. The factors were encoded into variables with measurement scales as presented in Table 1.

These scales were tested and calibrated after surveying over 30 questionnaires with a group of subjects suitable for the study. The survey sample size is determined by [3]:

$$n = \frac{N}{1+N(e)^2} \quad (1)$$

where, $n$ is the number of people to survey, $N$ is the estimated number of women aged 18 to 60 in Bac Giang 2024 [18]; $e$ is the standard deviation, select $e = 0.05$.

$$n = \frac{N}{1+Ne^2} = \frac{1015697}{1+1015697*(0,05)^2} = 400 \quad (2)$$

Choose to survey 820 individuals aged 18 to 60 in Bac Giang with the same number as Table 2.

After the survey, all questionnaires were collected, checked and entered on excel software. Eliminating the questionnaires with missing data, 813 valid questionnaires were obtained.

The basic statistical characteristics of the continuous variables in the survey data, such as mean, median, and standard deviation, were determined. The pairwise linear relationships among the continuous variables in the survey dataset (including *age, w, h, inc*, and *outc*) were examined using the *pair.panel* function in R software. The relationships between the continuous influencing factors and personal fashion style (*style* variable) were also investigated. Furthermore, the distribution of categorical variables in the collected data was described in detail.

Table 1. Scale and encode classification variables

| Factors/ variables | Options | Scale | Factors/ variables | Options | Scale |
|---|---|---|---|---|---|
| **1. *Age* (*age*)** | The age of the person surveyed | | **2. Height (*h*)** | Body height | cm |
| **3. *Weight* (*w*)** | The weight of the person surveyed | **kg** | ***4. Income* (*inc*)** | One-year income of the surveyed person. | (million VND) |
| ***5. Fashion Expenditure* (*outc*)** | The level of spending on personal fashion a year of the person surveyed | (million VND) | ***6. Attractiveness* (*act*)** | The attractiveness of the individual is surveyed, self-rated on a scale (0 corresponds to Completely Unattractive; 10 corresponds to Completely Attractive). | 0-10 |
| ***7. Education level* (*level*)** | High school | 1 | ***8. Personality* (*char*)** | **Idealist:** Possesses noble and clearly defined goals, and pursues them with persistence; demonstrates honesty, fairness, responsibility, and compassion. | 1 |
| | College/ University | 2 | | **Realist:** Objective and pragmatic, taking concrete actions to address and resolve problems. | 2 |
| | Graduate | 3 | | **Rationalist:** Values reason, science, and logical thinking, engaging in analytical reasoning rather than relying on emotions. | 3 |
| | Other | 4 | | **Sentimentalist:** Acts based on emotions or empathy, forming strong attachments and connections, and placing high value on personal feelings. | 4 |
| 9. ***Gender* (*gender*)** | Male | 1 | ***10. Marital Status* (*mar*)** | Single | 1 |
| | Female | 2 | | Living with spouse | 2 |
| | Other | 3 | | Living with spouse and children | 3 |
| ***11. Hair color* (*hair*)** | Black | 1 | ***12. Skin color* (*skin*)** | Light skin tone | 1 |
| | Brown | 2 | | Slightly light skin tone | 2 |
| | Another | 3 | | Medium skin tone | 3 |
| ***13. Occupation* (*occ*)** | Student | 1 | | Slightly dark skin tone | 4 |
| | Office Worker | 2 | | Dark skin tone | 5 |
| | Businessperson | 3 | **14. *Place of Residence* (*local*)** | Urban | 1 |
| | Teacher/Lecturer | 4 | | Rural | 2 |
| | Worker/Laborer | 5 | | | |
| | Artist | 6 | | | |
| | Other | 7 | | | |
| ***15. Stylelife* (*life*) [2]** | Survivors: the lowest income, the least potential, the oldest of all segments, the customer loyal to the brand. | 1 | Markers: low potency, practicality, value independence, focus on family, work, entertainment and little interest in the outside world. Appreciate practical and useful products. | | 2 |
| | Believers: low potency, modest income, conservative consumption, advocacy of reputable products and brands, a life focused on family, religion, community, and country. | 3 | Strives: successful group-like values, low potential, limited economic, social and psychological potential, style is important for competing with those they admire. | | 4 |
| | Achievers: High potential, success at work, job and family satisfaction, political conservatism, respect for authority and rank, and support for reputable products and services that help show success to colleagues. | 5 | Thinkers: High potential, driven by ideas, maturity, responsibility, well-trained, home entertainment, up-to-date, open to changes, high income, practical and reasonable consumption. | | 6 |
| | Experiencers: High potency, young, high energy, physical and social activities, eager for consumption (clothing, fast food, music...), especially new products and services. | 7 | Innovators: Value yourself, abundant potential, feel comfortable to express your potential, need to build an image - the expression of independence and personality, the highest income, towards the better in life. | | 8 |
| **16. *Personal fashion style* (*style*)** | Classic Style | 1 | Unconventional Style | | 9 |
| | Modern Style | 2 | Vintage (Retro) Style | | 10 |
| | Sporty Style | 3 | Minimalist Style | | 11 |
| | Bohemian Style | 4 | Rocker Style | | 12 |
| | Business/Office Style | 5 | Aristocratic Style | | 13 |
| | Street Style | 6 | Sexy Style | | 14 |
| | Feminine Style | 7 | Casual Style | | 15 |
| | Masculine Style | 8 | | | |

Table 2. Units, locations, and number of surveyors

| | Unit | Location | Amount |
|---|---|---|---|
| 1 | The Inter-agency Headquarters of Bac Giang Province | 3/2 Square, Than Nhan Vu Street, Ngo Quyen Ward, Bac Giang City. | 50 |
| 2 | TMIV Garment Company | No. 572, Xuong Giang Street, Xuong Giang Ward, Bac Giang City. | 100 |
| 3 | Quang Châu Industrial Park | Quang Chau Commune, Viet Yen Town, Bac Giang Province. | 110 |
| 4 | Thuong Market | Ly Thai To Street, Tran Phu Ward, Bac Giang City | 150 |
| 5 | Industrial Engineering College | No. 202, Tran Nguyen Han Street, Tran Nguyen Han Ward, Bac Giang City. | 300 |
| 6 | Ngo Gia Tu College | Que Nham Commune, Tan Yen District, Bac Giang Province | 50 |
| 7 | Bac Giang Intermediate School of Culture, Sports and Tourism | Quan Thanh, Xuong Giang Ward, Bac Giang City | 14 |
| 8 | Green Market | Xuan Huong Commune, Lang Giang District, Bac Giang Province | 46 |
| | **Sum** | | **820** |

The Random Forest algorithm has been effectively applied for feature selection on the dataset [19]. In this study, the Random Forest algorithm is employed to determine the importance level of personal factors influencing individual fashion style. A variety of factors potentially related to personal fashion style were surveyed; however, only a subset of these factors may actually be relevant or have a significant impact on personal fashion style. To identify the most important factors (variables) affecting personal fashion style, the following steps were carried out in sequence:

- Eliminate redundant factors from the surveyed variables for each individual as described above.

- Rank the factors in order of their importance to the classification of fashion style groups.

- Select the key factors influencing personal fashion style.

The elimination of redundant variables in the surveyed dataset was based on the pairwise linear correlation coefficients of continuous variable pairs. The pairwise linear correlation coefficients between factors in the dataset were determined using the *pair.panel* (or *cor*) function in the R software. If $r$ is greater or equal 0.95, the two variables were considered to be highly correlated, and one of them could be removed [19]. The correlation coefficient is a statistical measure that quantifies the strength of the relationship between two variables and is defined as follows [20]:

$$r = \frac{\sum_{i=1}^{n}(x_i-\bar{x})(y_i-\bar{y})}{\sqrt{\sum_{i=1}^{n}(x_i-\bar{x})^2 \quad \sum_{i=1}^{n}(y_i-\bar{y})^2}} \qquad (3)$$

where, $x_i$ and $y_i$ are the continuous variables of the surveyed subjects, and $n$ is the sample size.

The ranking of variables according to their importance in classifying data into personal fashion styles was carried out using the Random Forest machine learning algorithm, chosen for its objectivity and its proven success in various fields. From the original dataset, a sample $L$ consisting of $n$ subjects was extracted to compute the parameters of the Random Forest model. In subsequent steps, this process was repeated $b$ times to generate samples $L_b$, each containing $n$ subjects, by resampling with replacement from the original sample, followed by parameter estimation.

Bagging was used as a method to aggregate the results obtained from Bootstrapping, after which the model was trained on the random samples. The core principle of Random Forest (RF) is the decision tree, a branching structure that grows from root to leaf. The grouping value of a sample is tested on the decision tree. Each sample proceeds from the root, representing the input data, to a leaf node, representing the predicted classification result for that sample. The importance of variables was estimated using the *Importance* function. For a categorical output variable (personal fashion style), the estimation of important variables was evaluated according to two metrics: Mean Decrease Accuracy (MDA) and Mean Decrease Gini (MDG) for each variable [21]. The most influential factors in data classification were selected based on this ranking. The Gini index is defined as the sum of squared probabilities that an object belongs to each category (of the output categorical variable) in the

model. The Random Forest model was implemented using the *randomForest* function in R software.

## 3. Results and Discussion

The survey results on factors and personal fashion styles of 813 individuals in Bac Giang were compiled and analyzed. The statistical characteristics of the continuous variables are presented in Table 3.

The relationships between the continuous variables were examined for two groups, male and female as shown in Fig. 1. The weight, height and income of the male group were higher than those of the female group, while the other factors showed no significant differences between the two groups.

Table 3. Statistical characteristics of the continuous variables

| | *age (years)* | *w (kg)* | *h (cm)* | *inc (million VND)* | *outc (million VND)* |
|---|---|---|---|---|---|
| Min | 18.0 | 37 | 145 | 0 | 2 |
| Max | 60.0 | 90 | 180 | 600 | 30 |
| Average | 30.5 | 56.3 | 161.9 | 95.2 | 8.5 |
| Median | 27.0 | 54 | 160 | 80 | 8 |
| Standard Deviation | 11.2 | 11 | 7.2 | 82.96 | 7.1 |


Fig. 1. Correlation diagram of continuous variables by gender (male, female)

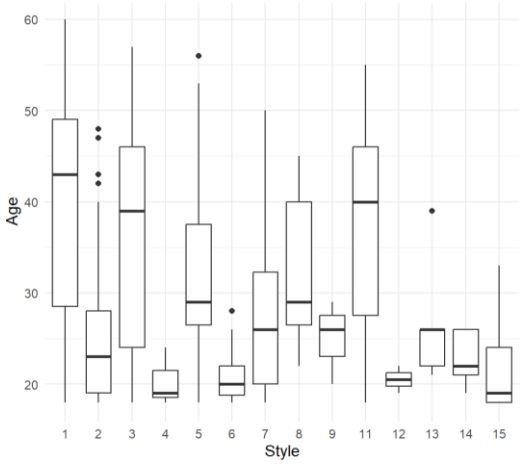


Fig. 2. Correlation diagram between personal fashion style and age

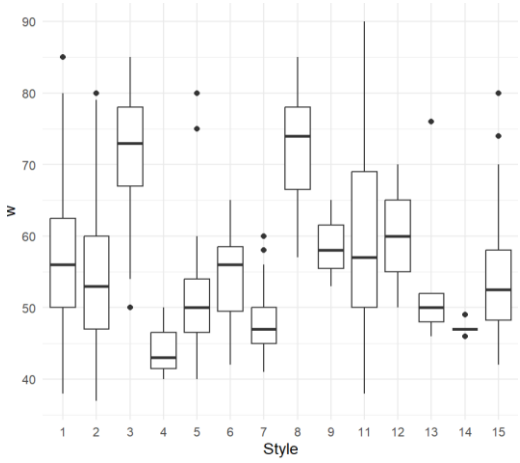


Fig. 3. Correlation diagram between personal fashion style and body weight

The surveyed group aged between 40 and 60 years primarily exhibited personal fashion styles such as classic style (*1*), sporty style (*3*), and minimalist style (*11*). The surveyed group aged 30 to under 40 years demonstrated styles such as sporty style (*3*), office style (*5*), and masculine style (*8*), whereas younger individuals exhibited a more diverse range of fashion styles.

The surveyed group weighing 60 kg or more (mostly male) predominantly exhibited sporty style (*3*), masculine style (*8*), and rocker style (*12*). In contrast, the group weighing between 40–50 kg tended to adopt personal fashion styles such as bohemian style (*4*), office style (*5*), feminine style (*7*), and sexy style (*14*).

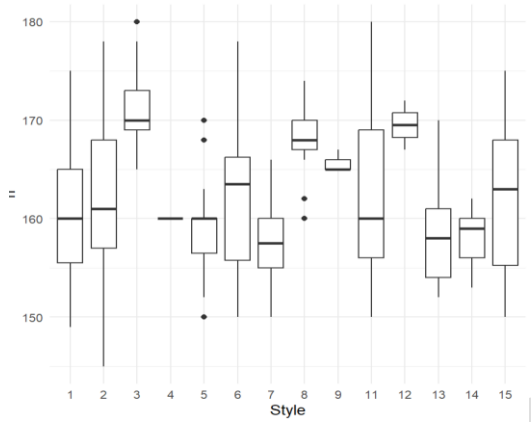


Fig. 4. Correlation diagram between personal fashion style and body height

The surveyed group with a height above 160 cm predominantly exhibited personal fashion styles such as modern style (*2*), sporty style (*3*), street style (*6*), masculine style (*8*), avant-garde style (*9*), rocker style (*12*), and casual style (*15*). Meanwhile, the group with a height of 160 cm or below displayed a variety of styles, including classic style (*1*), bohemian style (*4*), office style (*5*), feminine style (*7*), aristocratic style (*13*), and sexy style (*14*).

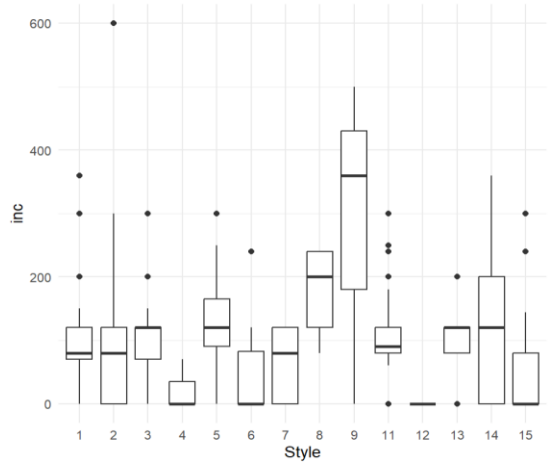


Fig. 5. Correlation diagram between personal fashion style and income

The surveyed group with a high annual income ranging from 200 million to 600 million VND predominantly exhibited personal fashion styles such as masculine style (*8*) and avant-garde style (*9*). In contrast, the group with a low annual income of less than 60 million VND displayed styles such as modern style (*2*), bohemian style (*4*), street style (*6*), feminine style (*7*), and casual style (*15*).

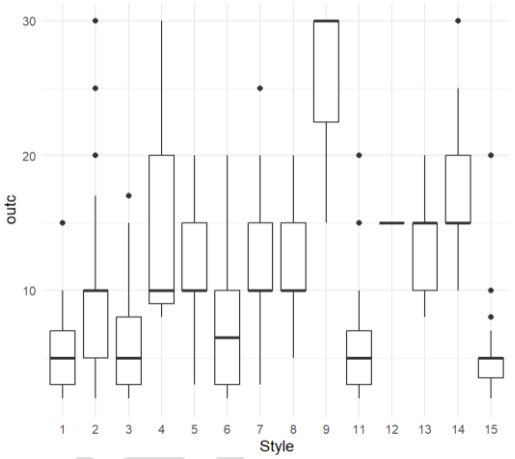


Fig. 6. Correlation diagram between personal fashion style and fashion expenditure

The surveyed group with a high annual expenditure of over 20 million VND on fashion products predominantly exhibited personal fashion styles belonging to the avant-garde group (9). In contrast, the group with a low annual expenditure of less than 10 million VND on fashion products displayed styles such as classic (*1*), sporty (*3*), street (*6*), minimalist (*11*), and casual styles (*15*).

There is no significant linear relationship between age, weight, height, income, and fashion expenditure among the surveyed individuals (Fig. 7). Personal fashion style differs according to age group, body weight, height, income, and fashion expenditure (Fig. 2, Fig. 3, Fig. 4, Fig. 5, and Fig. 6).

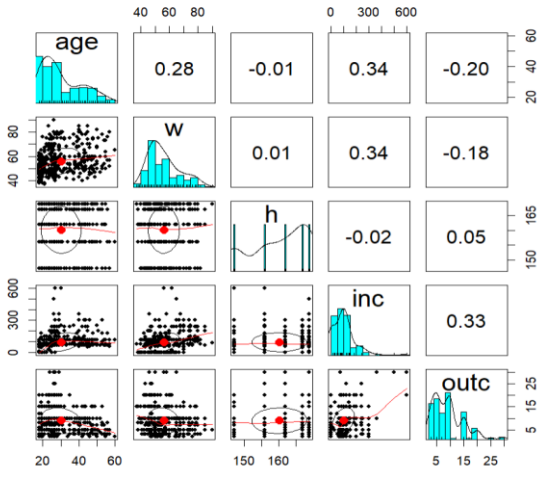


Fig. 7. Pairwise correlation diagram between continuous variables

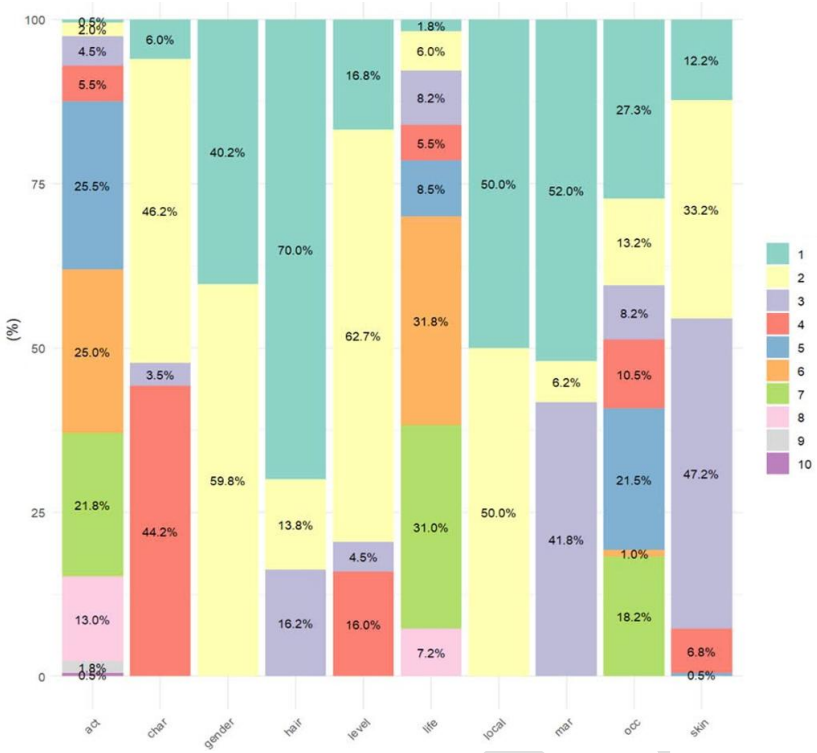


Fig. 8. Distribution chart of personal attributes as categorical variables

The distribution of the surveyed subjects across groups related to gender, marital status, occupation, skin color, hair color, and other attributes is presented in Fig. 8.

The results of determining the importance of input variables for the Random Forest model in classifying fashion styles, based on the survey dataset, were obtained using the *importance_rf_model* function in R software. These results are presented in Table 4 and Fig. 9.

Table 4. Importance of input variables for personal fashion style

| Variables | MeanDecreaseAccuracy | MeanDecreaseGini |
|---|---|---|
| *age* | **20.0433** | **42.3915** |
| *gender* | 10.3463 | 7.2069 |
| *level* | **17.5588** | 17.2172 |
| *occ* | 7.5941 | 17.6512 |
| *mar* | 9.5942 | 9.7368 |
| *w* | 8.4483 | **37.7135** |
| *h* | 7.2553 | **34.8658** |
| *skin* | 3.6150 | 16.2505 |
| *hair* | 4.4389 | 11.6000 |
| *inc* | 10.2459 | 24.6922 |
| *local* | 3.6128 | 10.0205 |
| *char* | 7.1525 | 12.8730 |
| *life* | 10.2508 | 22.7729 |
| *outc* | **17.5250** | **32.9847** |
| *act* | **14.4527** | 28.6842 |

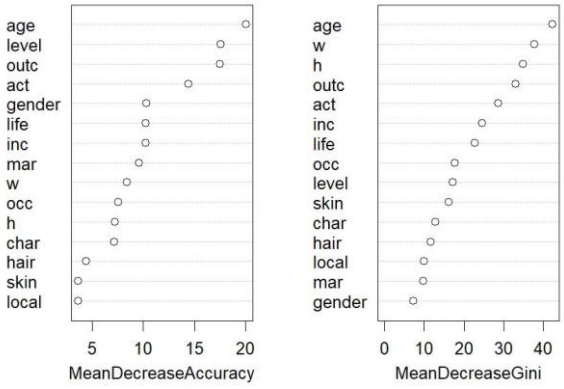


Fig. 9. The decrease in accuracy and the decrease in purity of the RF model

The variables *age, level, outc*, and *act* play the most important roles in maintaining the accuracy of the RF model for classifying fashion styles. Removing the variable *age* would reduce the model's accuracy by 20.0433%; similarly, removing *level* or *outc* would reduce the accuracy by 17.5588% and 17.5250%, respectively. Variables such as *local, skin*, and *hair* have relatively minor importance in the RF model's classification of fashion styles. Specifically, removing *local* would reduce accuracy by 3.6128%, while removing *skin* or *hair* would result in respective reductions of 3.6150% and 4.4389%. The remaining variables have a moderate level of importance for determining personal fashion style.

The results of the variable importance analysis in the Random Forest classification model indicate that

the variables *age*, *level*, *outc* (annual expenditure on fashion), and *act* (activity level) exhibit the highest importance scores, contributing most significantly to the model's classification accuracy. The exclusion of *age* from the input set results in a 20.0433% decrease in accuracy, while the removal of *level* and *outc* leads to reductions of 17.5588% and 17.5250%, respectively. In contrast, the variables *local* (place of residence), *skin* (skin tone), and *hair* (hair color) demonstrate minimal contribution to the model's predictive performance, with accuracy reductions below 5% upon their removal. Given their limited influence, these variables may be considered for exclusion from the input set in order to streamline the model, reduce dimensionality, and mitigate potential noise without materially affecting classification outcomes. Accordingly, subsequent modeling efforts should prioritize the retention of high-importance variables while excluding those with negligible impact, thereby enhancing both computational efficiency and model robustness. From the perspective of Mean Decrease Gini (MDG), which reflects the purity of splits in decision trees, the variables *age*, *w* (weight), *h* (height), and *outc* again emerged as the most influential in distinguishing between different fashion styles. The variables *gender*, *mar* (marital status), and *local* had the lowest Gini-based importance; however, removing them still resulted in more than a 5% decrease in split purity. Notably, this study provides one of the first quantitative rankings of personal attributes shaping fashion style based on large-scale consumer data in a Vietnamese local context, thereby extending prior fashion research that has largely relied on qualitative or descriptive approaches.

An analysis of the sample distribution across the 15 identified fashion styles revealed that the numbers of participants exhibiting styles 4, 9, 10, 12, 13, and 14 were 3, 3, 0, 2, 4, and 7, respectively. The small sample sizes for these styles may cause class imbalance, thereby reducing the model's ability to generalize and accurately identify such categories. This imbalance likely reflects the rarity of these fashion styles in the surveyed population. As a result, these styles are considered for removal in subsequent classification and prediction processes.

From a sustainability-oriented analytics perspective, focusing on prevalent fashion styles allows predictive models to better support scalable design decisions while avoiding inefficient allocation of resources toward marginal or niche segments with limited market demand.

## 4. Conclusion

This study systematically analyzed the relationships between demographic, physical, and socioeconomic factors and personal fashion style preferences among 813 participants in Bac Giang province, Vietnam. The results revealed that while continuous variables such as age, weight, height, income, and fashion expenditure showed no significant pairwise linear correlations, clear differences in fashion style distribution were observed across different age groups, body measurements, and socioeconomic categories.

By applying the Random Forest algorithm, this study quantitatively identified and ranked the relative importance of personal attributes in fashion style classification age, education level, fashion expenditure, and attractiveness as the most influential predictors for fashion style classification in terms of model accuracy, while age, weight, height, and fashion expenditure demonstrated the highest importance in terms of split purity (Mean Decrease Gini). Variables such as place of residence, skin tone, and hair color showed negligible contributions and may be excluded to improve model efficiency without compromising predictive performance.

From a scientific perspective, this research provides novel empirical evidence by integrating large-scale consumer survey data with machine learning–based analysis to clarify the relative importance of personal factors shaping fashion style in a Vietnamese local context, an aspect that has been insufficiently addressed in previous studies. From a practical perspective, the findings offer actionable insights for fashion product development, personalized recommendation systems, and targeted marketing strategies, thereby supporting more consumer-oriented and sustainable fashion practices.

The study also identified class imbalance among certain fashion styles, which may affect model generalization. Future research should expand the dataset to include more diverse populations and underrepresented style categories to further validate and refine the proposed approach.

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