

## Factors that Determine the Purchase of Portable Electronic Devices

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### KEYWORDS

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### ABSTRACT

This study establishes whether the link to a specific sector of activity influences consumer purchasing behavior, and the factors that determine that lead them to purchase a portable electronic device. The ornamental stone industrialization sector was selected. A statistical descriptive study was carried out with a sample of 145 consumers involved in processing in the ornamental rock sector. Descriptive statistics, correlation and multiple linear regression analysis were applied for data analysis. The results demonstrate that consumers take into account interconnected factors, such as brand, design and utility, when purchasing a portable electronic device, and they look for a simultaneous application in their professional activities, with little emphasis on new features. Thus, it is concluded that consumers are interested in products with a proven multifunctional application. Future studies could analyze consumer behavior in other economic sectors, as well as proceed with an comparative analysis of the results achieved, which could contribute to improvements in organizational management for micro and small companies in different economic segments.

### PALAVRAS-CHAVE

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### RESUMO

O estudo objetiva verificar se o vínculo a um setor de atividade específico influencia o comportamento de compra do consumidor e os fatores determinantes que o levam a adquirir um dispositivo eletrônico portátil. Foi escolhido o setor de industrialização de rochas ornamentais. Um Estudo Descritivo Estatístico foi realizado tendo como amostra 145 consumidores envolvidos com o beneficiamento do setor de rochas ornamentais. Para a análise dos dados aplicou-se a estatística descritiva, correlação e análise de regressão linear múltipla. Os resultados mostram que os consumidores no momento da compra do dispositivo eletrônico portátil levam em consideração fatores interconectados como marca, *design* e utilidade, e buscam uma aplicação simultânea entre a atividade profissional, com pouca ênfase no aspecto da novidade. Assim, conclui-se a existência de interesse por produtos que atestam sua multifuncionalidade. Estudos futuros poderiam analisar o comportamento do consumidor de outros setores econômicos, bem como proceder uma análise comparativa dos resultados, o que pode contribuir com melhorias na gestão organizacional para as micro e pequenas empresas de diversos segmentos

## 1 Introduction

To a large extent, unrelenting competition has been responsible for the increasing speed in changes that have taken place both within and outside of organizations (Guidi *et al.*, 2018). In this setting, company behavior has demonstrated a significant transformation, which has resulted in these companies giving greater emphasis to individual values, collective competencies and structural reconfigurations, striving for flexibility and dynamism. These qualities require constant change and innovation, which are determinants in organizational performance (Guidi *et al.*, 2017a; Jia & Li, 2016; Tomei & Ferrari, 2010).

Thus, radical or incremental innovation is a means to temporarily achieve a competitive advantage, which is a condition relevant for company participation in current and potential markets. For the client, innovation also makes a difference, since it creates value for personal gain, through the supply of technologically more advanced products (Feldens, Maccari, & Garcez, 2012; Šandová & Grabowska, 2015). However, the high costs generated by the lack of useful information and absence of qualified labor have been, in Kuhl and Cunha's (2013) opinion, the most common obstacles that result in companies delaying their development processes for new products or services.

We highlight that the marketing process, as an innovative tool, greatly assists companies in implementing changes, product design or even with packaging, as well as their positioning, promotion and in establishing prices, with a view to providing a better response to client needs, as well as facilitating the opening of new businesses, or even repositioning a product in an existing market, in the eagerness to improve sales (Jia & Li, 2016; Organisation for Economic Co-operation and Development [OECD], 2005; Šandová & Grabowska, 2015).

Furthermore, programming innovations is a challenging procedure that requires study, time and resources, as well as determination by the managers who make decisions, with a view to overcoming the turmoil caused by these barriers. Among the obstacles, those which are most prominent are of economic, organizational, informational and technical (qualified staff and technical services) origin; however, the existence of other difficulties (cooperation, consumers,

norms and regulations), of equal importance to the previous items (Kuhl & Cunha, 2013), cannot be ignored.

In fact, seeking to understand the importance of the process of presenting new products and services in this setting of accelerated technological development, so, the search problem could be defined as: would their purchasing decisions for these products be influenced by their professional performance?

The main objective of this study is to identify which requirements consumers consider when they decide to acquire gadgets. Seeking to discover the needs and reasons that lead them to obtain new, technologically developed products is justified by the fact that the development of new and/or replacement products is fundamental for a company's long-term success, guarantee Neves & Castro (2003) and Pantano & Priporas (2016). However, as the authors highlight, it is not a simple process, since "the capacity for innovation is the differentiating factor for consumers" (p. 41). Therefore, researching why a client acquires a gadget assists with an organizational vision and justifies obtaining the knowledge required to prospect for new portable electronic devices.

Therefore, this research is equally justified, to a large extent, by an individual's sense of satisfaction with life, and as Costa & Horn (2012) recommend, may be related not only to differences in the objective experience but also to what a person has and their expectations. This said, the reputation of products and the possibility of social interaction that gadgets provide, favor the intensification of their assimilation. Thus, for Crossland, Silva & Macedo (2014), electronic products, such as smartphones, tablets and e-book readers have achieved a marked increase in sales, with a rapid deference to the possibility of accessibility in recent years. In line with McHenry *et al.* (2017), the increase in assimilation is also due to developments in the provider's level of comfort and the possibility of an environment characterized by high levels of technology.

The relevance of this work is to verify the influence of consumer behavior, with regards to the growing search for technologically developed products. So, the search problem could be defined as: would their purchasing decisions for these products be influenced by their professional performance? Thus, paraphrasing Lauterborn (1990), Grönroos (1994, 1996), Gummesson

(2017), Payne & Frow (2017) and Rosenberg & Czepiel (1992), improvements in making the appropriate decisions is required to support this topic, which may provide an insight into what consumers are looking for, or need to attain.

Similarly, Pantano & Priporas (2016) and Eastman & Liu (2012) highlight the relevance of a study concentrating on improving knowledge of consumer behavior in this setting of an increase in portable electronic products, as a promising area that lacks investigation. Consequently, for Rodriguez-Torrico, Cabezudo & San-Martin (2017, p.465), portable electronic devices “are involved in almost 70% of purchasing processes.” Thus, consumer influence in the purchasing decision-making process is highlighted and, according to Gensler, Verhoef & Bohm (2012), this is demonstrated by the possibility of greater interactivity in all stages of the process, such as: research, purchasing and post-sales.

Following this initial chapter, we present the theoretical foundations on the topic and, according to Knopf (2006), should be conclusive. To this end, we do not merely seek to describe a summarized list of what each researcher presents but, instead, focus on the body of work, seen as a whole; in other words, in the spirit of performing a literature review, to provide theoretical support. The methodology used is detailed in the third chapter and data analysis is presented in the fourth chapter. The debate is brought to a close in the fifth chapter, putting forward the final considerations.

## 2 Theoretical Framework

Modern consumer have presented distinct behavioral characteristics, e.g., greater demands, individualism, involvement with the origins of products, independence in personal choices, information and quality of the goods acquired (Capon & Hulbert, 2000). However, despite being vital for the growth, profitability and longevity of Brazilian companies, the development and launch of portable electronic products has become a reality (Zeithaml, 1988).

According to Kratzer, Meissner & Roud (2017) and the OECD (2005), a company is characterized as groundbreaking when it presents an innovative program (e.g., product, process, marketing and organization) during its market evaluation period and is achieved by anticipating tendencies.

Therefore, we highlight that an early understanding of market characteristics is part of the informational strategy with which an operational manager needs to operate, in order to guarantee a competitive advantage over direct and indirect competitors. With this in mind, the organization should aim to learn about the behavior of current and potential clients in advance, in order to adjust in time and, therefore, have better conditions for functionality, service, accessibility, image, deadlines, price, quality and respect for international norms (Grover & Kohli, 2012; Ravald & Grönroos, 1996; Zeithaml, 1988; Zeithaml & Zeithaml, 1984).

According to Costa & Horn (2012), in Brazil the dramatic growth of e-commerce reflects the expansive reality, and the search for gadgets for daily use is presented as a new frontier of consumerism (Guidi, Giuliani & Spers, 2017c). Examining perceived quality in a direct comparison with experience, Costa & Horn (2012) highlight four standards in their observations: a) the gap between what a person has and what this person wishes to have; b) the gap between what a person has and what s/he thinks similar people have; c) the gap between what a person has and what s/he owned in the past that was considered better and d) the difference between what a person has and their expectations.

Starting with competence, represented by the sum of individual know-how, a company can acquire new knowledge for their products, processes and applicability (Grönroos, 1994; Guidi, Spers, & Oliveira, 2017b; Payne & Frow, 2017). With regards to knowledge, this can take place in three ways: a) through social networks with users; b) by identifying perceived opportunities, and c) from other companies, through their capacity for design, and following-up competitor behavior through consumer behavior (Grönroos, 1994; Payne & Frow, 2017).

According to Paiva, *et al.* (2018) and Schumpeter (1961), an entrepreneur's search for new consumer markets leads him/her to cross new frontiers and promote conceptual innovations, with a view towards retaining intensive commercial transactions. These authors see the current technological growth as part of what they call “creative destruction”; in other words, a process that is required in order to prepare companies to replace their old products with new or technological more advanced ones, following the

target market trend.

Generally speaking, for Assis, Serralvo & Prado (2015), Gomes & Pereira (2015), Manfio & Lacerda (2016) and Rozenfeld *et al.* (2006), presenting products consists of a set of activities through which possibilities and possible technological restrictions are sought from the desire for consumption, to achieve ideal specifications. However, we highlight that the conceptualization of new products has basic differences but they all converge towards the definition established by the Oslo Manual, which considers products, based on three attributes: a) really new products; in other words those that do not yet exist in the market; b) products launched to meet client demands, and c) products created to replace existing ones and do not meet client demands (OECD, 2005).

For Peres, Muller & Mahajan (2010) and Saeidi, *et al.* (2015), the main factor for the growth of new products is the heterogeneity of consumers, and not interaction between them. According to their approach, the social system is heterogeneous in innovation, sensitivity and price requirements. Despite this, the market volume dynamic is determined by product distribution facing a fall in prices (Scuotto, Giudice & Carayannis, 2017).

In relation to the factors for success or failure of many companies' products, various definitions can be used, which may lead to different results (Guidi *et al.*, 2017b). For a wide range of organizations, the measure of success is the volume of sales achieved while, for others, it is the profit obtained. There are also those who consider success as a way of improving their market image. The determinants of the success or failure of the same product are different in each company (Cordova, Dolci, & Gianfrate, 2015; Crosetto & Regner, 2014; Mattar, 1982; Ramoglou & Tsang, 2016; Scuotto, Giudice & Carayannis, 2017).

Therefore, the market presents a positive tendency in relation to the search for something new, in terms of innovation, or even products with on-board technology systems<sup>1</sup>, for the development of new products. The economic advantage generated by the success of a new product produces a significant relation, by altering characteristics of company behavior in relation to

the consumer (Story, Boso, & Cadogan, 2015; Tukker, 2015; Urdan & Osaku, 2005; Scuotto, 2016; 2014; Scuotto, Giudice & Carayannis, 2017).

Strategies for product reputation and recommendations of association and content are perceived using the sequential analysis of actions. Along these lines, Henard & Szymanski (2001) present what they consider to be predictions of performance that would lead to success on the launch of a new product: a) marketing proficiency; b) a proficient launch; c) market orientation; d) proficiency in strategic planning activities for products; e) meeting consumer needs; f) marketing orientation; g) dedicated R&D resources; h) technological innovation of the product; i) technological proficiency: applied human resources, and j) market orientation: proficiency in strategic planning activities for products.

Thus, the observation that the importance of success factors usually declines over time and requires new theoretical approaches, in order to better capture the nature of new product development (NPD), is unmistakable. To this end, it may be inferred that the potential to create competitive advantages by understanding NPD factors of success is reduced when knowledge becomes more widespread among managers. On the other hand, consumer behavior has other variables; in other words, a search for a previously recognized problem and also purchasing actions have developed with individual impulses (Evanschitzky, *et al.*, 2012; Costa & Horn, 2012; Rodriguez-Torrico, Cabezudo & San-Martin, 2017).

### 3 Methodology

With the aim of achieving the goals proposed for this research, the methodological investigation strategy observed was a deductive, quantitative and positivist study, with a cross section, since the data had been collected in a single event and summarized statistically. Thus, we organized this article using hypothetic-deductive logic (Hair, *et al.*, 2007; Levine, *et al.*, 2008).

We highlight that an adapted, structured questionnaire was used, taking the foundations proposed by Gade (1998), Davenport & Prusak

<sup>1</sup>On-board technology systems are related to the use of hardware (electronic) and software (instructions), incorporated into a device with a pre-defined objective.

(1998), Santini, *et al.*, (2019), Van Roy & Zaman (2019) and Cromwell *et al.*, (2020) as the basis, which discuss the fact of motivation originating in the individual through instinct, impulses or needs; in other words, they seek to store the data on technology systems, located in various departments, which central information systems departments manage, to improve responses to requests for organizational marketing management. From another perspective, observing the foundations proposed by Lee, Kim & Choi (2019), Grewal, *et al.*, (2019), Muhammad, Dey & Weerakkoky (2018), Ahmad, *et al.*, (2019) and Camurça (2008), who highlight the presence of psychological factors, which are also determinants for the consumer in this process, identified in the following way: for pleasure, profit, self-esteem, social approval, and to avert loss or pain. Thus, among the internal and external factors, we established the questioned criteria for this research that led a consumer to acquire a specific product, thereby improving the understanding of the power of the need for satisfaction and the background to purchasing decisions.

When gathering the data, there was neither persuasion nor personal insistence, in relation to the respondents during application of the questionnaire. From the structured questionnaire a total of 185 respondents replied by the end of the established timeframe. From this total, at the end of the specified period, only 145 questionnaires were considered valid, therefore forming the final sample, henceforth called the “sample”. This result demonstrates a very low number of non-valid responses.

We opted to use primary, instead of secondary data, to undertake this research. The target population was specifically made up of consumers who had acquired portable electronic devices in the last 24 months, on account of the considerable increase in sales in recent years. The above-mentioned sample was made up of employees at micro and small companies, who work in the ornamental stone processing sector in the southeast region of Brazil. Thus, the sample unit of this research is made up of “elements of the population who will be submitted to the sampling” (Malhotra, 2012, p.272); in other words, collaborators at micro and small companies who are involved in the ornamental stone processing sector in the southeast region of Brazil, since this region has the largest technological development in

this area. Therefore, we define the classification of the sampling techniques as non- probabilistic and selected for convenience, since this technique uses random selection, the researcher’s criterion, and availability of the sample unit (Malhotra, 2012; Creswell, 2014).

Since the researchers were not present on application of the questionnaire, it was made up of closed questions, which are easy to apply and analyze, accompanied by clear and specific instructions (Creswell, 2014). Since the characteristics of the population were inferred from a sample, an error factor was introduced to the process, with regards to the real difference between the sample and the population (Hair *et al.*, 2007; Levine *et al.*, 1998; Levine *et al.*, 2008). The data was collected during the period between December 31, 2013 and June 10, 2014.

Before the instrument was applied, it was duly validated using Cronbach’s Alpha, to discover if the construct scales correctly represented the respective concepts. We measured all the variables in Likert or semantic differential scales, with five, mutually exclusive, ordinal points.

We used the multiple regression analysis technique, which is made up of a combination of independent variables, in order to better understand the variable dependent, from an analysis of the results attained. We performed the premises of homoscedasticity (Breusch-Pagan), the absence of multicollinearity (FIV), serial autocorrelation (Durbin-Whatson), and normality of the residuals (Kolmogorov-Smirnov) (Hair *et al.*, 2007; Levine *et al.*, 1998; Levine *et al.*, 2008).

To continue, we adopted the multivariate approach, to analyze the structures in the internal relations between the variables, favoring use of the exploratory factor analysis (EFA) technique, which was proceeded by the principal component analysis method, use of Varimax orthogonal rotation and Kaiser normalization, in order to provide the variables, observed from the created factors. We also undertook the following procedures during this phase of analysis: analysis of internal consistency reliability by calculating the Cronbach’s Alpha coefficient; Bartlett’s test of sphericity, significant to the level of 5%, and the Kaiser-Meyer-Olkin – KMO test. Similarly, we also observed the cluster analysis and multidimensional scaling. The level of significance used in all the analyses was 5% (Creswell, 2010; Hair *et al.*, 2005; Levine, *et al.*, 2008; Stevenson,

1986). We performed all the statistical procedures using SPSS 22 software.

#### 4 Analysis

With regards to sample characterization, it was made up of both male (63%) and female (37%) respondents, with an age variation of between 25 and 55. The vast majority of the respondents had an average income of between seven and ten minimum salaries per month. They were all identified as being regularly employed, as participants in a formal activity, and small business owners, operating in the ornamental stone processing sector in the state of Espírito Santo. Their main activities were not identifiable.

In relation to the descriptive statistics (Table 1), we noted that, on average, the consumers represented in the sample are indifferent to the importance of the New Features (X14) variable when purchasing their gadgets, since the average is very close to 3. The Professional Activity (X11) variable presents an average close to 4, indicating that, on average, the sampled individuals partially agreed with the importance of its application in their professional activity, with regards to purchase and use. Following the same line of interpretation, the Status (X10) variable average was 2.3103, and this demonstrates that the sampled individuals partially disagreed with the importance of status at the time of acquisition. For the Exclusivity (X13) variable, the average of 2.5586 indicates that the individuals in the sample position themselves between partially disagree and being indifferent, in relation to the importance of exclusivity.

**Table 1: Descriptive Statistics**

Variable	n	Mean	Std. Deviation
<b>X1 = Brand Reliability</b>	145	4.0966	1.0496
<b>X2 = Product Design</b>	145	3.9241	0.9866
<b>X3 = On-Board Technology</b>	145	4.4414	0.6548
<b>X4 = Price</b>	145	3.4621	1.1961
<b>X5 = Practical Use</b>	145	4.3034	0.8844
<b>X6 = Advertising</b>	145	2.7379	1.1181
<b>X7 = Family/Friends</b>	145	2.4621	1.2528
<b>X8 = Self-Esteem</b>	145	2.2276	1.2458
<b>X9 = Cost-Benefit</b>	145	3.8069	1.0158
<b>X10 = Status</b>	145	2.3103	1.2333
<b>X11 = Professional Activity</b>	145	3.8414	1.2838
<b>X12 = Off-The-Shelf</b>	145	2.9448	1.2178
<b>X13 = Exclusivity</b>	145	2.5586	1.1895
<b>X14 = New Features</b>	145	3.0069	1.2275

**Note:** Generated by the Statistical Package for Social Sciences (SPSS) statistical software.

**Source:** Prepared by the authors.

The coefficient of variation (CV) presents a better sense of data dispersion. Therefore, it is a measure that associates the standard deviation with the average; in other words, it provides the variation of the data obtained in relation to the average. In this case, the higher this coefficient, the more heterogeneous the data obtained (Creswell, 2014; Hair *et al.*, 2007). Thus, data variability is better described through CV. With regards to the percentage of data variability analyzed, the Status (X10) variable has 53.38%, Professional Activity (X11) 33.42%, Exclusivity (X13) 46.49% and New Features (X14) 40.82%. Based on this data, the standard deviation for these variables has a relatively high value and indicates the dispersion of the sample data, i.e., how much they differ from the average (Hair *et al.*, 2007). It was also confirmed that the standard deviation of the sample presents high values. For the four variables analyzed above, the standard deviation varies between 1.19 and 1.29, with these values being relatively high, when compared with approximate averages of 2.60 and 3.80 respectively.

The positive correlations, as per Table 2, indicate that when one variable increases, the other also rises. In a negative correlation, the increase in the value of a variable is associated to a reduction in the value of another. This statistical analysis only evaluates linear associations, excluding any other format. They may vary between -1 and 1, with the closest to 1 in module, the stronger the correlation, and the closer to zero, the weaker the correlation, thereby indicating that a variable is not very linearly associated with the other (Creswell, 2014; Hair *et al.*, 2007).

The New Features (X14) variable only presents significant correlations with the Price (X4), Advertising (X6), Family/Friends (X7), Self-esteem (X8), Status (X10) and Off-The-Shelf (X12) variables, and application in Professional activity (X11). They are all positive and, between them, those that display a lower coefficient are Price (X4) and Off-The-Shelf (X12). Although the Professional Activity (X11) variable does not have a significant correlation with the New Features (X14) variable, as highlighted in Table 2.

**Table 2: Correlation of variables matrix**

Correlation															
A	X1 = Brand reliability	1.0000													
B	X2 = Design	0.3089	1.0000												
C	X3 = On-Board Technology	0.3821	0.2457	1.0000											
D	X4 = Price	-0.1796	-0.0289	-0.0405	1.0000										
E	X5 = Practical Use	0.1103	0.0743	0.3547	0.0438	1,000									
F	X6 = Advertising	0.1164	0.2525	0.1591	0.0704	0.1933	1.0000								
G	X7 = Family/Friends	-0.0394	-0.0501	0.0713	0.2782	0.1546	0.4638	1.0000							
H	X8 = Self-Esteem	-0.1444	-0.1215	-0.0133	0.1526	0.1134	0.3821	0.5728	1.0000						
I	X9 = Cost-Benefit	0.0567	0.2139	0.0768	0.3540	0.2357	0.0652	0.0433	0.0295	1.0000					
J	X10 = Status	-0.0609	0.0024	0.0356	0.1092	0.0850	0.3565	0.4728	0.5548	-0.0405	1.0000				
K	X11 = Professional Activity	0.3206	0.0946	0.1582	0.0164	0.1895	0.1111	-0.0275	-0.0511	0.2479	-0.0652	1.0000			
L	X12 = Off-The-Shelf	0.0477	0.2161	0.0656	0.2894	0.1639	0.1984	0.2398	0.1411	0.3899	0.1502	0.3364	1.0000		
M	X13 = Exclusivity	0.0121	0.1488	0.0290	0.2029	0.1678	0.2936	0.3754	0.4432	0.0841	0.3165	0.0766	0.4433	1.0000	
N	X14 = New Features	-0.0868	0.0750	0.0048	0.1681	0.1580	0.1936	0.2688	0.3577	-0.0323	0.4022	-0.1623	0.1954	0.4206	1.0000

**Note:** Generated by the Statistical Package for Social Sciences (SPSS) statistical software.

**Source:** Prepared by the authors

Multiple linear regression, as per Table 3, explains the New Features(X14) variable through the Exclusivity (X13), Status(X10) and Professional Activity (X11) variables. Table 3 indicates that the  $R^2$  for the model is 0.286. This means that the percentage of 28.6% variability of the New Features(X14) variable is explained by the Exclusivity (X13), Status (X10) and Professional Activity (X11) variables; or rather, it means that the 28.60% variation of the return (dependent variable) may be explained by three independent variables (Hair *et al.*, 2007).

From the ANOVA F-test, we observed that the model presented is significant ( $p=0.19$ ). We highlight the inexistence of multicollinearity, since the Variance Inflation Factor (VIF) values were less than 5 (Hair *et al.*, 2007; Levine *et al.*, 2008). Through the Variance Inflation Factor (VIF) values presented, as per Table 3, the inexistence of multicollinearity (Wooldridge, 2007) can be assumed. The homoscedasticity test states that the homoscedasticity hypothesis can be accepted and the randomness test states that the randomness hypothesis can be accepted. The Kolmogorov-

Smirnov adherence test states that the hypothesis of adherence to normal distribution can be accepted. There is an absence of serial autocorrelation, since the Durbin-Watson test value was 2.2 (Hair *et al.*, 2007; Levine *et al.*, 2008).

Observing the levels of significance, we noted that all of the model variables are significant, where, with each 1 point increase on the Status variable, there is an average increase in the New Features variable of 0.36 points. Therefore, we highlight that there is a positive correlation; in other words, the increase in the Status variable influences an increase in the New Features variable. Similarly, we noted that with each 1 point increase on the Professional Activity variable, there is an average increase in the New Features variable of 0.28 points, and with each 1 point increase in the Exclusivity variable, there is an average reduction in the New Features variable of 0.16 points. Therefore, the null hypothesis that there is no relation between the variables (Table 3) can be rejected.

**Table 3: Association of the New Features variable with Status, Professional Activity and Exclusivity**

Variable dependent – New Features	B	Standard error	t	p value*	95% confidence interval for B		VIF
					Lower limit	Upper limit	
Status	0.355	0.078	4.566	< 0.001	0.202	0.059	1.123
Professional Activity	0.281	0.075	3.744	< 0.001	0.133	0.429	1.121
Exclusivity	- 0.163	0.069	-2.376	0.019	-0.298	-0.027	1.015

F = 5.645

p value (F) = 0.019

Durbin-Watson = 2.218

R<sup>2</sup> = 28.60%

B - Coefficient; t – Test statistic; \*. Multiple linear regression; VIF – Variance inflation factor; statistically significant if p&lt;0.050.

Source: Prepared by the authors.

Exploratory factor analysis (EFA) is a multivariate technique (Table3) that approaches the problem of analyzing a structure of correlations between a high number of variables, reducing their dimension in to factors. To this end, the higher the factor loading, the higher correlation perceived (Hair *et al.*, 2007). The Product Design (X2) variable was disregarded during this process. Thus, 14 variables were reduced to 13 and then to only 4 factors. Therefore, from the 13 variables, with 145 observations, 4 factors were obtained with 145 observations. We observed data reduction, with a 39.282% loss in the total variance of the data observed in the model.

According to Aranha & Zambaldi (2008) and Bruin (2006), the initial eigenvalues are values obtained from the covariance or correlation matrixes, where the aim is to obtain a set of independent, uncorrelated vectors that explain maximum data variability. Thus, they indicate the total variance caused by each factor. Consequently, the sum of all the eigenvalues is equal to the number of variables: 13 in this case. The selection of 4 factors was achieved from an evaluation of the higher eigenvalues, or those close to 1, and their total variability. Therefore, the external influence factor had the highest value (eigenvalue =3.346); the second was the Delivery-Price factor (eigenvalue =2.036); the third was the Professional-Reliability factor (eigenvalue =1,528) and the fourth the Brand-Use factor (eigenvalue =0.993).

Proceeding, also in line with Aranha & Zambaldi (2008), a variance total of 60.718% was

confirmed; in other words, the accumulated variance percentage explained by the factors was higher than 50%, which is the minimum accepted, according to Marôco (2010). The internal consistency of each factor was considered substantial; in other words, between 0.61 and 0.80.

For an analysis of the results and classification reliability, using the Cronbach's  $\alpha$  coefficient calculation, according to the limits presented in order of importance, a value above 0.5 ( $\alpha > 0.50$ ) is considered acceptable. Thus, we concluded that: a) component 1 has  $\alpha = 0.796$ , a value which is considered high; in other words, there are inter-correlations among its variables in the external influences component; b) component 2 has  $\alpha = 0.605$ , a value considered moderate and, therefore, it is also concluded that there are inter-correlations among the variables in the price/delivery component, and c) the other components, 3 and 4, as presented, also demonstrate an internal consistency.

We noted that the first factor, 'External influences', principally explains the Self-Esteem, Status, Family/Friends, Exclusivity, Advertising and New Features variables. The following factor, called 'Delivery-Price', principally explains the Cost-benefit, Price and Off-The-Shelf variables. Factor 3, 'Professional-Reliability', principally explains the Professional Activity and Brand Reliability variables. Factor 4, 'Brand/Use', principally explains the On-Board Technology and Practical Use variables. Thus, achieving the goal of identifying which requirements consumers consider when they decide to acquire gadgets, we identified, through EFA, that needs and external influences are relevant factors. Therefore, the



external influences factor was of greater relevance; it was also characterized by a higher number of variables and was responsible for 25.74% of the variance explained. Thus, it corresponds to a use requirement, connected to external aspects, and, therefore, self-esteem, status, the influence of friends and relatives, the possibility of exclusive use and the influence of advertising are elements that, together, are put forward as the strongest for decision-making on acquisition. Therefore, they are the most sensitive elements perceived by consumers.

Therefore, the Delivery-Price factor is responsible for 15.66% of the explained variance, and corresponds to the cost-benefit implicit in the product, and Off-The-Shelf, together with the

desire to acquire. Thus, external influences and the product being Off-The-Shelf were the main elements explained by F1 and F2.

Proceeding, the professional reliability factor is responsible for 11.68% of the explained variance and corresponds to the possibility of use in professional activities, concomitant with the guarantees required with product quality. And, lastly, but no less importantly, the Brand-Use factor is responsible for 7.64% of the explained variance, and corresponds to the obligation perceived by consumers with use, linked to electronic elements and instructions incorporated into the product; in other words, with the intention of considering a predefined design.

**Table 4: Factors, factor loading, Cronbach's Alpha, Eigenvalue and % of Total Variance**

Variables	Components				Cronbach's Alpha	Eigenvalue	% of variance
	Factor 1 (F1) External Influences	Factor 2 (F2) Off-The-Shelf	Factor 3 (F3) Professional - Reliability	Factor 4 (F4) Brand - Use			
Self-Esteem	0.798						
Status	0.759						
Family/Friends	0.755				0.796	3.346	25.739
Exclusivity	0.640						
Advertising	0.637						
New Features	0.562						
Cost-Benefit		0.764					
Price		0.709			0.605	2.036	15.661
Off-The-Shelf		0.669					
Professional Activity			0.770		***	1.518	11.676
Brand Reliability			0.683				
On-Board Technology				0.791	***	0.993	7.642
Practical Use				0.779			
Total	-	-	-	-	-	-	60.718

Extraction method: Principal component analysis.

Rotation method: Varimax with Kaiser normalization

Source: Prepared by the authors.

According to Aranha & Zambaldi (2008) and Hair *et al.* (2007), the X8, X10, X7, X13, X6 and X14 variables are correlated, since they have a high communality value, or rather, application of self-esteem, status, family/friends, exclusivity, advertising and new features are related to the evaluation the consumer makes of external influences (F1). Therefore, the X9, X4 and X12 variables, are equally correlated, since they present a high communality for these variables; in other

words, the application of cost-benefit, price and off-the-shelf are related to the evaluation the consumer makes of price/delivery(F2) (Table 4).

In order to verify the presence of a significant correlation between the variables, we applied the Kaiser-Meyer-Olkin test and Bartlett's test of sphere city. The Kaiser-Meyer-Olkin (KMO) test provided the result of 0.722, considered satisfactory, since it is higher than the minimum value suggested of 0.6, as demonstrated in Table 5. Therefore, it is demonstrated that the multivariate analysis of the data is adequate. It is

also noted that the it is an adequate sample, or there is a partial correlation between the variables (Bruin, 2006).

From the result of Bartlett's test of sphericity, the null hypothesis should be rejected. The correlation matrix is an identity matrix, where the variable correlates exactly with it ( $r=1$ ), but does not correlate with the other variables ( $r=0$ ). The test provided the  $p$  value  $< 0.001$ . (Table 5). Therefore, the application of factor analysis is adequate and the factors explain the high proportion of data variability (Aranha & Zambaldi, 2008; Bruin, 2006).

**Table 5: KMO and Bartlett's Test**

Kaiser-Meyer-Olkin measure of sampling adequacy.				0.722
Bartlett's test of sphericity	Chi-square approximation			448.166
	gl			78
	P value			< <b>0.001</b>

Source: Prepared by the authors.

It is also perceived that the variables (X11) and (X1) have a high communality value; in other words, application of 'professional activity' and 'reliability of a known brand' is also strongly related to the evaluation the consumer makes of 'professional-reliability' (F3). Proceeding, it is confirmed that the On-Board technology (X3) and Practical Use (X5) variables have a high communality value and therefore are strongly related to the evaluation the consumer makes of 'brand/use' (F4). Thus, in almost all the variables, the communality value was higher than 0.5, and only X14 obtained a lower value but was still close, as presented in Table 6.

To summarize, the communalities represent the explanatory percentage that a variable obtained on the factor through factor analysis, where values under 0.50 should not be considered (Mâroco, 2010). The highest communalities were observed for the On-Board Technology (0.691), Professional Activity (0.684) and Practical Use (0.679) variables, and all of the remaining ones were higher than 0.50. This indicates a good explanatory power, with the exception of the New Features variable, which obtained the value of 0.469. However, this was not removed, since this variable is important for researchers.

**Table 6: Communalities**

Variable	Initial	Extraction
X1 = Brand Reliability	1.000	0.626
X3 = On-Board Technology	1.000	0.691
X4 = Price	1.000	0.594
X5 = Practical Use	1.000	0.679
X6 = Advertising	1.000	0.506
X7 = Family/Friends	1.000	0.588
X8 = Self-Esteem	1.000	0.652
X9 = Cost-Benefit	1.000	0.644
X10 = Status	1.000	0.588
X11 = Professional Activity	1.000	0.684
X12 = Off-The-Shelf	1.000	0.661
X13 = Exclusivity	1.000	0.512
X14 = New Features	1.000	0.469

**Extraction Method:** Principal Component Analysis.

**Note:** Generated using SPSS 22 statistical software.

Source: Prepared by the authors.

## 5 Conclusion

Thus, the relevance of marketing as a tool to sell the ideas that new product innovations require was also analyzed, in the theoretical foundation, which enables new studies to understand the value of this, as a way of learning, influencing and acting, in a hyper-competitive market

The statistical model provides an approximation and, therefore, the data, while not being completely true, may be close to reality. Thus, the model applied presents the relevance of the research, based on the sample attained, and considers the coverage of its results.

In response to the research problem; in other words, the requirements that consumers take into consideration when they decide to purchase portable electronic devices, it was noted that, *a priori*, the choices take place, striving for a simultaneous application between professional activity and other external activities, with moderate a tendency towards the new feature aspect. Consequently, based on the data obtained, we can confirm that these consumers essentially take into consideration a group of interconnected requirements at the time of the respective choice. To this end, we primarily highlight brand conceptualization, product design and their related applications to professional activity. We noted that the "professional activity" aspect was intrinsically connected to other activities related to the external

factors highlighted. We also observed the existence of a demand for products that have a proven, multifunctional application.

We highlight that the results indicate that the external environment exercises a strong influence on the organizational environment, requiring a proactive and innovative approach. Thus, we note that the need to implement and use online strategies to obtain organizational objectives, and improve the creation of value for consumers, allied to productivity, is implicit.

In addition, the following variables were highlighted: brand reliability, product design, on-board technology, price, practical use, advertising, family/friends, self-esteem and cost-benefit, as key elements in persuading clients to acquire a new product, with a technological profile, and practical use.

This result suggests standards of comparison in the correlation between these findings and those of Costa & Horn (2012), who researched the relationship of the perception of quality in portable electronic products. Therefore, we put forward their recommendations of product reputation, the possibility of individual or collective online interaction, and a better possibility for sequential analysis of behavioral actions as the main strategies observed.

Thus, the main correlated results in these findings suggest that the principal attributes of professional activity, which are coherent, are: brand reliability, product design, on-board technology and practical use.

## 6 Implications and Further Research

Therefore, we highlight the relevance of propagating innovative ideas. We suggest that the consumer profile for portable electronic device sin confirmed in expanded samples in future research. Future studies could then focus on the satisfaction of acquiring these products, in relation to what consumer shave, and what they wish to acquire, striving for constant innovation.

The limitations of this research focus on the lack of a probabilistic generalization. This technique could be used by future researchers for a comparison with this research data and statistical descriptive studies that confirm the consumer profile in expanded samples

Based on this research, future studies should analyze consumer behavior based on

academic criteria, as well as an analysis of the results achieved, which may improve organizational management for micro and small companies in the segment analyzed. In an increasingly interconnected world, an improvement in speed of access to information for academics, as well as an analysis of the results achieved could improve organizational management for micro and small companies in this sector, since this improvement enhances management capacity and market communication.

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