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**Thesis**

### MASTER THESIS MARKETING MANAGEMENT/MARKETING ANALYTICS FALL 2022

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1. *Chapter – Introduction*
2. *Chapter – Theoretical framework*
3. *Chapter – Methodology*
4. *Chapter – Analysis and Results*
   1. *The data*
      1. *Randomization*

The final sample was about 260 participants. All participants were randomly assigned to one of the experimental groups. To assess the randomization, in the study, a one-way ANOVA was performed with gender as the dependent variable. The result produced by this one-way ANOVA confirms that the process of randomization was well applied because there is no significant difference between the groups (genders) (F(1) = 0.367, p = 0.5453). The same procedure was done to confirm this test but using age as a dependent variable (F(1) = 0.11, p = 0.740). Again, these results confirm the initial statement that randomization was correctly applied in the experiment.

* + 1. *Cronbach’s Alpha – internal scale consistency*

Before running the main analysis, it is important to validate the internal consistency of some items within the questionnaire. Given that the unique variable that was measured through a scale was psychological ownership, this assessment was just applied to this variable but more precisely to the items related to it. As was explained by Cronbach (1951) when the alpha generated is higher than 0.70 it is possible to determine that the scale has a good consistency. The alpha obtained for the four items related to the measurement of psychological ownership was close to 0.96, this indicates that the scale has a very good level of reliability; therefore, the main analysis could be performed.

* 1. *Assumptions*

Given that this study uses analysis of variance to get the main outputs, some tests must be done to validate the basic assumptions behind ANOVA statistical model. First, the observations have to be independent, given that this is a between-subject design experiment it is possible to assume that this first condition was fulfilled.

The second of these assumptions is related to the concept of homoscedasticity or homogeneity of variances. To make this assessment, a Levene’s test should be carried out. It is important to recall that the null hypothesis in Levene’s test, states that all groups have equal variances. The test was done for both, willingness to pay (F(1, 258) = 0.675, p = 0.412) and psychological ownership (F( 1,258) = 6.174, p = 0.014). For the independent variable, there is no significant output; therefore, the null hypothesis is maintained and there is no difference between the variances. For the mediator there is a significant result, this means that it was observed different variances across the treatment groups. Usually, regarding Levene’s test, it is expected to avoid a significant p-value (lower than 0.05), but, according to Hair et al (2014) the violation of this assumption does not have a big impact if the groups have approximately the same size, that is the case in this study.

The third assumption is based on the concept of normality. To validate it, a Shapiro-Wilk test was carried out. This test suggests that normality was not found for either willingness to pay (W(260) = 0.95, p < 0.001) and psychological ownership (W(260) = 0.92, p <0.001). Although normality is always wanted, it is possible to be less concerned about it based on the contributions provided by Hogg et al (2012) who said that when the sample size is large enough (>200) the Central Limit Theorem guarantees a roughly normal distribution. Despite some results were not the expected ones, the general conditions were fulfilled therefore it was possible to carry out the main analyses.

* 1. *Descriptive statistics*

The descriptive statistics shown in table 2, summarize the data for each of the 4 experimental conditions.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Condition | Willingness to pay | | Psychological ownership | |
| M | SD | M | SD |
| Hedonic-High (N = 65) | 1944 | (1188) | 4.74 | (1.61) |
| Hedonic-Low (N = 66) | 1531 | (1132) | 5.25 | (0.99) |
| Utilitarian-High (N = 65) | 2067 | (1324) | 4.93 | (1.49) |
| Utilitarian-Low (N = 64) | 2242 | (1361) | 4.95 | (1.61) |

Table 2: Mean and standard deviation of dependent variables and mediator.

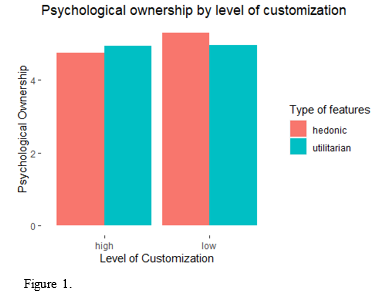
Notes: Psychological ownership was measured using a scale from 1 to 7. The range to measure willingness to pay was from 0 to 5000 USD.

* 1. *Correlations*

Although there is an important scatter along the data collected (the correlation coefficients tend to be small) there are some interesting correlations that were identified along the data set. For instance the relationship between willingness to pay and psychological ownership (r(258) = 0.26, p < 0.001) or the one obtained between the type of features used to customize and WTP (r(258) = -0.16, p <0.01) confirm the theory previously detailed in chapter two. Additionally, other interesting and significant correlations were detected, like those two related to one of the covariates, knowledge held by participants, about cars. This covariate had relevant links with both, willingness to pay (r(258) = 0.13, p = 0.03) and psychological ownership (r(258) = 0.20, p < 0.01).

* 1. *Main analysis*

To carry out the main analysis, model 8 of the PROCESS macro developed by Hayes (2022) was used and run in R. This procedure gives the main outputs to determine the direct and indirect effect of the moderated mediation but also, with it, is possible to assess the influence of each variable (including the covariates) and also if there is an interaction between the two treatment variables and both, the mediator and the dependent variable. Additionally, some individual t-tests and one-way ANOVA were performed to see the individual influence of each treatment variable, and its interaction with each other, with both, willingness to pay and psychological ownership.

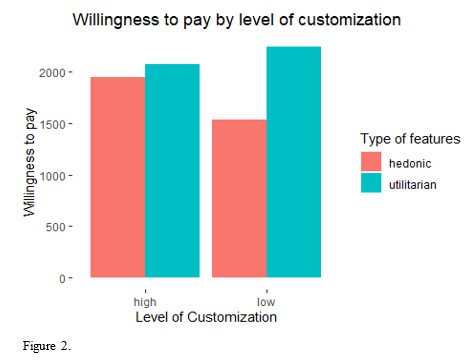
* + 1. *Psychological ownership – Mediator*

For psychological ownership, when the one-sided t-test was performed, there are no significant results regarding the second hypothesis (T(258) = -1.60, p = 0.94) therefore the hypothesis cannot be accepted because higher psychological ownership, for customers within the high-level condition, was not found, in fact, precisely the opposite was identified. Additionally, when the regression is performed to assess the interaction between the independent variable and the moderator, the level of significance is not relevant either (F(1) =2.55, p = 0.12). Hence the H4 cannot be accepted. If we take a deeper glance at the collected data regarding the mediator and each of the four experimental conditions, is possible to see a high degree of scattering, making it difficult to identify a pattern between the four groups and the mediator variable (M Hedonic-High = 4.74, SD = 1.61; M Hedonic-Low = 5.29, SD = 0.998; M Utilitarian-High = 4.93, SD = 1.49; M Utilitarian-Low = 4.95, SD = 1.61).

|  |  |  |  |
| --- | --- | --- | --- |
| Psychological Ownership | | | |
| Level of customization | Hedonic | Utilitarian | Mean |
| High-level | 4.74 (σ = 1.61) | 4.93 (σ = 1.49) | 4.83 (σ = 1.55) |
| Low-level | 5.29 (σ = 0.99) | 4.95 (σ = 1.61) | 5.12 (σ = 1.34) |

Table 3: Mean and standard deviation of psychological ownership by the level of customization and type of features used to customize.

* + 1. *Willingness to pay – Dependent variable*

For the dependent variable, the effect of the independent variable is not significant (T(258) = 0.79, p = 0.21) although the mean for the high-level condition is higher than the low condition (M High = 2006, SD = 1254) (M Low =1881, SD = 1295); therefore, H1 has to be rejected. The effect of the interaction (IV\*MOD) is (F(1)= 2.68, p = 0.10). Although it was so close to being significant, based on the confidence interval stated for this research, we have to reject H3. If we analyze the result by the means of each group, it is possible to see how, in general, the average willingness to pay is higher for the two groups with the utilitarian condition assigned (M Utilitarian-High = 2067, SD = 1324; M Utilitarian-Low = 2242, SD = 1361; M Hedonic-High = 1944, SD = 1188; M Hedonic-Low = 1531; SD = 1132). Table 4 summarizes all the findings regarding the dependent variable.

|  |  |  |  |
| --- | --- | --- | --- |
| Willingness to Pay | | | |
| Level of customization | Hedonic | Utilitarian | Mean |
| High-level | 1944 (σ = 1188) | 2067 (σ = 1324) | 2006 (σ = 1254) |
| Low-level | 1531 (σ = 1132) | 2242 (σ = 1361) | 1881 (σ = 1295) |

Table 3: Mean and standard deviation of willingness to pay by the level of customization and type of features used to customize.

Although, when the one-sided t-tests were performed, the results were not the expected ones, it is possible to highlight that there are some significant differences when some two-sided t-tests were executed. Table 4 contains that information. In it, is possible to see how there is a significant difference in willingness to pay between the two conditions of the moderator.

|  |  |  |
| --- | --- | --- |
| Two-sided t-tests | | |
| Variables | Level of customization | Type of features |
| Psychological ownership | T(258) = -1.60; p = 0.11 | T(258) = 0.44; p = 0.66 |
| Willingness to pay | T(258) = 0.79; p = 0.43 | T(258) = -2.68; p = 0.01 |

Table 4: Coefficients and p-values of individual two-sided t-test.

* + 1. *Hayes Bootstrapping mediation analysis model 8*

To determine the possible mediation-moderation effect in our model, model 8 in the PROCESS macro developed by Hayes was executed. Figure 3 depicts the statistical diagram with all the relevant paths for the model.

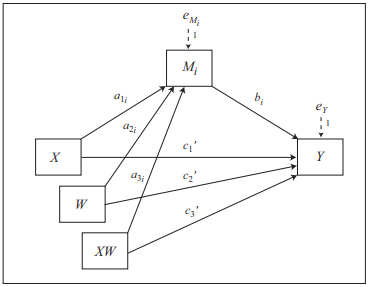


Figure 3: statistical diagram model 8 Hayes.

Table 5 and Table 6 contain the summarized information of the bootstrapping analysis with both variables, psychological ownership and willingness to pay as outcome variables. It is also important to mention that in both models, all the covariates determined for the study were included. For the first model (Table 5), it is important to highlight how this analysis confirms what was determined previously about the interaction between the treatment variables and its influence on psychological ownership (p = 0.128), although is not possible to say that is significant, it was close of being. Regarding the covariates the one with the highest degree of significance was knowledge got by respondents about cars (p = 0.014).

About table 6, it is possible to highlight several things. First is that in this model (model 2) the interaction between the treatment variables and the outcome variable, for this case willingness to pay, is significant (p = 0.039). This is an important output because gives us relevant insights into the moderating role and its influence on the relationship between the level of customization and willingness to pay. Second is the influence of the mediator on the dependent variable (p < 0.001). This result is in concordance with the individual correlation assessment made between both variables (t(258) = 4.280; p < 0.001). Although the correlation coefficient is relatively low due to the scattering in the dataset, there is a significant influence of psychological ownership on willingness to pay. Third, regarding the covariates, again the unique one with a significant effect on the outcome variable was the knowledge got by respondents about cars (p = 0.035).

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model 1 Bootstrapping for Psychological Ownership | | | | |
| Variable | Path | Coeff | SE | P-value | |
| Level of customization (IV) | a1 | .507 | .249 | .046 | |
| Type of features (MOD) | a2 | .329 | .286 | .202 | |
| IV\*MOD | a3 | -.545 | .371 | .128 | |
| Gender (COV) |  | -.291 | .210 | .154 | |
| Car knowledge (COV) |  | .108 | .044 | .014 | |
| Favorite means of transportation (COV) |  | -.129 | .762 | .511 | |
| Age (COV) |  | .327 | .590 | .603 | |
| Model summary |  |  |  |  | |
| Total | .098 |  |  |  | |
| p | .039 |  |  |  | |
| F | 1.771 |  |  |  | |

Table 5: Result of the bootstrapping analysis with psychological ownership as the outcome variable.

Notes: The p-values are two-sided. This means that low p-values show a significant difference between the groups but these probably are not the best to test the previously stated hypotheses. For this model, the base conditions are High-level for the IV and Hedonic for the MOD.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Model 2 Bootstrapping for Willingness to Pay | | | | |
| Variable | Path | Coeff | SE | P-value | |
| Psychological ownership (MED) | b1 | 221. | 54. | .001 | |
| Level of customization (IV) | c1 | -581. | 214. | .001 | |
| Type of features (MOD) | c2 | 142. | 217. | .513 | |
| IV\*MOD | c3 | 627. | 302. | .039 | |
| Gender (COV) |  | -8. | 172. | .963 | |
| Car knowledge (COV) |  | 79. | 37. | .035 | |
| Favorite means of transportation (COV) |  | 500. | 643. | .414 | |
| Age (COV) |  | 531. | 496. | .417 | |
| Model summary |  |  |  |  | |
| Total | .176 |  |  |  | |
| p | .000 |  |  |  | |
| F | 3.233 |  |  |  | |

Table 6: Result of the bootstrapping analysis with psychological ownership as the outcome variable.

Notes: The p-values are two-sided. This means that low p-values show a significant difference between the groups, but these probably are not the best to test the previously stated hypotheses. For this model, the base conditions are High-level for the IV and Hedonic for the MOD.

There are other relevant and interesting insights that could be interpreted through the coefficients. For instance, the coefficient produced in model 1 regarding the independent variable is positive, but in model 2 is negative, this means that, on average, the respondents on the high condition were willing to pay more for the product than those in the low condition; but, at the same time they showed lower psychological ownership compared with the opposite condition related to the independent variable.

When the overall outputs were analyzed to determine if there is moderated mediation effect in the model, the approach, given by Hayes (2022) was followed. According to it, to make inferences regarding the moderated mediation effect involves determining whether an interval estimate, for the direct and indirect paths, includes zero. For the case of this study, the bootstrap interval includes zero (LLCI = -296; ULCI = 44); therefore, there is not enough evidence to support a significant moderated mediation effect in this model. It is not possible to be certain that the indirect effect was caused by the moderator if the confidence interval encompassed zero (Hayes, 2022). Based on the previous statements, the null hypotheses for H5 and H6 cannot be rejected.