JISS Journal of Indonesian Social Science

Vol. 5, No. 5, May 2024
E-ISSN: 2723-6692
P-ISSN: 2723-6595
http://jiss.publikasiindonesia.id/

Facial Coding Study of the Effect of Halal Claims on Purchase Intention of Electronic Products: Linking Maslow's Hierarchy of Needs Theory

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KEYWORDS
Electronic Products; Facial Coding, Halal Claim; Maslow's Hierarchy Of Needs; Neuromarketing

ABSTRACT
Usability testing plays a pivotal role in assessing user experience on websites, providing businesses with invaluable insights into customer perspectives. Eye-tracking, a widely accepted methodology, zeroes in on visual engagement by analyzing specific Areas of Interest (AOI). This study embarked on an exploration of the impact of AOI on dwell time for the latest iteration of the Waters website and further delineated the sections that captivated the most and least user attention. Adopting a quantitative stance, a two-way ANOVA was deployed on a sample comprising 15 master's students from two distinct academic institutions. Preliminary findings underscore significant disparities in dwell times across different AOIs, implying that specific AOIs retain user attention more robustly. Notably, the research has its constraints, encompassing potential deviations in webcam-based eye-tracking accuracy, the modest sample size, and post-hoc AOI categorization. As an extension, subsequent studies could probe the nuanced factors swaying dwell time within Waters' website AOIs, integrating methodologies such as the WSD thnique and proactive AOI classification.

1. Introduction

Facial coding, as a non-invasive and non-verbal method, measures emotional responses in marketing (Mehta et al., 2021). It involves the automatic decoding of facial movements, known as action units (AU), to predict self-report of emotion, advertisement, and brand effects. The technology allows for moment-by-moment monitoring of emotional reactions, resulting in a rich data stream of emotion-relevant facial movements. It has shown promise in predicting advertisement effects beyond self-report, and its great promise for tracking the effectiveness of advertisements in real-time and

optimizing advertisements based on emotional responses is highlighted. However, there are ethical concerns regarding the use of facial recognition technology, notably in commercial and political contexts, and collecting or analyzing facial data without consent (Höfling & Alpers, 2023; Shore, 2022).

Maslow's Hierarchy of Needs theory, a fundamental psychological framework, provides further depth to our exploration. As consumers navigate the vast array of electronic products, their decisions are influenced by functional attributes and intrinsic factors such as ethical considerations. The claim of "Halal" (permissible under Islamic law) in electronic products represents one such ethical consideration that aligns with Maslow's hierarchy, wherein consumers seek to satisfy not only their physiological and safety needs but also their belongingness and esteem needs (Iloka & Anukwe, 2020; Karimah & Darwanto, 2021; Taormina & Gao, 2013).

This introduction sets the stage for a comprehensive investigation of how Neuromarketing, facial Coding technology, and "Halal" claims interact within the electronic industry, shaping consumer purchase intentions. To delve deeper into these multifaceted dynamics, we will explore the underlying neurobiological processes, consumer perceptions, and their interconnectedness, ultimatelyshedding light on the intricate fabric of consumer decision-making in the electronic industry.

2. Materials and Methods

This study aims to explore how halal claims affect the purchase intention of electronic products and their relationship to the different levels in Maslow's Hierarchy of Needs Theory. A total of 20 participants were chosen for this study. In order to produce unbiased results, the participants with the same income level and religion were selected randomly from the population. The participants were chosen according to the following criteria which are Muslim and low-income.

The tool used for this research is RealEye, which identifies the panelist's face and pupils. The procedures of the study were explained briefly to the participants. The research was conducted by sending the link to the study created by the researchers in RealEye. Four stimuli were introduced to the participants: a picture of a rice cooker and a picture of an iPhone (with and without the Hala Logo) representing the physiological and psychological needs in Maslow's Hierarchy of Needs Theory. The exposure time of the participants towards the picture shown was 5 seconds. For the first stimuli in representing the physiological needs of Maslow's Hierarchy of Needs Theory, a picture, as shown in Figure 1.1, would be exposed to the participants for 5 seconds, followed by a picture, as shown in Figure 1.2 for another 5 seconds. As for the second stimulus, which represented the psychological needs in Maslow's Hierarchy of Needs Theory, a picture, as shown in Figure 1.3, would be exposed to the participants for 5 seconds, followed by a picture in Figure 1.4 for another 5 seconds. The mean Attention and the time to first Attention were recorded from the participants' results and compiled in an Excel file. The Excel file was then used as the database for SPSS to determine whether the relationship between the factors investigated above was significant. Statistical analysis like ANOVA, specifically the Kruskal Wallis Test, was used to analyze the data obtained from the Facial Coding test.

Rp. 200 000

Figure 1. A picture of a rice cooker with a price of Rp. 200 000

Rp. 200 000

Figure 2. A picture of a rice cooker with a price of Rp. 200 000 and a halal logo

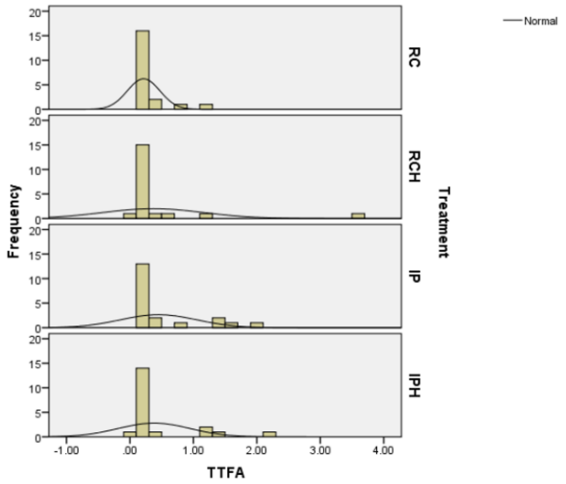
Rp. 15 000 000

Figure 3. A picture of an iPhone with a price of Rp. 15 000 000

Rp. 15 000 000

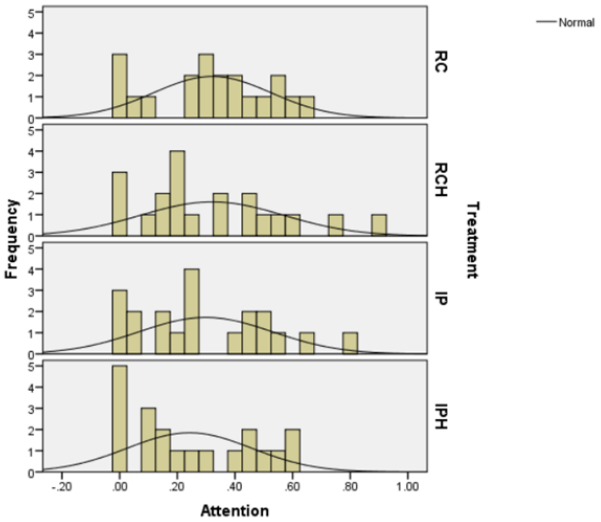
Figure 4. A picture of an iPhone with a price of Rp. 15 000 000 and a halal logo

3. Result and Discussion



Graph 1 Histogram of TTFA for the 4 Different Treatments

Graph 1 shows the Histogram of TTFA (Time to First Attention) for the four treatments: RC, RCH, IP, and IPH. RC represents the treatment of a Rice Cooker without the halal logo, and RCH represents the treatment of a Rice Cooker with the Halal Logo. RC and RCH represent the basic or physiological needs in Maslow's Hierarchy of Needs Theory. IP represents the treatment of the iPhone without the Halal Logo, whereas IPH represents the treatment of the iPhone with the Halal Logo. IP and IPH represent the psychological needs in Maslow's Hierarchy of Needs Theory. The histogram shows the frequency of the TTFA variable across the four different treatments. TTFA of 0.1s has the highest frequency for all the treatments. According to the regular line distributions, the data for TTFA are not normally distributed for the four treatments.



Graph 2 Histogram of Attention for the 4 Different Treatments

Graph 2 shows the Histogram of Attention for the four treatments: RC, RCH, IP, and IPH. RC represents the treatment of a Rice Cooker without the halal logo, and RCH represents the treatment of a Rice Cooker with the Halal Logo. RC and RCH represent the basic or physiological needs in Maslow's Hierarchy of Needs. IP represents the treatment of the iPhone without the Halal Logo, whereas IPH represents the treatment of the iPhone with the Halal Logo. IP and IPH represent the psychological needs in Maslow's Hierarchy of Needs Theory. The histogram shows the frequency of the variable Attention across the four different treatments. Compared to the histogram showing the variable TTFA, which has TTFA of 0.1s as the highest frequency for all the treatments, the histogram of the variable Attention shows that the different treatments have different values of Attention with the highest frequency. According to the regular line distributions, the data for Attention are more normally distributed compared to the TTFA histogram for the four treatments, with RC being the most normally distributed compared to the other treatments.

Table 1 Ranks

	Treatment	N	Mean Rank
TTFA	RC	20	39,05
	RCH	20	38,38
	IP	20	43,63
	IPH	20	40,95
	Total	80	

Test Statistics [a,b]

	TTFA
Chi-Square	.848
df	3
Asymp. Sig	.838

a. Kruskal Wallis
b. Grouping Variable Treatment

Table 1 for both ranks and test statistics of the Kruskal-Walis test of the variable TTFA (time to first Attention). The treatment IP representing iPhone without a halal logo has the highest mean rank, while the treatment RCH representing rice cooker with a halal logo has the lowest mean rank. Lower values of the mean rank of TTFA suggest that a shorter time is required for the participants to reach the first Attention. When RC and RCH are compared, RCH has a lower mean rank value than RC, thus showing that RCH attracts the Attention of the participants faster than RC. When IP and IPH are compared, IPH has a lower mean rank value than IP, thus showing that IPH attracts the participants' Attention faster than IP. As seen from the table of test statistics above, the p-value of the test is higher than 0.05, which means that the variable TTFA has no significant difference between different treatments.

Discussion

Electronics is one of the leading industrial sectors developed to answer the challenges of future industrial development (Susdarwono et al., 2020). Indonesia's manufacturing sector contributes 20% to the GDP, and electronics is one of its sub-sectors. The development of the electronics industry has allowed consumers to have many choices and variations in types of electronics. Various things, including halal claims, influence consumer choices. Indonesia, as a country with a majority Muslim population, is one of the markets for products with halal claims. Halal claims are no longer limited to food and beverage products but also include electronic products. Halal claims on non-food and beverage products generally cover aspects related to the raw materials, manufacturing, packaging, and storage processes.

Following the advancement of technology, the marketing world has witnessed tremendous adoption of technology that helps marketers make better decisions. Neuromarketing is a new marketing field that is experiencing increasing technology penetration. Various neuromarketing techniques include neurometrics, biometrics, implicit response testing, eye tracking, and facial coding (Gill & Singh, 2022). In this study, researchers used facial coding techniques to determine the influence of Halal claims on intention to purchase electronic products, which is linked to Maslow's hierarchy of needs theory.

Facial coding is a cost-effective neuromarketing technique because it can be done using just a webcam. Facial coding focuses on involuntary reactions formed by micro-expressions that track facial muscle activity. In the facial coding technique, six core emotions are observed in real time, namely happiness, sadness, surprise, dislike, fear, and anger (Dragoi, 2021). Van Boxtel (2010), in his research titled Facial EMG as a tool for inferring affective states. Proceedings of measuring behavior summarize the produced actions of elementary emotions as follows:

Table 2 Proceedings of measuring behavior summarize the produced actions of elementary emotions

Elementary Emotion	Produced Actions
Happiness	Closed eyelids Mouth corners up
Surprise	Eyebrow raised; upper eyelid raised
Fear	Eyebrow raised Eyebrow lowered Raised upper eyelid
Anger	Eyebrow lowered Raised upper eyelid Closed Eyelid
Sadness	Raised eyebrows Lowered eyebrows with depressing lip corners
Disgust	Raised upper lip Raised upper lip with wrinkled nasal skin

In this research, the researchers used an online research platform with an eye-tracking webcam, RealEye. RealEye utilizes the processing capabilities of standard PCs or laptops to execute artificial intelligence (Deep Neural Network) that assesses images captured by a webcam. The AI identifies the panelist's face and pupils, predicting the focal point of their gaze. All of these operations take place seamlessly within a web browser in real time (Lewandowska, 2020).

Time to First Attention (TTFA) and the average duration of participants' Attention were recorded and analyzed. The Kruskal-Walis test indicates no significant difference between treatments

regarding Time to First Attention (TTFA) and Attention levels. This shows that Halal claims do not significantly affect purchase intention and Maslow's Hierarchy of Needs. Hussain (2016) The literature analysis of studies on the effect of Halal signs and symptoms on customer purchase intention yields mixed results. While some research, such as those conducted in Pakistan and Turkey, shows that Halal signage positively affects purchase intention (Varinli et al., 2016), others, such as the Malaysian study, suggest that the impact is less substantial (Lada et al., 2009). For example, a study in Pakistan discovered that the Halal logo had no positive impact on customers' purchasing intentions (Garczarek-Bąk et al., 2021; Hussain et al., 2016). However, a study in Turkey underlined the importance of preference for Halal-certified items in influencing buying intention (Varinli et al., 2016). These differing conclusions highlight the complexities of consumer behavior and the need for additional research in this area (Lada et al., 2009). In short, raising Halal awareness will only sometimes increase sales. This has another conclusion: the Halal awareness effort implemented by the authorities thus far could have been more effective. The predictability of Halal awareness among Muslims and non-Muslims is disputed. This means that Halal awareness efforts must be thoroughly examined and improved. In a nutshell, the level of Halal awareness among Malaysians needs to be raised (Karimah & Darwanto, 2021). Despite lacking statistical significance, these nuanced findings point to a complicated interaction between Halal claims and Maslow's Hierarchy of Needs. The physiological demands represented by the rice cooker garner more Attention in the absence of an explicit need for a Halal claim, but the psychological needs represented by the iPhone may have a more nuanced association with Halal claims.

The literature review of studies on the effect of Halal signs and symptoms on consumers' purchase intention reveals varying results (Hussain et al., 2016). While some studies, such as those conducted in Pakistan and Turkey, indicate a positive influence of Halal signs on purchase intention (Varinli et al., 2016), others, like the study in Malaysia, suggest that the impact may not be as significant (Lada et al., 2009). For instance, the study in Pakistan found that the Halal logo did not positively influence consumers' purchase intention (Hussain et al., 2016), while the research in Turkey highlighted the importance of preference for Halal-certified products in influencing purchase intention (Varinli et al., 2016). These differing conclusions underscore the complexity of consumer behavior and the need for further research in this area (Lada et al., 2009).

Some limitations may affect this finding. Facial coding has limitations, particularly in the context of automatic facial expression detection and classification. The accuracy of facial coding can be affected by factors such as poor lighting conditions, strong light sources behind the participant, and the quality of the webcam hardware. Additionally, the system's algorithm may exclude sessions based on calibration quality, which can impact the validity of the data collected. These limitations highlight the importance of addressing environmental and technical factors to ensure the reliability and accuracy of facial coding data.

In order to improve the quality of this study, expanding the range of stimuli to include a broader range of electronic products, integrating multimodal neuroimaging techniques, exploring subtle halal claim integration, and conducting longitudinal studies to understand consumer responses over time are recommended. It also suggests cross-cultural analysis, incorporating socioeconomic factors and tailoring marketing messages to address halal claims. Validation through questionnaires is also recommended to strengthen the findings. These recommendations aim to guide future research and contribute to a deeper understanding of the impact of halal claims on consumer behavior in the electronic products market.

4. Conclusion

Investigating consumer behavior and purchase intention nowadays has become essential in exploring the effectiveness and strength of various marketing strategies. This research paper explores how halal claims affect the purchase intention of electronic products and determines its relationship to the different levels in Maslow's Hierarchy of Needs Theory. By using facial coding as the neuromarketing tool and subjecting the results to statistical analysis, this paper has found that the relationship between the factors above did not demonstrate statistical significance. Thus, it shows that the presence of halal claims on electronic products in both physiological and psychological needs in Maslow's Hierarchy of Needs Theory does not significantly impact consumers' purchase intention. Although our results may challenge conventional assumptions regarding the influence of halal claims on consumer decision-making in electronic products, they also highlight the complexity of factors contributing to purchase intentions. The absence of a significant correlation indicates that numerous elements beyond ethical considerations, such as social and cultural factors like ongoing trends, brand reputation, trust, etc., play a pivotal role in shaping preferences for electronic products. Future studies may explore additional variables such as these factors in delving deeper into the influences affecting consumer behavior in the electronic products market.

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