

SELECTED NONPARAMETRIC TESTS ON COSMETIC MARKET CONSUMERS REGARDING CSR

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Purpose: The aim of this article is to present the results of research on consumers' perception of CSR in the Polish cosmetics market, including the impact of CSR on purchasing decisions or the main sources of consumers' knowledge on this topic. The analysis also incorporates selected nonparametric tests (Mann-Whitney U test and Kruskal-Wallis test) to identify statistically significant differences between respondent groups based on gender and age.

Design/methodology/approach: A survey was conducted using the CAWI method to examine how socio-demographic characteristics, including gender, age, and education, affect the evaluation and perception of CSR activities implemented by cosmetics companies. A questionnaire distributed via Google Forms consisted of single-choice and multiple-choice items, as well as questions on a five-point Likert scale. To analyze group differences, two non-parametric tests were applied: the Mann-Whitney U and the Kruskal-Wallis test.

Findings: The results indicate that CSR is a significant aspect for younger respondents, particularly women. The conducted nonparametric tests revealed statistically significant relationships between gender and the perceived importance of CSR, age group and the impact of CSR on purchasing decisions.

Research limitations/implications: The study was conducted over a short period in 2024 and may not capture longer-term trends in consumer perception. Additionally, not all aspects were considered, such as consumers' actual knowledge of CSR practices. Detailed discussion of these limitations and their implications is provided in the Summary section.

Originality/value: This article provides new empirical insights into consumer perceptions of CSR in the Polish cosmetics market, an area where nonparametric tests have been rarely used. The study combines survey data with Mann-Whitney U and Kruskal-Wallis tests to identify significant differences in CSR perceptions based on gender, age, and education. The results are valuable for researchers examining consumer perceptions of CSR in the cosmetics market. The study contributes to the literature by offering quantitative data on the influence of demographic factors on attitudes toward CSR, filling a gap in research on socially responsible practices in the Polish cosmetics market.

Keywords: Cosmetics market, CSR, nonparametric tests.

Category of the paper: Research paper.

1. Introduction

Regarding the Polish cosmetics market, corporate social responsibility (CSR) has emerged as a major area of focus in recent years. Although CSR has a long-standing tradition in the scientific literature, including management and quality sciences or economy, cosmetics companies treat this issue as relatively new, arising primarily from current legal regulations and social expectations. Both academic research and industry reports highlight the growing consumer awareness expressed through the analysis of cosmetic ingredients, the choice of sustainable products (e.g. those with international certifications or biodegradable components), the expectations of transparency and the selection of socially responsible brands.

Previous research on consumer behaviours and preferences in the Polish cosmetics market has focused primarily on the general issues rather than CSR. Most studies sought to identify key determinants, shopping locations, purchase frequency and purchasing strategies (e.g. stockpiling or spontaneous purchases). Several studies have explored consumer behaviour in the natural cosmetics market (Kantor, Hübner, 2019; Bojarczuk, Smalej, 2020; Firek, Dziadkowiec, 2020). Nevertheless, none of them have focused on CSR-related issues. Additionally, the majority of studies are based on survey research, both traditional and CAWI, but they do not employ statistical descriptions or tests, such as nonparametric methods. These observations inspired the present study on consumer perception in the cosmetics market in the context of CSR practices. This article focuses on the Mann-Whitney U test and Kruskal-Wallis tests.

2. Research description

For the purposes of this study a survey was conducted using CAWI method between April 25 and May 31, 2024. The main objective was to analyze the impact of socio-demographic characteristics, such as gender, age and education, on the evaluation and perception of CSR activities implemented by cosmetics companies. A questionnaire was developed for the study and subsequently distributed through Google Forms platform. This survey consisted of two sections and included single-choice and multiple-choice questions, as well as questions using a five-point Likert scale. The main section of the questionnaire addressed the following questions:

- Do you pay attention to CSR activities in the case of cosmetics companies? (Answer: Yes or No).
- Using a 1-5 scale, please rate how important CSR activities are to you in the context of cosmetics companies (1 - not important at all, 2 - rather unimportant, 3 - neither important nor unimportant, 4 - rather important, 5 - very important).
- Which of the following dimensions of CSR do you consider the most important in the context of cosmetics companies? (Select one: environmental, ethical, philanthropic, social, legal).
- Using a 1-5 scale, please indicate to what extent the implementation of CSR activities by cosmetics companies influences your purchasing decisions? (1- does not influence at all, 2 - rather does not influence, 3 - neither influences nor does not influence, 4 - rather influences, 5 - definitely influences).
- Where do you obtain information about CSR in cosmetics companies? (Multiple choice: from the Internet, social media, television, other people, magazines, discussion forums, reports, I do not obtain any information on this topic).

The second part of questionnaire, focusing on demographic information, included the following questions:

- gender (female or male),
- age group (up to 17 years, 18-29 years, 30-39 years, 40-49 years, 50-59 years, 60 years and above),
- education (primary, vocational, secondary, higher),
- place of residence (village, city up to 50,000 inhabitants, city 51,000-150,000 inhabitants, city 151,000-500,000 inhabitants, city over 500,000 inhabitants).

Due to the limited time available for the study, a random sampling method was employed, which is also referred to by other researchers as convenience sampling. This approach is primarily fast and inexpensive to implement and relies on units that are easily accessible and willing to participate (Szreder, 2004). Although random sampling does not guarantee the representativeness of the sample, it can provide a basis for understanding the population (Miszczak, Walasek, 2013, p. 103). In total, the study involved 432 respondents.

3. Description of variables

For the purposes of this study nine variables were used. Each of them is discussed in more detail in Table 1.

Table 1.
Description of variables

Variable	Type of variable	Question type	Example
Gender	Nominal, dichotomous	Single-choice question; selection of one of two options	Female
Age	Ordinal (age ranges)	Single-choice question; selection of the appropriate age range from six options	30-39 years
Education	Ordinal	Single-choice question; four response options	Higher
Place of residence	Ordinal (by range)	Single-choice question; five response options	City over 500,000 inhabitants
Consumer attention to CSR in cosmetics companies	Nominal, dichotomous	Single-choice question; selection of one of two options	Yes
Perceived importance of CSR in cosmetics companies	Ordinal	Five-point Likert scale question	4 - rather important
Key dimension of CSR in cosmetics companies	Nominal	Single-choice question; five response options	Ethical
Impact of CSR on purchasing decisions	Ordinal	Five-point Likert scale question	4 - rather influences
Sources of CSR knowledge	Nominal	Multiple-choice question	Internet, social media

Source: Own study.

Graphical presentations in the form of charts were created for all variables. In addition, two nonparametric tests were applied. To determine the relationship between gender and consumers' assessment of CSR activities undertaken by cosmetics companies, the Mann-Whitney U test was used. When analyzing variables such as the impact of CSR activities on purchasing decisions across different age groups, the Kruskal-Wallis test was employed.

4. Results of variable analysis

As previously mentioned, a total of 432 respondents participated in this study. In terms of gender structure, the vast majority of respondents were women (80,1%), while men accounted for 19,9% (Figure 1). This result may indicate that women continue to show greater interest in the activities of cosmetics companies including the implementation of socially responsible practices.

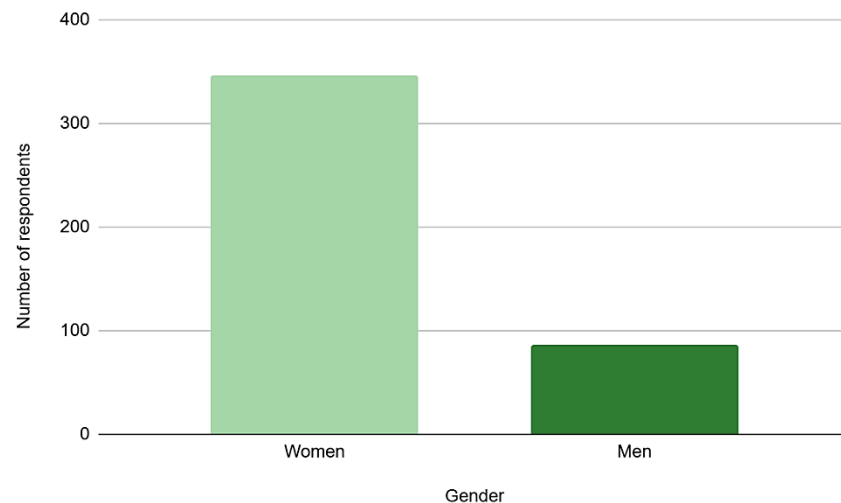


Figure 1. Distribution of respondents by gender.

Source: Own studies.

As presented in Figure 2, the age distribution of respondents was uneven, with a clear predominance of younger consumers. The largest group consisted of individuals aged 18-29 (50,46%). This was followed by the 30-39 age group (21,30%) and the 50-59 (14,35%). Smaller proportions were observed in the 40-49 age group (9,95%) and among those aged 60 and above (3,94%). It should be noted that no respondents under 18 participated in the study.

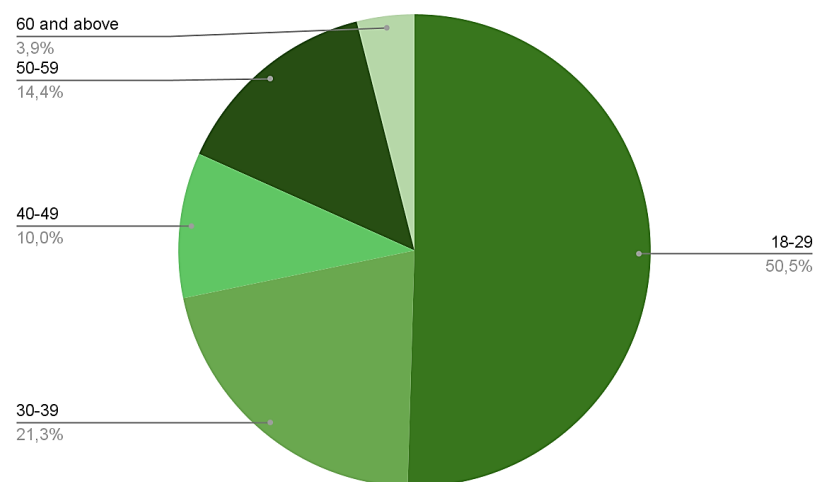


Figure 2. Age distribution of respondents.

Source: Own studies.

Regarding respondents' education, only two groups were represented in the study: those with secondary education (213 respondents, 49.3%) and those with higher education (219 respondents, 50.7%). No respondents with primary or vocational education participated in the survey. This distribution indicates that the sample was relatively well-educated (Figure 3). It may reflect that individuals with at least secondary education are more aware or attentive to CSR issues.

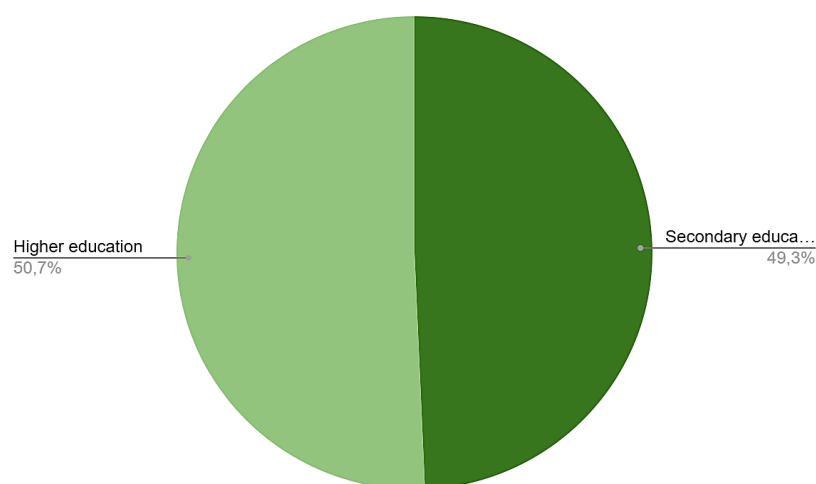


Figure 3. Respondents' education.

Source: Own studies.

The analysis of respondents' place of residence reveals a clear predominance of urban participants (Figure 4). Only a small proportion of the sample lives in rural areas ($n = 23$) or in small towns up to 50,000 inhabitants ($n = 21$). A slightly larger group comes from towns of 51,000 to 150,000 residents ($n = 48$). However, the majority of respondents reside in larger urban centers, with 213 participants living in towns of 151,000 to 500,000 inhabitants and 127 in cities with more than 500,000 inhabitants.

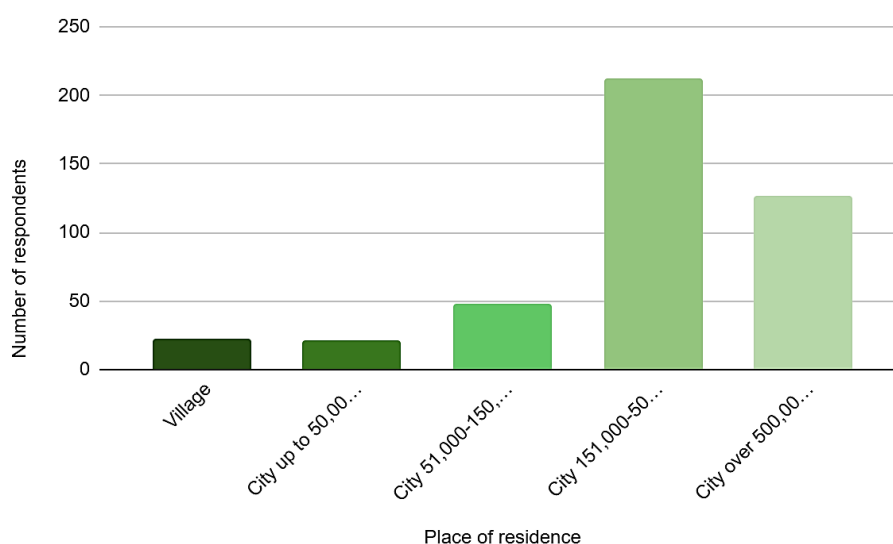


Figure 4. Distribution of respondents by place of residence.

Source: Own studies.

The analysis of respondents' attention to CSR in the context of cosmetics companies indicates that a substantial majority of participants consider CSR to be important (Figure 5). Specifically, 303 respondents reported that they pay attention to CSR initiatives, while 129 respondents stated that they do not. These results may suggest the growing importance of ethical and responsible business practices among consumers in the Polish cosmetics market.

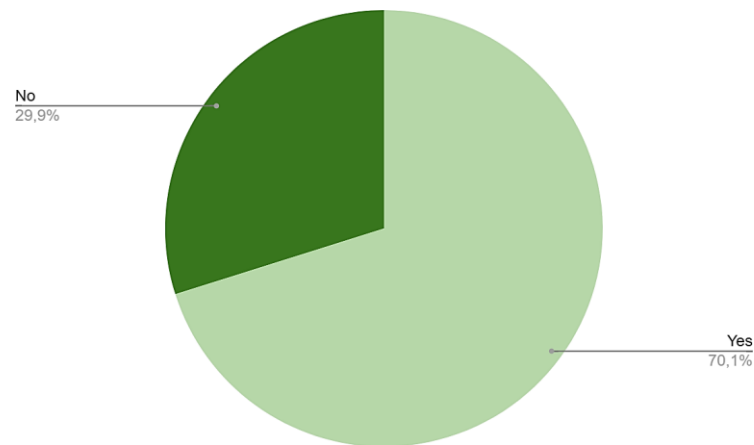


Figure 5. Attention to CSR initiatives in cosmetics companies.

Source: Own studies.

Respondents were also asked to rate the importance of CSR in cosmetics companies on scale from 1-5 where 1 indicated not important at all and 5 very important. The results show that the majority of respondents consider CSR to be significant (Figure 6). 32% of them rated it as 4 and 29% as 5. Lower ratings were less frequent, with 16% of respondents selecting 1 and an equal proportion (16%) selecting 3, while 8% selected 2.

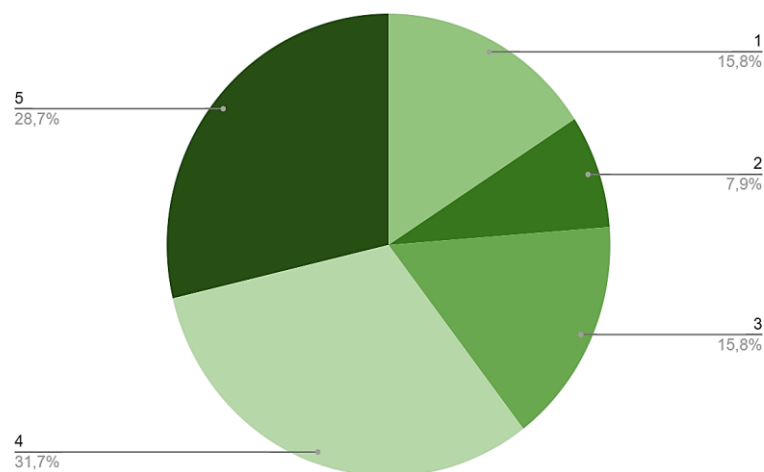


Figure 6. Consumers' ratings of CSR significance in cosmetic companies.

Source: Own studies.

Respondents were asked to indicate which CSR dimension they considered most important. As presented in Figure 7, the ethical dimension was identified as key by 48% of participants. The environmental dimension was identified by 28%, followed by the social dimension (20%). Only 4% of respondents considered the philanthropic dimension the most important, and none identified the legal dimension.

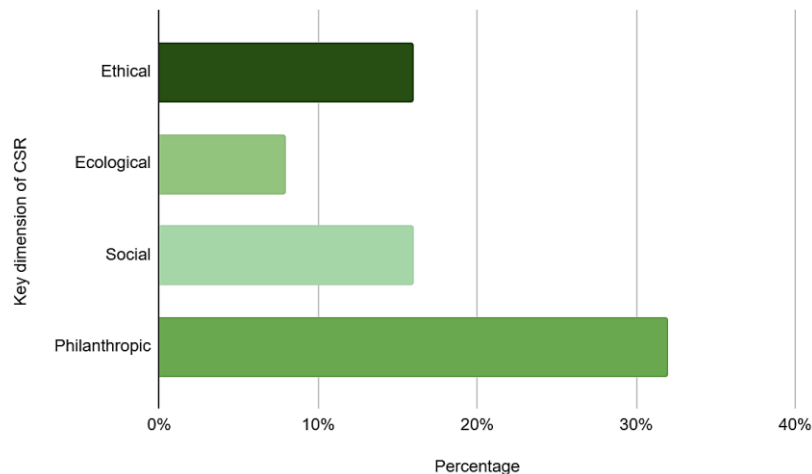


Figure 7. Key dimensions of CSR according to respondents.

Source: Own studies.

Analyzing the influence of CSR on consumers' purchasing decisions in the cosmetics sector (Figure 8), the highest proportions were observed for ratings 4 (30%) and 5 (24%). It indicates that a substantial share of respondents considers corporate social responsibility to be an important factor. On the other hand, lower ratings (1 and 2) together account for 41%, suggesting the presence of a group of consumers for whom CSR is not a significant consideration when purchasing cosmetics. The neutral rating (3) was selected least frequently (5%). Overall, these results reveal clear divisions among respondents in their perception of the importance of CSR.

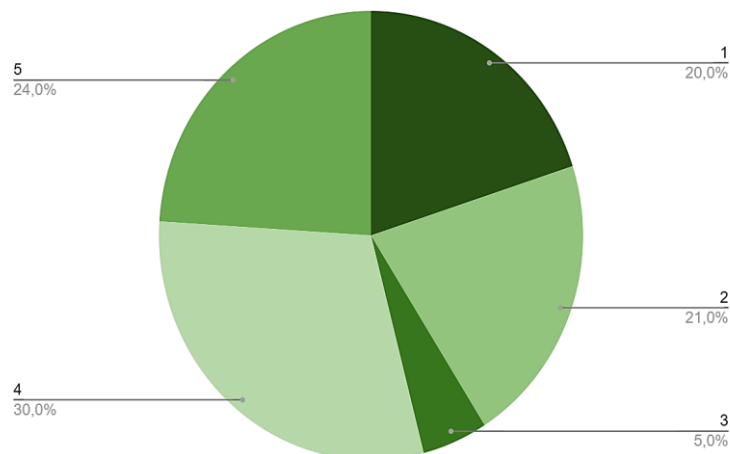


Figure 8. The impact of CSR on consumer purchasing decisions.

Source: Own studies.

In the case of information regarding CSR activities undertaken by cosmetic companies, digital platforms play a central role (Figure 9). In a multiple-choice question, the Internet ($n = 272$) and social media ($n = 213$) were the most frequently indicated sources. Notably, 152 respondents stated that they do not seek information about CSR in this context. This suggests that, despite the growing presence of CSR in online communication, there

remains a segment of consumers for whom CSR issues are not important or visible. In this case, a key action for cosmetic companies would be to carry out educational initiatives aimed at raising consumer awareness. Traditional media were mentioned far less often, with television cited by 8 participants and magazines by 3. Surveys were reported by 2 respondents.

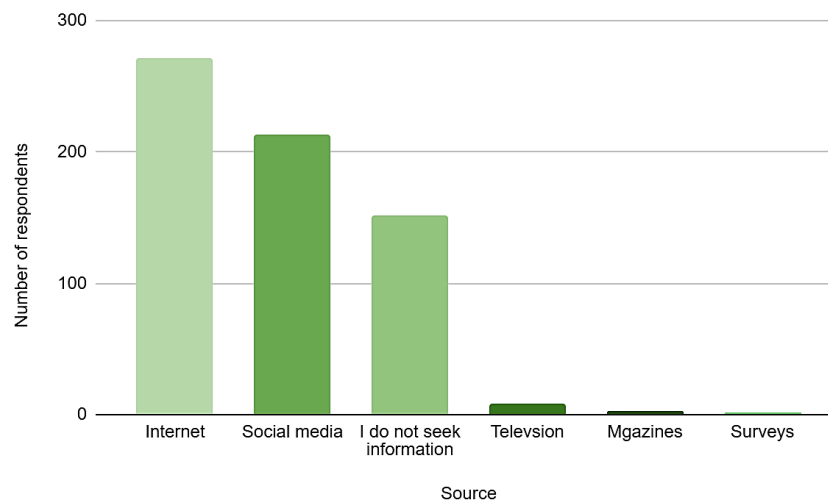


Figure 9. Sources of information on CSR.

Source: Own studies.

The analysis indicates that digital platforms play a central role in the communication of corporate social responsibility (CSR) activities within the cosmetics market. At the same time, 152 respondents reported that they do not actively seek information related to CSR, which suggests a heterogeneous level of consumer engagement in this area. The variables presented in this chapter, along with the overall distribution of responses, provide a necessary foundation for further statistical analysis. In the next stage of the study, the results will be subjected to nonparametric tests in order to determine whether and to what extent socio-demographic characteristics, such as gender and age, differentiate respondents' perceptions of CSR.

5. Nonparametric tests and results

According to Cz. Domański statistics, as a method of extracting information from observed data, serves to make logical decisions under conditions of uncertainty (Domański, 2014, p. 1). Although it is mainly associated with natural and exact sciences, it also has a wide range of applications in the social sciences. The literature highlights that statistical methods can be implemented at almost every stage of research design, from data collection and processing to analysis and interpretation. Consequently, the use of statistical methods in management and quality sciences is becoming increasingly important (Chybalski, 2017, p. 6).

A key aspect is the proper selection of statistical tests. Researchers often consider the use of parametric and nonparametric tests. Parametric tests require certain assumptions to be met, such as a normal distribution of the variable in the population and homogeneity of variance (Kleka, Jasielska, 2008; Kompa, 2014, p. 4). When these conditions are not satisfied, nonparametric tests provide a suitable alternative. Their advantages include ease of calculation, speed, and independence from the shape of the variable's distribution (Donocik, 2013, p. 34). Nonparametric tests are particularly useful in pilot (Chavan, Kulkarni, 2017, p. 41) and survey research. As M. Słowińska notes, statistical analysis constitutes an integral part of survey result interpretation, enabling the verification of previously formulated hypotheses (Słowińska, 2019, p. 37).

The most commonly used nonparametric tests include Chi-Square test, One Sample Wilcoxon Signed-Rank test, Wilcoxon Signed-Rank Paired sampled test, Spearman's Rank Correlation test, Mann-Whitney U test and Kruskal-Wallis test. For the purposes of this study, two nonparametric tests were applied. To determine the relationship between gender and consumers' assessment of CSR activities undertaken by cosmetic companies, the Mann-Whitney U test was used. To analyze the impact of CSR activities on purchasing decisions among different age groups of cosmetic consumers, the Kruskal-Wallis test was employed.

The Mann-Whitney U test is considered a nonparametric equivalent of the independent samples t-Test. Its purpose is to verify the hypothesis that the two analyzed samples originate from different populations (Malska, 2017, p. 114). In this study, the Mann-Whitney U test was used to examine whether there are statistically significant differences in the assessment of the importance of CSR between genders. The significance level was set at $p < 0.05$. The following hypotheses were formulated:

- Null hypothesis (H_0): There are no statistically significant differences in perceived importance of CSR between genders.
- Alternative hypothesis (H_1): There are statistically significant differences in perceived importance of CSR between genders.

The results presented in Figure 10 indicated a statistically significant difference between the two groups ($U = 27,552$, $p < 0.001$). Analysis of median scores showed that women assign higher importance to CSR activities, with a median rating of 4, whereas men tend to give lower ratings, with a median of 1. The distribution of ratings among women is concentrated in the higher range (4-5). However, some women gave lower scores, such as 3, indicating slight variability within the group. Men's ratings are more dispersed and shifted toward lower values (1-2). The boxplot also highlights a few outliers among men, indicating that some male respondents rated CSR higher than the majority of their group.

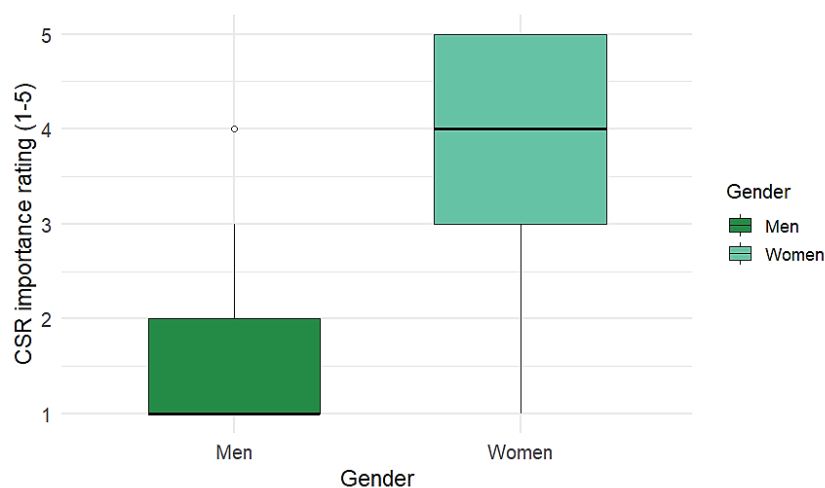


Figure 10. Importance of CSR by gender.

Source: Own studies.

The Kruskal-Wallis test is a nonparametric equivalent of analysis of variance (ANOVA) (Donocik et al., 2013, p. 34). It is applied when the assumption of normality is violated, the subsamples are small, and the variable is ordinary in nature (Wiktorowicz, Grzelak, Grzeszkiewicz-Radulska, 2020, p. 111). The selected variables meet these criteria. Both age (respondents' age groups) and the perceived impact of CSR on consumers' purchasing decisions are ordinary variables. Statistical significance is assumed at $p < 0.05$. In the present study, the Kruskal-Wallis test was used to determine whether the perceived influence of CSR on purchasing decisions in the cosmetics market differs between age groups. The following hypothesis was formulated:

- Null hypothesis (H_0): There are no statistically significant differences in the perceived influence of CSR on consumers' purchasing decisions in the cosmetics market between age groups.
- Alternative hypothesis (H_1): There is at least one age group in which the perceived influence of CSR on consumers' purchasing decisions in the cosmetics market differs significantly from the other groups.

The Kruskal-Wallis test revealed a statistically significant difference in the perceived impact of CSR on purchasing decisions between age groups (chi-square = 244.94, $df = 4$, $p < 0.001$). Younger respondents (18-29 and 30-39) tended to rate the impact of CSR higher, with most ratings concentrated in the 4-5 range, whereas older respondents (50-59 and 60+) generally gave lower ratings, mainly between 1 and 3. Middle-aged groups (40-49 and 50-59) showed a more dispersed distribution of ratings. A few outliers were observed across all groups, indicating occasional anomalous ratings (Figure 11). These results suggest that age significantly influences how consumers perceive the importance of CSR in the cosmetics market.

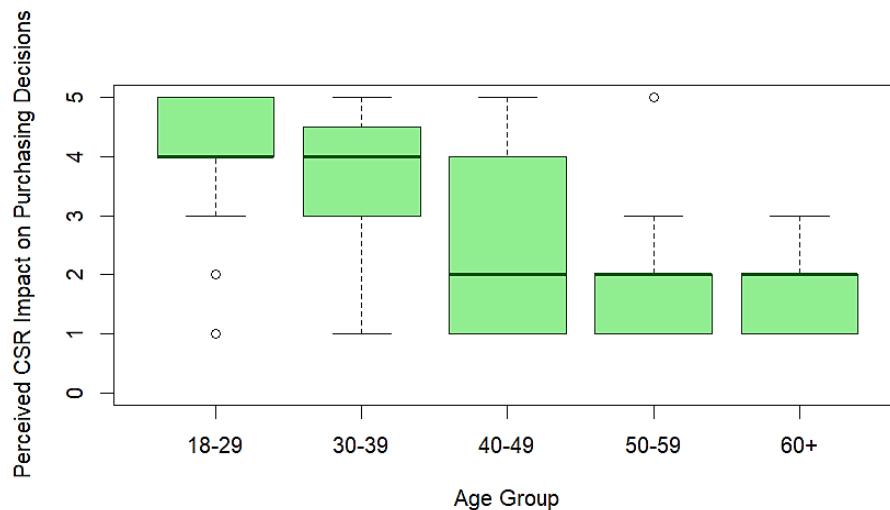


Figure 11. The impact of CSR on purchasing decisions depending on the age group.

Source: Own studies.

The main finding of the analysis is that CSR perception is not homogeneous and varies significantly depending on socio-demographic characteristics. The application of nonparametric statistical tests enabled empirical verification of the research hypotheses and addressed a gap in the existing literature, where quantitative methods are still relatively underutilised in this field.

6. Summary

Although consumer preferences, attitudes and opinions constitute the primary focus of research on the cosmetics market, there is still a lack of publications in which assumptions regarding relationships between specific variables are supported by appropriate statistical tests. Based on the conducted research, the following conclusions can be drawn:

- Gender and age are significant determinants of CSR perception, with women and younger consumers (18-39 years) assigning higher importance to CSR-related activities.
- A considerable proportion of respondents does not actively seek information about CSR, indicating limited consumer engagement despite generally positive attitudes.
- The ethical dimension of CSR is perceived as the most important compared to environmental and philanthropic aspects.

To further explore this topic in future research, the following criteria should be considered:

- purposive sampling,
- increasing the sampling size,

- ensuring representativeness,
- including questions in the survey to assess consumers' knowledge of socially responsible practices implemented by cosmetics companies (e.g. tests on recognizing certifications),
- taking into account actual purchasing behaviours (i.e., whether purchasing CSR-compliant cosmetics is real or merely declared),
- extending the duration of studies,
- the use of additional nonparametric or parametric tests.

In conclusion, the study provides valuable insights into consumer perceptions of CSR in the cosmetics market and demonstrates the usefulness of nonparametric statistical methods in analysing such relationships. Although the results should be treated as preliminary due to the applied sampling method and limited time frame, they indicate clear patterns in how different demographic groups perceive CSR. The findings may serve as a foundation for more comprehensive and methodologically advanced future research in this area.

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