REVISTA DESIGN & TECNOLOGIA
ISSN: 2178-1974
2024, Vol. 14, No. 29
DOI 10.23972/det2024iss29pp51-61

PGDESIGN
www.pgdesign.ufrgs.br

Analysis of the influence of the color aesthetic element on trust in mobile commerce interfaces

Renata J. L. Kormann[1]; Rafael Tezza[1]; Ana P. Kieling[1]

1 *Programa de Pós-Graduação em Administração, Departamento de Administração, Universidade do Estado de Santa Catarina*

ABSTRACT

Mobile commerce has become increasingly integrated into daily life, primarily due to the ease with which consumers can access applications on tablets and smartphones. In this context, the element of color appears to play a significant role in shaping user experience and consumer behavior. This study adopts a descriptive approach to analyze the influence of color as an aesthetic element on the trust perceived by m-commerce consumers. The paper begins with a theoretical framework on mobile commerce, followed by a review of the literature on trust in m-commerce, human-computer interaction (HCI), and color aesthetics. A quantitative survey consisting of 15 ordinal scale items was developed and administered to a sample of 361 m-commerce users to test four research hypotheses. The study employed screens simulating the consumer's purchasing journey within a shopping app, maintaining the same interface structure while varying the colors displayed for each group. Statistical analysis was conducted to evaluate the correlation between aesthetic perception and trust, the impact of color variations on trust perception, and their suitability for m-commerce users. The findings revealed a correlation between aesthetic perception and trust, with the color gray contributing to a higher perception of trust compared to blue and orange. Additionally, the data indicated that users were sensitive to changes in color arrangements on m-commerce platforms. The primary managerial implication of this study is its guidance for website development and design to enhance consumer trust—a critical factor for companies' marketing strategies and customer success. This can be achieved by incorporating neutral colors into app interfaces and prioritizing usability.

KEYWORDS

M-commerce;
Trust;
Aesthetics;
Color.

Análise da influência do elemento estético cor na confiança em interfaces de comércio móvel

RESUMO

O comércio móvel tem se tornado cada vez mais presente no dia a dia, principalmente pela facilidade dos consumidores acessarem aplicativos em tablets e smartphones. Nesse contexto, o elemento cor parece desempenhar um papel importante na experiência do usuário e no comportamento do consumidor. O presente estudo é descritivo e analisa a influência da cor como elemento estético na confiança percebida pelos consumidores do m-commerce. Inicialmente, o artigo apresenta o referencial teórico do comércio móvel, seguido da literatura sobre confiança no m-commerce, bem como de HCI e estética das cores. Uma pesquisa quantitativa survey com 15 itens foi desenvolvida e aplicada a uma amostra de 361 usuários de m-commerce para testar quatro hipóteses. Esta pesquisa utilizou telas que simulam a trajetória de compra do consumidor no aplicativo de compras, mantendo a mesma estrutura de interface, e alterando as cores apresentadas para cada grupo. Análises estatísticas foram realizadas para testar a correlação entre percepção estética e confiança, a influência das mudanças de cor na percepção de confiança e a adequação para usuários de m-commerce. Como resultado, verificamos que existe correlação entre percepção estética e confiança e que a cor cinza contribuiu para um aumento dessa percepção em relação às cores azul e laranja. Além disso, os dados mostraram que os usuários parecem perceber mudanças na disposição das cores em um site de m-commerce. A principal contribuição gerencial é orientar o desenvolvimento e design de websites com maior percepção de confiança do consumidor, o que tem se mostrado crucial para a gestão das estratégias de marketing das empresas e sucesso do cliente. Isso pode ser feito por meio do uso de cores neutras nas interfaces dos apps e investindo na usabilidade.

PALAVRAS-CHAVE

M-commerce;
Confiança;
Estética;
Cor.

CONTATO: Ana P. Kieling – *anakieling@gmail.com*

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1. INTRODUCTION

As more products resulting from technological advances become part of everyday life, more tasks require using smartphones, which are widely accessible devices. With the proliferation of websites that provide identical products, services, or information, e-commerce has to find new ways to remain competitive (TANG, 2019).

Mobile commerce or m-commerce is a concept that refers to commercial activity through a mobile device. However, e-commerce and m-commerce are practices not yet universalized (LI; YEH, 2010). Previous studies identified critical factors, presented different ways to increase user trust in m-commerce, as well as explained the advantages of using e-commerce, whether mobile or not (HUSSAIN ET AL., 2017; MARRIOT, WILLIAMS, 2018; RIND ET AL., 2017; SARKAR ET AL., 2020). These authors bring up some of the challenges in using m-commerce, such as low trust in e-commerce, consumer's perceived risk, lack of enthusiasm caused by lack of trust, perceived security, quality of service, or quality of information. They also point out possible solutions to prevent or circumvent such barriers in adopting e-commerce.

M-commerce market is developing, and potential consumers are still cautious and unfamiliar with most of its features, aggravating the feeling of uncertainty (Liébana-CABANILLAS ET AL., 2017; SARKAR ET AL., 2020). User experience has become a topic of concern for professionals and researchers. In addition to ease of use, this experience includes other cognitive, sociocognitive, and affective/emotional aspects of the user's experience in their interaction with artifacts, such as user pleasure, aesthetic experience, desire to repeat use, playfulness, and improved mental models (LAW, VAN SCHAIK, 2010). Among the various factors influencing a good user experience on web and mobile platforms, aesthetics has been gaining ground as an initial strategy to retain customers in a market with many options.

Some authors explain aesthetics as the main factor influencing a website's first impression (THIELSCH ET AL., 2013). Following Lavie and Tractinsky (2004), studies investigate the subjective effects of aesthetics, such as, for example, the involvement between aesthetics and online trust (Hussain et al., 2017; Li and Yeh, 2010), in the first impression, overall impression, and intentional outcomes (Thielsch et al., 2013) and also the objective effect of aesthetics on website performance (MOSAGHEN ET AL., 2009; REPPA, MCDOUGALL, 2015).

Thus, the literature shows an interest in understanding the design experience widely from the user's perspective (LAVIE, TRACTINSKY, 2004). Several elements have been identified in different studies as components of online aesthetics: visual attractiveness and design quality (WANG ET AL., 2010; LORENZO-ROMERO ET AL., 2013, XU ET AL., 2019), color (LING, SCHAIK, 2008; HA, 2019, KUO ET AL., 2022), usability (NIELSEN, BUDIU, 2014; SCHREPP ET AL., 2021), and layout (RAMEZANI ET AL., 2020). This research is limited to analyzing the aesthetic element of color associated with the perception of trust in m-commerce.

Groß (2016) suggests that m-commerce involves potential risks for the consumer, and trust plays a crucial role, especially in the online environment. Liu and Goodhue (2012) address consumer trust in returning to a website, seeking the cognitive factors of perceived trust in websites. Guo et al. (2013) explored the return to a website based on gained trust and showed that satisfaction with the first experience on the website could positively affect customer trust, which can lead to repurchase. For Kumar et al. (2018), an attractive visual aesthetic can significantly influence user purchase intentions.

This research analyzes the influence of the aesthetic element of color on trust in m-commerce interfaces in the Brazilian context. As specific objectives, this study aimed to a) examine the relationship between aesthetic perception and trust in m-commerce interfaces, b) investigate the influence of color on the perception of trust in m-commerce interfaces, and c) analyze the influence of color on the perception of service suitability in m-commerce interfaces.

The remainder of this article is structured as follows: Section 2 discusses the literature; Section 3 describes the data and the proposed model; Section 4 presents the empirical finding; Section 5 discusses practical implications; and Section 6 concludes with the main findings and suggestions for future research.

2. THEORETICAL FRAMEWORK

This work is related to a variety of disciplines across information systems and marketing. To help address our research questions, we discuss the most relevant streams of literature: 1) M-commerce; 2) Trust in M-commerce; 2) Aesthetics and human-computer interaction; 3) Aesthetics and colors.

2.1 M-commerce

With technological advances and external factors such as the COVID-19 pandemic, mobile commerce has grown exponentially, gaining ground from traditional e-commerce. This sales channel stands out in several segments, such as retail, financial products, and services, being conveniently accessible via smartphone (NGUBELANGA, DUFFET, 2021).

Xu and Yang (2012) differentiate m-commerce and e-commerce conceptually, pointing out the context of access and the technology involved. While e-commerce is predominantly operationalized through a browser, access to m-commerce is via other access protocols, depending on the range used, such as via satellite, 4G/5G, Bluetooth, and Wi-Fi (ZHANG ET AL., 2004). Regarding mobile devices, equipment connectivity is a key differentiating factor.

M-commerce has attracted the interest of researchers in recent years due to technological growth, innovative character, and different applications (KHAN ET AL., 2015). Previous studies have explored topics such as user perception and consumption preferences (ZANQUET ET AL., 2022; BORBA, TEZZA, 2021), use of applications in services (HUR ET AL., 2017), the process of acceptance and satisfaction with new technologies (LIÉBANA-CABANILLAS ET AL., 2017; OFARI ET AL., 2018), and design and usability (WANG ET AL., 2021; NIELSON, BUDIU, 2014). Even with its expansion, many consumers remain cautious about its use, increasing uncertainty (SARKAR ET AL., 2020). Therefore, building trust plays a decisive role in m-commerce (CHANG ET AL., 2019), and the applications' design and aesthetics are among the factors influencing user trust and security.

2.2 Trust in M-commerce

Trust in electronic commerce is a topic that has gained attention over time. Bart et al. (2005) showed the psychological state of understanding the intention to accept a particular vulnerability and, in return, to have a positive expectation fulfilled. According to Li and Yeh (2010), five website characteristics are responsible for structuring consumer trust: website personalization, ease of entry and navigation, legibility of display, accuracy, and richness of information. This research addresses the characteristics of the website design and the perceived trust from the aesthetics.

For Kim and Park (2013) and Oliveira et al. (2020), it is possible to categorize trust into two types: cognitive and emotional. Cognitive trust is consumer trust based on what the user believes or expects from the website, with three

dimensions: integrity, benevolence, and competence. Emotional trust is based on the experiences that the consumer has experienced with the website, the way the relationship was conducted, the perceived security of the website, and the company's solidity.

Researchers have suggested that trust is the most significant factor for success in an online environment. According to Siau and Shen (2003), trust in m-commerce can be divided into two categories: trust in mobile technology and trust in mobile suppliers. Trust has been treated in studies under the view of consumer's intention in e-commerce or in terms of the impact of this trust, but in a comprehensive way concerning consumer perception and intention in e-commerce (AL-KHALAF, CHOE, 2019; RIND ET AL., 2017; THONGPAPANL ET AL., 2018; TROJANOWSKI, KULAK, 2017). Therefore, hypothesis 1 is:

H1: There is a correlation between the perception of aesthetics and trust in m-commerce websites.

Researchers address the framework of the website by observing the perception of the aesthetic elements as a whole and their influence on the consumer's perception of trust (HUSSAIN ET AL., 2017; IBRAHIM ET AL., 2011; LI, YEH, 2010). Some authors address the risks involving the consumer and their trust in an m-commerce website (GROß, 2016; MARRIOTT, WILLIAMS, 2018). Others bring the importance of trust in m-commerce in general (GUO ET AL., 2013), as well as the antecedents and consequences of trust in m-commerce (SARKAR ET AL., 2020).

In terms of design, Hussain et al. (2017) point out that design elements increase trust in using m-commerce, mainly due to navigability, readability, credibility, and relevant content. For Li and Yeh (2010), the website's characteristics influence trust building when they are perceived as productive, easy to use, and customizable by customers. The authors also found evidence that design aesthetics may increase the success of website features in a stationary internet environment. Their research shows how aesthetics can influence the experience in m-commerce and affect consumer trust in mobile sellers.

2.3 Aesthetics and Human-Computer Interaction

Historically, aesthetics is connected to beauty. This concept of "beauty" emerges from art and elements of nature, and according to the traditional Platonic philosophical thought, there is a hierarchy where the "beauty" of nature was superior to that of art (SUASSUNA, 2012). According to Lipovetsky and Serroy (2013), aesthetic manifestations and the constant search for harmonic aspects single out an era or society, affecting the humanization and socialization of the senses.

Researchers have been looking for aesthetic aspects in human-computer interaction (HCI). Gait (1985) was one of the first to raise this issue, arguing that interfaces with more aesthetic appeal increase the interest and effectiveness of a website. Mbipom and Harper (2009) explain that the visual aesthetics of graphical interfaces is determined by the positive or negative evaluation of the system's qualities throughout the ordered content presentation.

According to Król and Zdonek (2020), a high-quality website has an attractive design, is aesthetically pleasing, and inspires credibility. The authors clarify that graphic elements can arouse the user's interest and induce them to perform a specific action, which in e-commerce can be the key to clicking on the 'buy' button and completing the purchase. A product's visual appearance is the first thing that connects a potential buyer (BLOCH ET AL., 2003).

Some interfaces are designed so that the user experience is more positive and that the user can achieve their goal most efficiently (TUCH ET AL., 2012). According to Barbosa et al. (2021), HCI comprises interface, interaction, and affordance. Interaction is a process through which the user formulates an intention, plans their actions, acts on the interface, perceives and interprets the system's response, and evaluates whether they achieved their goal. The interface, in turn, is the user's means of contact with the system, which can be physical (motor or perceptual) or conceptual. Affordance is the set of hardware and software characteristics the user perceives that indicate what they can do during interaction.

Lavie and Tractinsky (2004) classify aesthetics as classical and expressive. The first emphasizes order in design, as in the classical aesthetics of antiquity. It is described by traditional notions such as "clean", "clear", and "well-organized". Expressive aesthetics stresses the designer's elegance and is described with adjectives such as "fascinating", "original", and "sophisticated". This research chose classic aesthetics so that the most expressive elements would not affect the consumer's perception.

Oyibo and Vassileva (2020) state that perceived aesthetics refers to how much a person believes a website is visually attractive and pleasing to the eye. In this more subjective aspect of hedonic interfaces, Donati et al. (2019) present how the analysis of design elements evokes six emotions (hate, anxiety, boredom, fun, serenity, and love) in addition to showing how to convert the graphic characteristics so that negative emotions are minimized or converted to positive emotions. According to Hassenzahl (2004, p. 342), "beauty may then be understood as a prerequisite for a bonding between user and product" thus, encouraging the desire to continue a relationship with the company.

2.4 Aesthetics and Colors on the Web

It is well known that the cores influence the production of meanings. It seems to vary according to their relationship with the other visual elements and the context of the graphic composition (LIMA, PEREIRA, 2020).

Previous research has demonstrated the effect of certain aesthetic elements on the web and the users' reactions. The study by Flavian, Gurrea, and Orus (2009) demonstrated that aesthetics, in a broader sense, is a key factor in obtaining positive results, as it influences the perceptions and behaviors of online users and consumers. In addition, the authors state that the aesthetic presentation of websites is an excellent framework for online companies to generate satisfaction, trust, and positive intentions from users regarding the website.

The study conducted by Nia and Shokouhyar (2020) covers aspects of the user's psychological and behavioral reactions to the website's aesthetics. For Kumar et al. (2018), design resources such as the applications' colors, graphics, and text work combined and not as individual elements, directly influencing the users' experience and leading to loyalty intentions. Deng and Poole (2012) evaluated the complexity of the arrangement of aesthetic elements on the website and the consumer's perception. The research developed by Cyr et al. (2009) concluded that the presence of human images provides rich information to the user and increases the perception of the website's social presence. Thus, hypothesis 2 is:

H2: There is a correlation between the perception of trust and the color used on m-commerce websites.

Udsen and Jørgensen (2005) sought to clarify how research on aesthetics on the web contributes to research on design and information technology and subdivided research on aesthetics into four overall approaches: cultural, functionalist, experience-based, and techno-futuristic. This research was based on the bias of the functionalist approach since the

construction of the used screens focused on the use of aesthetics to quantify the perception of trust generated by certain colors. Donati et al. (2019) identified that different elements of websites affected consumers' perceptions. Regarding layout comparisons, Robins and Holmes (2008) research the aesthetic aspect as a whole, from colors to the distribution of graphic elements on the screen.

Cyr et al. (2009) show how human images on the website increase social presence. Following aesthetics standards and understanding of the generated feeling, Kumar, Purani, and Viswanathan (2018) address the need to explore aesthetics in the mobile environment – since websites work differently on mobile devices and computers – and emphasize the importance of aesthetics on user trust.

For Lorenzo-Romero et al. (2013), aesthetics refers to experiences people enjoy through their senses and influences online shopping behavior. In the same sense, Nia and Shokouhyar (2020) bring aesthetics as something understood through the senses and consists of artistic elements of the website, with the main objective of achieving a pleasant appeal or effect. In e-commerce, aesthetics focuses on combining elements and components to achieve website attractiveness and affect user experience. Shamoi et al. (2020) explain that aesthetic experiences are omnipresent in modern life. Color is generally considered an important aesthetic issue, significantly impacting product sales, accounting for 85% of why a consumer buys a product. Following this line of thought, Xiao et al. (2020) offers a mobile marketing recommendation method that includes the users' aesthetic preferences for layout and approach factors that influence human aesthetic sensitivity. Therefore, hypothesis 3 is:

H3: There is a correlation between the perception of suitability and the color used on m-commerce websites.

We believe in the evidence that website aesthetics is relevant since it affects consumers' trust, and high trust increases the likelihood of completing purchases (LI, YEH, 2010). In this sense, color is a visual guide; it offers clues about different types of information and takes the eyes around the screen to focus the user's attention on what is important (ROGERS ET AL., 2013). According to Kuo et al. (2022), colors represent the most critical element in the web environment, as they affect users' interest in the content of a website or application. The authors explain that color determines the user's interaction with the environment, influencing consumer behavior and cognition. Thus, hypothesis 4 is:

H4: Users perceive changes in color on an m-commerce website.

The following sections explain the methodology and empirically discuss the correlations hypothesized.

3. METHOD

This section discusses the research approach and design of this study. It aims to measure consumers' preference for aesthetic elements and perception of trust.

3.1. Measurement

A survey was developed based on studies by Lavie and Tractinsky (2004), Lee and Koubek (2010), Van Schaik and Ling (2008), Li and Yeh (2010), Mbipom and Harper (2009), Chang and Chen (2008), and Hall and Hanna (2004). Fifteen questions distributed in five dimensions were defined. The first dimension approached the consumers' perceptions of the suitability of the m-commerce website presented in the research instrument, assessing whether the consumer understood the website as valid to consider the other dimensions.

The second dimension was trust, which sought to directly assess the consumers' perceptions concerning the website's screens, observing how safe they would feel buying if it were a real website. This element was based on studies by Chang and Chen (2008) and Li and Yeh (2010). In the dimension of aesthetics, a single item was included to assess the consumers' opinions regarding the aesthetic presentation, measuring how much the website presented was aesthetically pleasing. This issue was based on studies by Chang and Chen (2008), as well as Lee and Koubek (2010).

The fourth dimension referred to control items developed to validate the consumer's intention of trust in a website they had never seen before. In addition, the study assessed whether there was any interference regarding the product chosen to illustrate the website, which in this case, was a pair of sneakers – as in Chang and Chen (2008), and Schneider (2019). Finally, the dimension of color perception assessed the consumer's perception of the aesthetics of the website as a whole, where they could give an opinion about finding it pleasant, dark, intense, or the level of contrast, based on Lavie and Tractinsky (2004) and Mbipom and Harper (2009). Figure 1 shows the dimensions and items of the applied survey and the reference of each item.

Dimensions and items	Studies
Adequacy	
The presented website is commercially suitable	Chang and Chen (2008) Hall and Hanna (2004)
The website appears to provide excellent service.	Chang and Chen (2008) Van Schaik and Ling (2008)
The website seems to have good interaction	Chang and Chen (2008) Li and Yeh (2010)
Trust	
The website seems trustworthy	Chang and Chen (2008) Li and Yeh (2010)
The website seems to fulfill what it offers	Chang and Chen (2008) Li and Yeh (2010)
The website appears to have good intentions.	Chang and Chen (2008) Li and Yeh (2010)
Aesthetics	
The website's aesthetics are pleasant	Chang and Chen (2008) Lee and Koubek (2010) Lee and Koubek (2010)
Control items	
I tend to trust an e-commerce website	Chang and Chen (2008)
It's easy for me to trust a website	Chang and Chen (2008)
Trusting someone or something is not difficult	Chang and Chen (2008)
Sneakers are very important to me	Schneider (2019)
Perception of color	
Little Pleasant – Very Pleasant	Lavie and Tractinsky (2004) Mbipom and Harper (2009)
Little Intense – Very Intense	Lavie and Tractinsky (2004) Mbipom and Harper (2009)
Dark light	Lavie and Tractinsky (2004) Mbipom and Harper (2009)
Low Contrast – High Contrast	Lavie and Tractinsky (2004) Mbipom and Harper (2009)

Figure 1 Dimensions and items of the research. (Source: Elaborated by the authors).

The survey was submitted to two specialists in the field of administration and one specialist in the field of information science. A pre-test was also carried out to adjust the questions according to the understanding of the target audience.

3.2 Data Collection and Sample

The sample consisted of Brazilian students over 18 who shop on mobile devices. The survey was developed using Google

Forms, and a link was sent via e-mail to higher education institutions (HEI) nationwide, requesting the dissemination to their students.

The instrument presented scenarios with different colors and was distributed by sectors, where HEIs from certain regions received surveys presenting the same colors. This measure avoided the risk of participants accessing the survey more than once and responding to the instrument multiple times, evaluating different colors.

A total of 367 subjects responded to the instrument, where 154 responded to the survey with the color gray, 108 blue, and 105 orange. Six respondents under 18 years old were excluded from the sample, leaving a sample of 361 valid responses.

3.3 Research Design

The research instrument presented screens simulating m-commerce and questions related to them. We chose to develop images simulating a website because, according to Lindgaard et al. (2006), the consumer creates a first impression of a website in the initial 50 milliseconds. Tractinsky et al. (2006) also argue that the aesthetic impressions of websites are formed in a very short time, half a second in this case. Therefore, by presenting four screens, it is assumed that the participant had the exposure time necessary to capture the first impression about the presented aesthetics.

Sneakers were chosen because they are considered a standardized product without a specific gender. Additionally, the sneakers were in black and white, eliminating any gender bias. In addition, as shown in Dobler (2008), sneakers are worldwide commodities known to all consumers.

Thus, screens from a fictitious sneakers store website were applied to three groups, one with screens in gray (Figure 2), blue (Figure 3), and orange (Figure 4). These colors were chosen to represent the color temperature categories, where gray represents the achromatic color, orange represents warmth with better legibility than yellow and without the connotation of danger such as the color red, and blue represents a cold color. For each researched group, a set of four screens simulating navigation for a purchase journey was presented.

The screens were created by a digital product designer using Adobe XD software. A benchmarking was carried out in popular shoe stores, and the screens were designed based on the already known m-commerce framework of these stores.

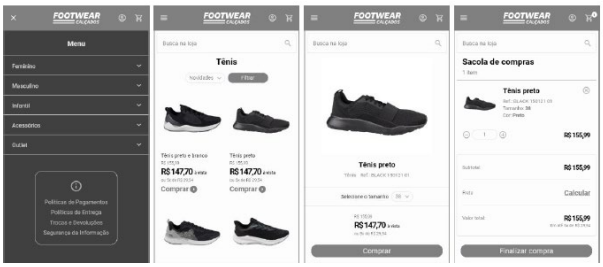


Figure 2 Screens for gray color. (Source: Elaborated by the authors).

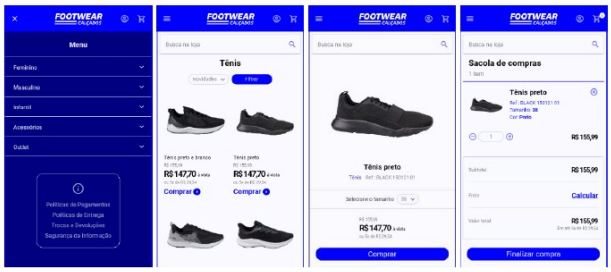


Figure 3 Screens for blue color. (Source: Elaborated by the authors).

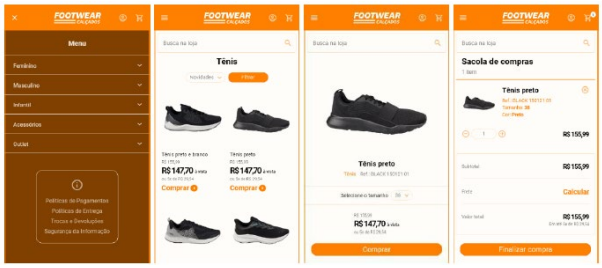


Figure 4 Screens for orange color. (Source: Elaborated by the authors).

The colors were defined according to the RGB of the "purest" colors. For blue, it was set to 255 (maximum) in the blue bar and zeroed in the other bars, thus defining a blue without the presence of other colors. For its darkest color, red and green were kept at zero, and blue was reduced by half, leaving it at 128. Thus, pure blue was obtained in a tone with less brightness. For gray, the three colors were set to 128, getting the darkest gray in half (64) in the three bars. For orange, red was placed at 255, green at 128, and blue at zero. In its darkest hue, red was set to 128, green to 64, and blue kept at zero.

The white background offers less differentiation between the colors, so we used the same light color in the background as the other parts of the screen but with a transparency of 2% to achieve a softer tone and ensure reading. The application of light and dark colors was the same for blue and orange.

4. DATA ANALYSIS AND RESULTS

The data were organized for analysis using Microsoft Excel and R software. A descriptive analysis and normality test were performed for each question dealing with trust and aesthetics. Because the data did not show normality, Kolmogorov-Smirnov non-parametric test was performed to compare the color groups.

The correlation between aesthetic perception and trust (Hypothesis 1) was verified using the Spearman correlation test. The perception of color changing and the correlation between color on the perception of trust and suitability (Hypotheses 2, 3, and 4) were verified using the Kruskal-Wallis test. The trust dimension showed a Cronbach's alpha of 0.904, representing excellent internal consistency (Hair et al., 2005). The suitability dimension showed a Cronbach's alpha of 0.841, representing good internal consistency.

4.1 Socio-demographic characteristics

The sample consisted of 361 participants, mostly females (57%) and between 22–25 years old (23%). Notably, 70% of the sample fits the age classification of up to 32 years. Considering the level of education, most have completed higher education (57%). Such data were expected since the young population is considered to be the actual users of technology associated with computing (SOUZA, 2016). Table 1 presents the socio-demographic characteristics of the sample.

4.2 Hypothesis tests and discussion

The first research hypothesis, "H1: There is a correlation between the perception of aesthetics and trust in m-commerce websites" was tested by analyzing items referring to the dimensions of trust and aesthetics. Table 2 shows Spearman's Rho values showing moderate to strong correlations.

The analysis shows that between the items "the website's aesthetics are pleasant" and "the website seems to deliver what it offers" there is a correlation with Spearman's Rho of 0.361, characterized as weak to moderate, but significant at the level of p- value <0.01. This is the correlation between the

website's aesthetics and the respondent's perception that the website delivers what it offers. Even with moderate intensity, this correlation can be explained by the concept of cognitive confidence, discussed in section 2.3. Santos and Terres (2011) state that cognitive trust is the impulse to trust based on "good reasons." Therefore, based on the website's aesthetics, the consumer obtained the necessary perceptions to formulate an opinion that fulfilled expectations regarding the presented website.

Table 1 Socio-demographic characteristics of the sample

Characteristics	No	%
Gender		
Male	154	43
Female	207	57
Age		
18 – 21	71	20
22 – 25	85	23
26 – 29	50	14
30 – 33	48	13
> 33	107	30
Education		
Incomplete Elementary	2	0.5
Complete Elementary	2	0.5
Complete High School	153	42
Complete Higher Education	204	57
Operational System		
Android	266	74
iOS/Apple	92	25
Unknown	3	1

(Source: Elaborated by the authors)

Table 2 Correlation analysis between the items of trust and aesthetics

	The website seems trustworthy	The website seems to deliver what it offers	The website seems to have good intentions	The website's aesthetics are pleasant
The website seems trustworthy	1.000			
The website seems to deliver what it offers	0.712**	1.000		
The website seems to have good intentions	0.746**	0.724**	1.000**	
The website's aesthetics are pleasant	**0.525****	**0.361****	**0.475****	1.000

*significant at the level of p-value< 0.01.

(Source: Elaborated by the authors)

In addition, design, security, and privacy are pillars of building trust in the study by Ibrahim et al. (2011). Therefore, the correlation between aesthetics and the consumer's positive perspective regarding the website is confirmed through moderate correlation.

Comparing the items "the website's aesthetics are pleasant" and "the website seems to have good intentions" a stronger correlation is obtained, being moderate with a Spearman Rho of 0.475, also significant at the level of p -value <0.01. This correlation explains the crossing between the responses of the respondent's perception of the website's intention and the aesthetics presented on the website. Deng and Poole (2012) show that aesthetics directly influence successful shopping experiences. In their study, 24 images were presented to the respondents, varying in the order of the aesthetic elements of the screen and complexity. The study concluded that the order of the elements did not influence the motivational tendency to make a purchase, unlike the complexity of the elements on the website, which influenced the consumer's purchase intention. Thus, this study maintained the order and complexity characteristics, with differentiation in the colors used, complementing Deng and Poole's research, where aesthetics is seen as an important factor for consumer intention. However, the vast possibility of aesthetic elements on the website requires further and in-depth studies.

When comparing the items "the website's aesthetics are pleasant" and the item "the website seems trustworthy" a moderate to strong correlation is obtained, with a Spearman Rho of 0.525, which is also statistically significant. This item directly captures the respondents' perception of trust, which may explain the higher value of Spearman's Rho coefficient compared to the previous items.

Thus, this research corroborates the study by Porat and Tractinsky (2012), which presents the website's aesthetics as a factor that directly influences consumer trust. Li and Yeh (2010) and Hussain Mahmood and Naser (2017) focus on this relationship between trust and aesthetics, given that the number of users in m-commerce is growing significantly and trying to fill a gap in studies on this aspect. The study by Li and Yeh (2010) was based on data collection with a survey, where the screens of a photo camera website gained information (such as a more extensive product description). As users received more information, the consumer's perception of trust increased.

These findings respond to this study's aim and confirm H1 about the correlation between the perception of aesthetics and trust in m-commerce websites since a significant and moderate correlation was verified. Additionally, the same analysis was performed for each group of colors used in the survey to verify whether the color would influence these results, thus testing the robustness of the general analysis. Spearman's correlation matrices for each color are shown in Table 3.

The Spearman correlation analysis identified a statistically significant difference between the Rho values in each tested color. For blue, weak to moderate correlation values were obtained between the items assessing trust and the aesthetics item. The items "the website seems to deliver with what it offers" and "the website seems to have good intentions" concerning the item "the website's aesthetics are pleasant" presented weak to moderate correlations with Spearman's Rho in the values of 0.310 and 0.365 respectively. The correlation between the item "the website's aesthetics are pleasant" and "the website seems trustworthy" showed a weak to moderate correlation with a Rho of 0.478. This stronger correlation in the last item suggests that the perceived trust was higher than expected.

Table 3 Correlation analysis between the items of trust items by color

Color		The website seems trustworthy	The website seems to deliver what it offers	The website seems to have good intentions	The website's aesthetics are pleasant
Blue	The website seems trustworthy	1			
	The website seems to deliver what it offers	0.761**	1		
	The website seems to have good intentions	0.778**	0.772**	1	
	The website's aesthetics are pleasant	**0.478****	**0.310****	**0.365****	1
Gray	The website seems trustworthy	1			
	The website seems to deliver what it offers	0.670**	1		
	The website seems to have good intentions	0.712**	0.712**	1	
	The website's aesthetics are pleasant	**0.537****	**0.375****	**0.517****	1
Orange	The website seems trustworthy	1			
	The website seems to deliver what it offers	0.707**	1		
	The website seems to have good intentions	0.758**	0.700**	1	
	The website's aesthetics are pleasant	**0.565****	**0.403****	**0.490****	1

** significant at the level of p-value< 0.01.
(Source: Elaborated by the authors)

Concerning the gray color, Rho values were obtained with stronger correlations in comparing the items of the trust dimension and the aesthetics dimension. The analysis showed a weak to moderate correlation between the items "the website seems to deliver what it offers" and the item "the aesthetics of the website are pleasant" with a Rho of 0.375. This was the correlation with the lowest Rho value, suggesting that the consumers' perceived trust was higher than the cognitive perception of trust, which shows the expectation toward the website. However, between the items "the website seems to have good intentions" and "the website's aesthetics are pleasant" the correlation is moderate to strong with a Rho of 0.517, and this correlation also concerns consumer expectations regarding the website. Therefore, the perception of the website's intentions in gray is easier to identify. Also, when the perception of trust was explicitly evaluated (through the items "the website seems trustworthy" and "the website's aesthetics are pleasant"), a Rho of 0.537 was obtained, showing a moderate to strong correlation. This leads to the understanding that the consumer understands the gray website's intentions and reaches a greater perception of trust in m-commerce with this color.

When analyzing the website in the orange color set, the correlation between the items "the website seems to deliver what it offers" and the item "the website's aesthetics are pleasant" presented a Rho of 0.403 – a moderate correlation. There is a correlation of similar intensity between the items "the website seems to have good intentions" and "the website's aesthetics are pleasant" with a Rho of 0.490. Thus, it is understood that the consumer also perceives the orange website's intentions. However, the correlation between the items "the website seems trustworthy" and "the website's aesthetics are pleasant" presents a moderate to strong intensity with a Rho of 0.565, which identifies the highest correlation between aesthetics and trust.

The correlations between orange and gray color showed little difference when evaluating the correlations in the website's intention items. This finding indicates that the respondents had a similar perception of trust when submitted to the screens in these colors. On the other hand, the blue website obtained the lowest Rho values for website's intention, leading to the conclusion that blue aroused trust in the respondents, but not as high as in the other colors. This perception of trust is repeated when the item on the perception of trust and aesthetics is directly correlated, where blue obtained a moderate correlation and orange and gray had very similar values in moderate to strong correlations.

This finding corroborates Westerman et al. (2012), who addressed the effects of colors in m-commerce and identified a better performance of the color gray than blue. This result may be explained by the harmony between the colors of the interface in combination with the color of the product – in this study, black sneakers. In addition, the lack of screen color saturation increases the focus on the product.

When comparing the consumer's perception in general and the results obtained by color, it is possible to observe that the values for the website's intentions by color are very close to the correlation values obtained in the general analysis, leading to the understanding that the perception of the website's intention is considered positive, regardless of the color presented. Likewise, there is little differentiation in the correlation between aesthetics and the consumer's perception of trust when each color is individually evaluated concerning the total of those surveyed.

Hypothesis H2, which says that the perception of trust and the color are correlated in the context of m-commerce websites, was tested using the Kruskal-Wallis test, in which responses to each of the items in the trust dimension were compared in each color group (blue, gray, and orange). When comparing the item "the website seems to deliver with what it offers" in the color groups, the Kruskal-Wallis test showed a statistic equal to 8.696 and p-value = 0.013, representing that at least one of the groups has a different perception. To verify in which groups there is a difference, the Post Hoc Bonferroni test was used, which showed statistically significant differences between the blue and gray groups (p-value = 0.012) and between the gray and orange groups (p-value = 0.016) and in both cases gray had the highest mean value. The results show that color influences the perception of the website's capacity to deliver the products offered, which indirectly represents trust.

The comparison between the color groups for the item "the website seems to have good intentions" showed a Kruskal-Wallis statistic equal to 6.104 and a p-value equal to 0.047, which means that at least one of the groups has a difference in perception. The Bonferroni Post Hoc result showed a difference between the blue and gray groups (p-value = 0.042), with the gray color presenting the highest mean value.

The item "the website seems trustworthy" also showed statistically significant differences in the Kruskal-Wallis test (statistics = 7.371 and p-value = 0.025) and the Bonferroni Post

Hoc test, the difference was concentrated in the blue and gray groups (p-value = 0.007) – gray with the highest mean perception value. This indicated that the gray color inspires greater trust. One of the possibilities was pointed out by Heller (2013), who addresses gray as neutral, which can be interpreted here in this research as impartial. As also pointed out in the study by Taft (1997), gray is seen as discreet and neutral.

Another factor explaining this result is that gray, which is neutral, can drive the focus on the product, inspiring greater trust for an e-commerce website – where the product is central – and, consequently, sales. Some brands use gray in their visual identities, conveying neutrality and diplomacy, as shown by Farina et al. (2006). Examples of brands that use gray are Apple, Mercedes, and Swarovski.

The item "sneakers are very important to me" sought to assess whether the respondent had any involvement with the product. The results indicated no significance, meaning that the product did not affect the participant's responses. Therefore, the results confirm hypothesis H2 that there is a correlation between color and the perception of trust in m-commerce websites.

Hypothesis H3, which posits that there is a correlation between the perception of suitability and the color used on m-commerce websites, was tested based on the items of the suitability dimension, using the Kruskal-Wallis test, considering the three groups of colors. The results were not statistically significant for any of the three items. In the item "the website presented is suitable" (Kruskal-Wallis statistic = 4.392, p-value=0.111), the result can be understood by the lack of standardization of the concept of suitability for the consumer since what makes a website commercially suitable is very subjective and particular, thus there was no consensus among the respondents for this item. In the item "the website seems to provide an excellent service" (Kruskal-Wallis statistic = 6.059, p-value=0.05), the lack of statistical significance can be explained by the fact that the survey offered static screens. Thus, the respondent did not exactly interact with the website to verify whether the website would behave in a way that met an expectation about interaction. This was the case also for the item "the website seems to have good interaction" (Kruskal-Wallis statistic = 1.820, p-value=0.403).

These results do not confirm hypothesis H3. In general, this can be interpreted by the subjectivity in the concepts of "suitable" or "excellent" in addition to the lack of interaction with the website for the respondent to evaluate this item properly. Another factor that can be considered is that websites devoid of color are not among the most famous m-commerce websites (Mercado Livre, AliExpress, Amazon, and Shopee). In addition, this result demonstrates how the perception of trust is more evident than that of excellence when color differences are tested.

Hypothesis H4, which says that users perceive changes in color on an m-commerce website, was intended to verify whether the changes to colors made in the three groups are perceived in terms of aesthetic characteristics associated with colors, such as being pleasant, intensity, light/dark, and contrast. The items used to test this hypothesis were those from the dimension "perception of color" shown in Table 1.

The analysis of the Kruskal-Wallis tests to obtain the statistical significance of the comparisons regarding the item "not very pleasant – very pleasant" showed that the respondents did not perceive a difference between the three groups (Kruskal-Wallis statistic = 1.800, p-value = 0.407). Perception of what is pleasant is subjective, and these results suggest that the research participants do not identify general aesthetic differences when only the colors are changed. Perhaps such perception can be observed when other aesthetic elements and colors are manipulated. Although some studies argue that the concept of pleasantness associated with aesthetics influences users' preferences (Cyr et al., 2010), we did not find studies that work only on the effect of color on the perception of pleasure.

The results found for the other items in this dimension of color perception showed statistically significant differences. This corroborates the argument that participants perceive objective differences in aesthetic elements associated with colors, such as intensity, dark – light, and contrast, but not necessarily in subjective elements, such as the concept of pleasantness.

The item "little intense – very intense" presented a Kruskal-Wallis statistic of 112.920, which resulted in a p-value <0.001, representing a diverse statistical difference in at least one of the color groups. Bonferroni's Post Hoc test showed differences between blue and gray (p-value < 0.001) and between gray and orange (p-value < 0.001). Gray had the lowest intensity perception.

The item "dark – light" presented a Kruskal-Wallis statistic of 8.785, which resulted in a p-value = 0.012, representing a diverse statistical difference in at least one of the color groups. Bonferroni's Post Hoc test showed differences between blue and gray (p-value = 0.008), with blue perceived as lighter.

The item "a little contrast – a lot of contrast" presented a Kruskal-Wallis statistic of 29.845, which resulted in a p-value < 0.001, representing a diverse statistical difference in at least one of the color groups. Bonferroni's Post Hoc test showed differences between blue and gray (p-value < 0.001) and between gray and orange (p-value < 0.001). Blue and orange, respectively, were perceived as having greater contrast when compared to gray.

The results obtained from the items in this dimension suggest that the respondents perceived a color change, mainly when comparing gray with the other groups. Therefore, the results confirm hypothesis H4, considering that the user perceives changes in the colors of the screens of the tested website in terms of intensity, dark/light, and contrast. Figure 5 summarizes the research hypotheses and the results found in the study.

Hypothesis	Results
H1: There is a correlation between the perception of aesthetics and trust in m-commerce websites	Hypothesis accepted
H2: There is a correlation between the perception of trust and the color used on m-commerce websites.	Hypothesis accepted
H3: There is a correlation between the perception of suitability and the color used on m-commerce websites	Hypothesis rejected
H4: Users perceive changes in color on an m-commerce website	Hypothesis accepted

Figure 5 Relationship between hypotheses and research results. (Source: Elaborated by the authors).

5. CONCLUSION

M-commerce has become increasingly present in daily life, especially due to the ease of consumers accessing tablets and smartphones. Therefore, studies on mobile commerce are crucial, and this study contributes to the literature. In addition, this research contributes to increasing the understanding of the construction of consumer trust in m-commerce through using an aesthetic element, in this case, color.

The study analyzed the influence of color as an aesthetic element on the consumer's trust in an m-commerce website. As a result, we accomplished the first study's objective and

confirmed hypothesis H1, which posits that there is a correlation between the perception of aesthetics and trust in m-commerce websites since there was a significant and moderate correlation between items 3 and 7.

The findings from the analysis of the items in the dimension of trust separated by color led to achieving the second specific objective of the study and confirmed hypothesis H2 (there is a correlation between the perception of trust and the color used on m-commerce websites). The results demonstrated that the websites with colors presented a higher perception of trust from users.

The higher values found for the gray website in the items "the website seems to have good intentions" and "the website seems trustworthy" suggest a high perception of trust from consumers. The study concludes that the perception of consumer trust is more prominent when gray is used in the m-commerce layout.

The analysis of the items that make up the suitability dimension led us to accomplish another objective of this study, related to hypothesis H3, there is a correlation between the perception of suitability and the color used on m-commerce websites). The hypothesis was rejected since the issues related to suitability rely on subjective concepts.

Hypothesis H4 (users perceive changes in color on an m-commerce website) was confirmed based on the analysis of the items in the dimension of color perception, with analysis between each of the studied groups. This hypothesis corroborates hypothesis H2 regarding the perception of colors by the respondents. The findings of this research are relevant for the context of m-commerce, and a suggestion for companies operating online activities.

5.1 Limitations, Implications, and Directions for Future Research

The main limitation of this research concerns to the aesthetic elements. The items that make up the aesthetic elements of a website are numerous, ranging from symmetry and typography to color. In addition, the usability factors of a website can also be addressed in this type of research, but our scope was restricted to analyzing the colors.

Nevertheless, this research used a survey with static screens simulating a website for data collection. As a suggestion for future research, we recommend experimenting with a real website and including items related to user navigation. This strategy will produce findings in other aspects (such as usability, as mentioned above), and it would be possible to control factors inherent to the device used in the study. The survey applied was unable to control whether the participants were responding on a device that could fit the image of the entire website without a scroll bar or whether the screen had the appropriate size to click on the response items easily.

As practical implications, we highlight the concern of technology companies with responsiveness, seeking websites with good navigation and reading in the various models of mobile devices, and the necessary concern with the usability of these devices. We also demonstrated that neutral colors direct the focus to the product for sale or to the information you want to highlight on the screen, which is a market strategy to be taken advantage of.

In the academic realm, this study helps fill the research gap regarding the connection between aesthetics and trust in mobile e-commerce. Few studies combine aesthetics and the perception of trust in e-commerce, and it is crucial to expand the literature in this field to cope with the trend of increasing consumption via mobile devices.

Other aspects of the aesthetic element of color are worth investigating in future research, such as brightness, contrast, and color temperature. Considering that the construction of the screens took place only from the RGB of the colors, it is suggested to research colors and their variations in tone and/or brightness, since the tone of blue, for example, if too intense, may cause visual discomfort, unlike a softer blue. This measure allows to research variations in tonality and the users' perceptions of these variations.

APPENDIX

The instrument used in this research is available at the following link: https://drive.google.com/file/d/1_X9ir4HsNAf94k-DGG9N7HoPJh9uIAc6/view?usp=sharing

ACKNOWLEDGMENTS

This work has been supported by the following Brazilian research agencies: Coordenação de Aperfeiçoamento de Pessoal de Nível Superior – Brasil (CAPES); Fundação de Amparo à Pesquisa e Inovação do Estado de Santa Catarina (FAPESC); Universidade do Estado de Santa Catarina (UDESC/ESAG).

REFERENCES

1. AL-KHALAF E, CHOE P. Increasing customer trust towards mobile commerce in a multicultural society: a case of Qatar. Journal of Internet Commerce. 19:1, pp 32-61, 2019. http://dx.doi.org/10.1080/15332861.2019.1695179.

2. BARBOSA SDJ, SILVA BS, SILVEIRA M, GASPARINI I, DARIN T, BARBOSA G. Interação Humano-Computador e Experiência do Usuário. Rio de Janeiro: LeanPub, 2021.

3. BART Y, SHANKAR V, SULTAN F, URBAN GL. Are the Drivers and Role of Online Trust the Same for All Web Sites and Consumers? A Large-Scale Exploratory Empirical Study. Journal of Marketing, 69:4, pp 133-152, 2005. http://dx.doi.org/10.1509/jmkg.2005.69.4.133.

4. BORBA EH, TEZZA R. Análise da percepção de usuários sobre o comércio eletrônico móvel de artigos de moda, Revista Alcance, 28:2, pp 197-211, 2021. http://www.doi.org/10.14210/alcance.v28n2(mai/ago)197-211.

5. CHANG HH, WONG KH, HO PW. The determinants of trust transfer on mobile shopping decision: flow experience as a moderator. International Journal of Mobile Communications, 17:2, pp 201-213, 2019. http://dx.doi.org /10.1504/ijmc.2019.098064.

6. CHENG F, WU C, YEN D. The effect of online store atmosphere on consumer's emotional responses – an experimental study of music and colour. Behaviour & Information Technology, 28:4, pp 323-334, 2009. http://dx.doi.org/10.1080/01449290701770574.

7. CYR D, HEAD M, LARIOS H, PAN B. Exploring Human Images in Website Design: A Multi-method Approach. MIS Quarterly, 33:3, pp 522-539, 2009. http://dx.doi.org/10.2307/20650308.

8. CYR D, HEAD M, LARIOS H. Colour appeal in website design within and across cultures: a multi-method evaluation. International Journal of Human-Computer Studies, 68:1, pp 1-21, 2010. http://dx.doi.org/10.1016/j.ijhcs.2009.08.005.

9. DENG L, POOLE M. Aesthetic design of e-commerce web pages – Webpage Complexity, Order and preference. Electronic Commerce Research and Applications, 11:4, pp

420-440, 2012. http://dx.doi.org/10.1016/j.elerap.2012.06.004.

10. DONATI M, MORI G, PATERNO F. Understanding the transitions between web interfaces designed to stimulate specific emotions. Springer Science and Business Media LLC, 19:2, pp 391-407, 2019. http://dx.doi.org/10.1007/s10 209-019-00649-y.

11. FLAVIAN C, GURREA R, ORÚS C. Web design: a key factor for the website success. Journal of Systems and Information Technology, 11:2, pp 168-184, 2009. http://dx.doi.org/10. 1108/13287260910955129.

12. GAIT J. An Aspect of Aesthetics in Human-Computer Communications: pretty windows. Ieee Transactions on Software Engineering, 11:8, pp 714-717, 1985. http://dx.doi.org/10.1109/tse.1985.232520.

13. GROß M. Impediments to mobile shopping continued usage intention: a trust-risk-relationship. Journal Of Retailing and Consumer Services, 33, pp 109-119, 2016. http://dx.doi. org/10.1016/j.jretconser.2016.08.013.

14. GUO L, LUO X, ZHU M. An evolutionary game model in mobile business commerce customer trust. Journal Of Theoretical and Applied Information Technology, 48:1, 646-654, 2013.

15. HASSENZAHL M. The Interplay of Beauty, Goodness, and Usability in Interactive Products. Human-Computer Interaction, 19:4, pp 319-349, 2004. http://dx.doi.org/10.1207/s15327051hci1904_2.

16. HUSSAIN A B, MAHMOOD AT, NASER RK. Investigating the effect of m-commerce design usability on customers' trust. Aip Conference Proceedings, 1, pp 1-8, 2017. http://dx.doi.org/10.1063/1.5005410.

17. HUR HJ, LEE HK, CHOO HJ. Understanding usage intention in innovative mobile app service: Comparison between millennial and mature consumers. Computers in Human Behavior, 73, pp 353-361, 2017. https://doi.org/10.1016/j.chb.2017.03.020

18. IBRAHIM O, NILASHI M, BAGHERIFARD K, HASHEMI N, JANAHMADI N, BARISAMI M. Application of AHP and K-Means clustering for ranking and classifying customer trust in m-commerce, Australian Journal of Basic and Applied Sciences. 5:12, pp 1441-1457, 2011.

19. KHAN H, TALIB F, FAISAL MN. An Analysis of the Barriers to the Proliferation of M-Commerce in Qatar: A Relationship Modeling Approach. Journal of Systems and Information Technology, 17:1, pp 54-81, 2015. http://www.doi.org/10. 1108/JSIT-07-2014-0041

20. KIM S, PARK H. Effects of various characteristics of social commerce (s-commerce) on consumers' trust and trust performance. International Journal of Information Management, 33:2, pp 318-332, 2013. http://dx.doi.org/10.1016/j.ijinfomgt.2012.11.006.

21. KRÓL K, ZDONEK D. Aggregated Indices in Website Quality Assessment. Future Internet, 12:4, pp 72, 2020. http://dx.doi.org/10.3390/fi12040072.

22. KUMAR DS, PURANI K, VISWANATHAN SA. Influences of 'appscape' on mobile app adoption and m-loyalty. Journal of Retailing and Consumer Services, 45, pp 132-141, 2018. http://dx.doi.org/10.1016/j.jretconser.2018.08.012.

23. LAVIE T, TRACTINSKY N. Assessing dimensions of perceived visual aesthetics of web sites. International Journal of Human-Computer Studies, 60:3, pp 269-298, 2004. http://dx.doi.org/10.1016/j.ijhcs.2003.09.002.

24. LAW ELC, VAN SCHAIK P. Modelling user experience–An agenda for research and practice. Interacting with computers, 22:5, pp 313-322, 2010. DOI: http://www.doi.org/10.1016/j.intcom.2010.04.006

25. LI Y, YEH Y. Increasing trust in mobile commerce through design aesthetics. Computers in Human Behavior, 26:4, pp 673-684, 2010. http://dx.doi.org/10.1016/j.chb.2010.01.004.

26. LIÉBANA-CABANILLAS F, MARINKOVIC V, KALINIC Z. A SEM-neural network approach for predicting antecedents of m-commerce acceptance. International Journal of Information Management, 37, pp 14–24, 2017.

27. LIMA YLF, PEREIRA CPA. A influência da cor na produção de sentidos: um estudo no contexto de capas de livros. Revista Design & Tecnologia, 10:21, pp 89-100, 2020.

28. LIPOVETSKY G, SERROY J. A estetização do mundo. São Paulo: Editora Schwarcz, 2013.

29. LIU BQ, GOODHUE, DL. Two Worlds of Trust for Potential E-Commerce Users: humans as cognitive misers. Information Systems Research, 23:4, pp 1246-1262, 2012. http://dx.doi.org/10.1287/isre.1120.0424.

30. LORENZO-ROMERO C, CONSTANTINIDES E, ALARCÓN-DEL-AMO M. Web Aesthetics Effects on User Decisions: impact of exposure length on website quality perceptions and buying intentions. Journal Of Internet Commerce, 12:1, pp 76-105, 2013. http://dx.doi.org/10.1080/15332861.2013. 763695.

31. MARRIOTT HR, WILLIAMS MD. Exploring consumers perceived risk and trust for mobile shopping: a theoretical framework and empirical study. Journal of Retailing and Consumer Services, 42, pp 133-146, 2018. http://dx.doi.org/10.1016/j.jretconser.2018.01.017.

32. MBIPOM G, HARPER G. Visual Aesthetics and Accessibility: Extent and Overlap: A Review of the Literature. Hcw—Eivaa Technical Report, pp 1-45, 2009.

33. MOSHAGEN M, MUSCH J, GÖRITZ AS. A blessing, not a curse: Experimental evidence for beneficial effects of visual aesthetics on performance. Ergonomics, 52:10, pp 1311-1320, 2009. http://dx.doi.org/10.1080/00140130903061 717.

34. NIA MR, SHOKOUHYAR S. Analyzing the effects of visual aesthetic of Web pages on users' responses in online retailing using the VisAWI method. Journal of Research in Interactive Marketing, 14:4, pp 357-389, 2020. http://dx.doi.org/10.1108/jrim-11-2018-0147.

35. NGUBELANGA A, DUFFETT R. Modeling Mobile Commerce Applications' Antecedents of Customer Satisfaction among Millennials: An Extended TAM Perspective. Sustainability, 13, pp 1-29, 2021. https://doi.org/10.3390/su13115973.

36. NIELSEN J, BUDIU R. Usabilidade móvel. Rio de Janeiro: Elsevier, 2014.

37. OLIVEIRA LB, SOUZA EM, CABRAL CA, ALVES RB. Efeitos da Confiança e seus Antecedentes na Compra via Dispositivos

Móveis no Brasil. Encontro da ANPAD - EnANPAD 2020, 2020.

38. OYIBO K, VASSILEVA J. The Effect of Layout and Colour Temperature on the Perception of Tourism Websites for Mobile Devices. Multimodal Technologies and Interaction, 4:1, 8, 2020. http://dx.doi.org/10.3390/mti4010008.

39. OFORI KS, BOAKYE K, NARTEH B. Factors influencing consumer loyalty towards 3G mobile data service providers:evidence from Ghana. Total Quality Management & Business Excellence, 29:5, pp 580-598, 2018.

40. REPPA I, MCDOUGALL S. When the going gets tough the beautiful get going: Aesthetic appeal facilitates task performance. Psychonomic Bulletin & Review, 22:5, pp 1243-1254, 2015. http://dx.doi.org/10.3758/s13423-014-0794-z.

41. RIND MM, QURESHI IA, ANSARI AQ. Measuring the role of trust in m-commerce acceptance: An empirical analysis in the context of Pakistan. Mehran University Research Journal of Engineering and Technology, 36:2, pp 321-332, 2017. http://dx.doi.org/10.22581/muet1982.1702.10.

42. ROBINS D, HOLMES J. Aesthetics and credibility in website design. Information Processing & Management, 44:1, pp 386-399, 2008. http://dx.doi.org/10.1016/j.ipm.2007.02.003.

43. ROGERS Y, SHARP H, PREECE J. Design de interação: além da interação humano-computador. 3. ed. São Paulo: Bookman, 2013.

44. SARKAR S, CHAUHAN S, KHARE A. A meta-analysis of antecedents and consequences of trust in mobile commerce. International Journal of Information Management, 50, pp 286-301, 2020. http://dx.doi.org/10.1016/j.ijinfomgt.2019.06.018

45. SHAMOI P, INOUE A, KAWANAKA H. Modeling aesthetic preferences: Color coordination and fuzzy sets. Fuzzy Sets and Systems, 395, pp 217-234, 2020. http://dx.doi.org/10.1016/j.fss.2019.02.014.

46. SIAU K, SHEN Z. Building customer trust in mobile commerce. Communications of the ACM, 46:4, pp 91-94, 2003. http://dx.doi.org/10.1145/641205.641211.

47. SUASSUNA A. Iniciação à estética. 12. Ed. Rio de Janeiro: José Olympio, 2012.

48. TANG, Q. A systematic literature review and analysis on mobile apps in m-commerce: Implications for future research. Electronic Commerce Research and Applications, 37, 100885, 2019. https://doi.org/10.1016/j.elerap.2019. 100885.

49. THIELSCH MT, BLOTENBERG I, JARON R. User Evaluation of Websites: From First Impression to Recommendation. Interacting with Computers, 26:1, pp 89-102, 2013. https://doi.org/10.1093/iwc/iwt033.

50. THONGPAPANL N, ASHRAF AR, LAPA L, VENKATESH V. Differential Effects of Customers' Regulatory Fit on Trust, Perceived Value, and M-Commerce Use among Developing and Developed Countries. Journal of International Marketing, 26:3, pp 22-44, 2018. https://doi.org/10. 1509/jim.17.0129

51. TROJANOWSKI M, KUŁAK J. The Impact of Moderators and Trust on Consumer's Intention to Use a Mobile Phone for Purchases. Journal of Management and Business Administration. Central Europe, 25:2, pp. 91-116, 2017. https://doi.org/10.7206/jmba.ce.2450-7814.197

52. TUCH AN, ROTH SP, HORNBÆK K, OPWIS K, BARGAS-AVILA JA. Is beautiful really usable? Toward understanding the relation between usability, aesthetics, and affect in HCI. Computers in Human Behavior, 28:5, pp 1596-1607, 2012. https://doi.org/10.1016/j.chb.2012.03.024

53. UDSEN LE, JORGENSEN AH. The aesthetic turn: unravelling recent aesthetic approaches to human-computer interaction. Digital Creativity, 16:4, pp 205-216, 2005. http://dx.doi.org/10.1080/14626260500476564.

54. WANG ZW, XIAOYING W, YANG, Z. Explaining consumer implementation intentions in mobile shopping with SEM and fsQCA: Roles of visual and technical perceptions. Electronic Commerce Research and Applications, 49, 2021. https://doi.org/10.1016/j.elerap.2021.101080.

55. ZANQUET MA, KIELING AP, TEZZA R. Bateu a fome: em qual aplicativo pedir? uma proposta de análise utilizando o método Analytic Hierarchy Process (AHP). Revista Inovação, Projetos e Tecnologias – IPTEC, 10:2, pp 254-273, 2022. https://doi.org/10.5585/iptec.v10i2.22737.

56. WANG YJ, HERNANDEZ MD, MINOR MS. Web aesthetics effects on perceived online service quality and satisfaction in an e-tail environment: The moderating role of purchase task. Journal of Business Research, 63:9, pp 935-942, 2010. http://dx.doi.org/ 10.1016/j.jbusres.2009.02.013

57. XIAO L, MAO H, WANG S. Research on Mobile Marketing Recommendation Method Incorporating Layout Aesthetic Preference for Sustainable m-Commerce. Sustainability, 12:6, 2496, 2020. http://dx.doi.org/10.3390/su12062496.

58. XU H, YANG J. Do m-commerce user´s expectations reflect reality? International Journal of Electronic Business Management, 10:4, pp 322-331, 2012.

59. ZHANG JJ, YUAN Y, ARCHER N. Driving forces for m-commerce success. In: Shaw, M. J. (Ed.): E-Business Management: Integration of Web Technologies with Business Models. Massachusetts: Kluwer, Norwell, pp 51-76, 2004.