

The Relationship Between Academic Major and Smartphone Brand Preference: A Contingency Table Analysis

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Abstract. The choice of smartphone brand has become a topic of interest in consumer behavior research, with factors such as age, income, and social influence being widely studied. However, the role of academic background—specifically, whether a student's major field of study is associated with brand preference—remains underexplored. This study aims to investigate the association between university students' academic major (humanities vs. sciences) and their smartphone brand preference (Apple vs. Android). A questionnaire survey was conducted among 100 university students, comprising 50 humanities majors and 50 science majors. The data were organized into a 2×2 contingency table. Descriptive statistics, including percentage calculations and a stacked bar chart, were used to visualize the distribution. Inferential analysis was performed using the chi-square test of independence to examine whether the two categorical variables were statistically independent. Standardized residuals were calculated to identify cells contributing most to the overall chi-square value. The results show a significant association between academic major and brand preference ($\chi^2=16.61$, $df=1$, $p<0.001$), with humanities students showing a stronger preference for Apple and science students showing a stronger preference for Android. These findings suggest that academic discipline may shape consumer preferences, potentially through peer influence or value alignment.

Keywords: smartphone brand preference, academic major, chi-square test, contingency table, consumer behavior

1. Introduction

Smartphones have become an indispensable part of daily life, and the choice of brand—particularly between Apple's iOS ecosystem and the various Android-based manufacturers—reflects not only functional considerations but also social and psychological factors [1]. Previous research has identified demographic variables such as age, gender, and income as significant predictors of smartphone brand choice [2, 3]. Additionally, brand loyalty, perceived value, and social influence have been extensively examined [4]. However, relatively little attention has been paid to the potential role of educational background, specifically the student's academic major, in shaping brand preferences.

University students represent a unique consumer segment: they are technologically savvy, socially connected, and often subject to peer influence within their academic departments [5]. It is

plausible that students in different disciplines develop distinct value systems, social networks, and exposure to technology, which may in turn influence their brand choices. For instance, humanities students might be drawn to Apple's design aesthetics and user experience, while science students might favor Android's customizability and technical specifications [6]. Nevertheless, empirical evidence directly testing this hypothesis remains scarce.

This study addresses the following research question: is there a statistically significant association between university students' academic major (humanities vs. sciences) and their preferred smartphone brand (Apple vs. Android)? To answer this question, a questionnaire was designed and administered to 50 humanities and 50 science students at a university. The collected data were summarized in a 2×2 contingency table. The chi-square test of independence was employed to test the null hypothesis that the two variables are independent. Standardized residuals were further analyzed to interpret the pattern of association. The findings of this study are expected to contribute to the consumer behavior literature by highlighting the role of academic environment as a socializing agent. Moreover, the results may offer practical insights for marketers targeting university student populations and for educators interested in understanding how disciplinary cultures affect everyday choices [7].

2. Methodology

2.1. Participants and data collection

A convenience sample of 100 university students was recruited for this study. The sample consisted of 50 students majoring in humanities (including literature, history, philosophy, and languages) and 50 students majoring in sciences (including physics, chemistry, biology, computer science, and engineering). All participants were undergraduate students enrolled at a comprehensive university in China. Data were collected using a structured questionnaire that asked participants to report their academic major and the brand of the smartphone they were currently using. The questionnaire was administered in person during class breaks and in campus common areas. Participation was voluntary, and all responses were anonymized to ensure confidentiality.

2.2. Measures

Two categorical variables were measured:

- Academic major: humanities or sciences.
- Smartphone brand: Apple (iPhone) or Android (all other brands, including Samsung, Huawei, Xiaomi, Oppo, Vivo, etc.).

2.3. Data analysis

The collected data were tabulated into a 2×2 contingency table. Descriptive analysis involved calculating the percentage of Apple and Android users within each major group, and a stacked bar chart was generated to visually compare the distributions.

For inferential analysis, the chi-square test of independence was performed. The test statistic was calculated using the standard formula:

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^c \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (1)$$

where O_{ij} is the observed frequency in cell (i, j), and E_{ij} is the expected frequency under the assumption of independence, computed as:

$$E_{ij} = \frac{(\text{row total}) \times (\text{column total})}{\text{grand total}} \quad (2)$$

The degrees of freedom for a 2×2 table is 1. The p-value was obtained from the chi-square distribution. A significance level of $\alpha=0.05$ was adopted. If the null hypothesis of independence was rejected, standardized residuals were calculated for each cell using:

$$r_{ij} = \frac{O_{ij} - E_{ij}}{\sqrt{E_{ij} \times (1 - \text{row proportion}) \times (1 - \text{column proportion})}} \quad (3)$$

Cells with absolute standardized residuals greater than 2 were considered to contribute substantially to the overall association [8].

3. Results

3.1. Descriptive statistics

The survey yielded a 100% response rate, with all 100 participants providing complete data. The observed frequencies are presented in Table 1 below.

Table 1. Contingency table of academic major and smartphone brand preference

	Apple	Android	Total
Humanities	42	8	50
Sciences	22	28	50
Total	64	36	100

Among humanities students, 84% (42 out of 50) used Apple phones, while only 16% (8 out of 50) used Android. In contrast, among science students, 44% (22 out of 50) used Apple and 56% (28 out of 50) used Android. This marked difference in proportions is visually represented in Figure 1.

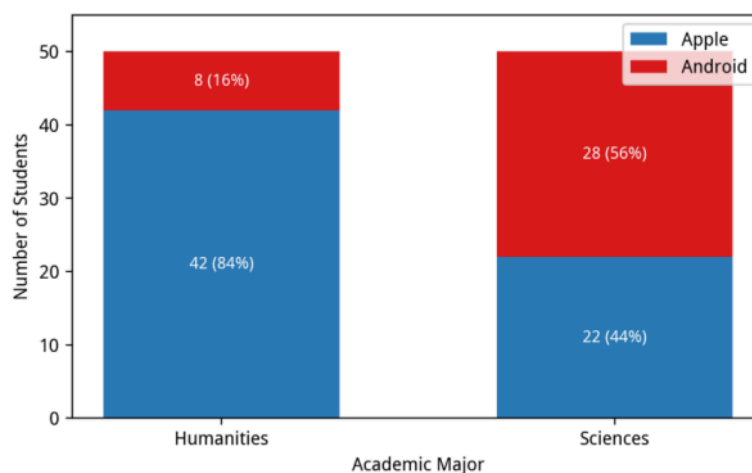


Figure 1. Stacked bar chart of smartphone brand preference by academic major

The figure clearly shows that the majority of humanities students preferred Apple, whereas science students were more evenly split, with a slight majority preferring Android.

3.2. Chi-square test of independence

The chi-square test was performed to determine whether the observed association between academic major and brand preference was statistically significant. The expected frequencies under the null hypothesis of independence were calculated using Equation (2) and are shown in Table 2.

Table 2. Expected frequencies under independence

	Apple	Android	Total
Humanities	32	18	50
Sciences	32	18	50
Total	64	36	100

The computed chi-square statistic using Equation (1) was $\chi^2=16.61$ with 1 degree of freedom. The corresponding p-value was less than 0.001, which is far below the conventional significance threshold of 0.05. Therefore, the null hypothesis of independence was rejected. This result indicates a statistically significant association between academic major and smartphone brand preference.

3.3. Standardized residuals

To interpret the nature of the association, standardized residuals were calculated for each cell using Equation (3). The results are presented in Table 3.

Table 3. Standardized residuals for each cell

	Apple	Android
Humanities	+2.88	-2.88
Sciences	-2.88	+2.88

The absolute value of the standardized residual for every cell was 2.88, which exceeds the threshold of 2. This indicates that all four cells contributed significantly to the overall chi-square value. Specifically, humanities students were substantially more likely to use Apple (and less likely to use Android) than would be expected by chance, whereas science students showed the opposite pattern—they were more likely to use Android and less likely to use Apple.

4. Discussion

4.1. Interpretation of findings

The results of this study provide strong evidence that academic major is associated with smartphone brand preference among university students. The chi-square test yielded a highly significant p-value, and the standardized residuals revealed a consistent pattern: humanities students gravitated toward Apple, while science students leaned toward Android.

Several possible explanations can be offered for this finding. First, the Apple brand is often associated with design, simplicity, and user experience—values that may resonate more with humanities students, who are trained to appreciate aesthetics, narrative, and human-centered design [9]. Conversely, Android's open-source nature, customization options, and technical versatility may appeal to science students, who often value functionality, control, and empirical tinkering [6].

Second, peer influence within academic departments may reinforce brand choices. Students in the same major tend to interact frequently in classes, study groups, and social activities, creating homophilous networks where brand choices are shared and validated [5]. If a critical mass of humanities students uses Apple, newcomers may adopt the same brand to fit in. Similarly, in science departments, Android might become a more common choice.

Third, economic factors may also play a role in shaping brand preferences. Android devices generally offer a broader range of price points, with many cost-effective options that may appeal to students whose smartphone needs are limited to basic daily functions. Apple products, by contrast, are typically positioned at a higher price level but are recognized for their superior performance in photography, gaming, and system fluidity. These features may attract students who value not only routine communication but also enhanced capabilities for entertainment and creative activities. Consequently, the interplay between budget constraints and functional expectations may partially account for the observed brand preference differences among students with distinct academic backgrounds.

4.2. Comparison with previous literature

The present findings are consistent with previous research suggesting that consumer preferences are shaped by cultural and social identities [3]. For instance, studies have shown that brand choice can signal group membership and personal values [10]. In the context of higher education, academic disciplines are not just knowledge domains but also social communities with distinct norms, rituals, and identities [7]. This study extends the literature by empirically demonstrating that such disciplinary cultures may extend to seemingly unrelated domains like smartphone choice.

However, direct comparisons are limited because few studies have specifically examined the link between academic major and brand preference. Most existing research has focused on demographic factors such as age and income [2], or psychological factors such as brand loyalty and perceived quality [4]. This study thus fills a gap by introducing educational background as a relevant variable [11].

4.3. Limitations

This study has several limitations that should be acknowledged. First, the sample was relatively small ($n = 100$) and was drawn from a single university in China, which limits the generalizability of the findings. Future research should replicate the study with larger and more diverse samples, including students from different countries, types of institutions, and disciplinary fields.

Second, the study used a binary classification of academic major (humanities vs. sciences). In reality, disciplines are more diverse, and within the humanities and sciences, there may be significant variation. For example, computer science students might have different preferences from biology students. A more fine-grained categorization could reveal more nuanced patterns.

Third, the study did not control for potential confounding variables such as income, family background, or prior technology exposure. Although the observed association is statistically

significant, causality cannot be inferred from a cross-sectional design. Future studies could adopt longitudinal or experimental designs to examine causal mechanisms.

Fourth, the study relied on self-reported brand data, which may be subject to recall or social desirability bias. However, given that smartphone brand is a salient and frequently used attribute, this bias is likely minimal.

4.4. Implications

Despite these limitations, the findings have practical implications. For marketers, understanding that academic major is associated with brand preference can inform targeted advertising and product positioning strategies on university campuses. For educators and university administrators, the results highlight the role of peer culture in shaping student behavior beyond the classroom. This could be relevant for initiatives aimed at promoting digital literacy or bridging the digital divide across disciplines.

5. Conclusion

This study investigated whether university students' academic major is associated with their preferred smartphone brand, using a 2×2 contingency table and chi-square test of independence. Data from 100 students (50 humanities, 50 sciences) revealed a clear and statistically significant association: humanities students predominantly used Apple, whereas science students predominantly used Android. The chi-square value was 16.61 with 1 degree of freedom, yielding a p-value of less than 0.001, which strongly rejects the null hypothesis of independence. Standardized residual analysis confirmed that all four cells contributed substantially to this association.

These findings suggest that academic discipline may function as a socializing factor that shapes not only intellectual orientations but also consumption patterns. The study contributes to the growing body of literature on consumer behavior by highlighting the role of educational context in brand choice. It also opens up new avenues for research, such as examining whether similar patterns exist across other consumer products, or whether the association changes as students progress through their academic careers.

Future research should address the limitations of this study by employing larger, more diverse samples and by controlling for potential confounding variables. Additionally, qualitative studies could explore the underlying reasons why students in different majors are drawn to different brands. Understanding these motivations would provide deeper insight into the mechanisms driving the observed association.

In conclusion, this study provides empirical evidence that academic major and smartphone brand preference are not independent. The pattern is consistent with the idea that disciplinary cultures and peer networks influence everyday consumer decisions. As smartphones continue to be integral to modern life, understanding the social and cultural factors that shape brand choice remains a relevant and worthwhile endeavor [12].

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