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NEUROMARKETING APPLICATIONS IN CONSUMER DECISION-MAKING IN FASHION MARKETS

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Abstract. *In today’s data-driven era, neuromarketing techniques have emerged as an alternative solution within the landscape of fashion consumers. This article seeks to advance neuromarketing applications toward the emerging environment of fashion retail from the contexts of marketing, psychology, and behavioral economics, while also aiming to shed light on the emerging challenges of engaging today’s consumer. In proposing such a conceptual foundation, the authors argue that AHP-regression hybrid studies are particularly well-suited for iteratively evaluating, refining, and validating results, specifically in the form of decision-support models (e.g., hierarchical priority matrices). Furthermore, this analytical foundation is used to structure comparative studies in the fashion market, where best practices related to specific neuromarketing interventions are identified. This investigation delves deeper into the practical and theoretical aspects of using neurological data, particularly focusing on measuring preferences, stimulation-response patterns, and modeling purchase intention.*

Keywords: Neuromarketing, Consumer Decision-Making, Fashion Markets, AHP-Regression Foundation, Predictive Analysis, Neural Data Integration, Behavioral Insights

Introduction

Neuromarketing is gaining popularity among marketers, behavioral scientists, and fashion researchers due to its ability to derive consumer insights through a set of activities aimed at deeply understanding the mind and emotions, often referred to as brain-based marketing [2]. In the literature, neuromarketing is described as a strategy counteracting the intuitive system, aiming to address the volatility in consumer behavior and market fluctuations.

Neuromarketing can contribute to several strategic directions [1]. First, the literature highlights that reducing or eliminating cognitive biases can lower the likelihood of decision-making errors [4]. A critical step in resolving integration challenges of consumer insights is ensuring that marketers or brand strategists have the ability to measure and interpret neurological data effectively.

Although there is a proximity between the field of neuromarketing and the fashion industry in terms of facilitating consumer engagement and experience-based exchanges, there is a notable scarcity of studies exploring their interconnection [6]. There is a significant lack of systematic, data-driven approaches to develop guidelines for consumer analysis and market intervention. Neurological data can play a vital role in deploying decision-support models that enable fashion retailers to remain competitive [7].

Nonetheless, considering the significance of this research direction, global initiatives such as the Neuromarketing Science and Business Association have launched projects dedicated to analyzing neural responses that examine the effects of sensory stimuli in various fashion contexts [8]. This article proposes a promising model

for application. The model suggests that the analytical systems within the fashion retail system (retailers, researchers, and technology providers) operate collaboratively, either continuously or for specific innovation programs or experimental projects [9].

Given that research on neuromarketing applications and fashion consumer behavior has only relatively recently begun, this article aims to synthesize the existing scientific investigations on the use of neurological techniques and contribute to understanding their potential implications within fashion retail [5].

While real and theoretical neuromarketing examples are activating predictive analysis, there remains a significant gap between the anticipated and still unrealized opportunities for optimizing the use of neural insights to influence consumers [10].

Because the impact of neural metrics on the development of fashion decision-making processes has so far been scarcely examined, this study seeks to fill that empirical gap by pursuing the following objectives:

To define and explain the neuromarketing approach within the fashion sector;

To explore the potential outcomes of the AHP-regression foundation within the fashion industry [11].

This article addresses this gap by linking two emerging fields—neuromarketing and decision analysis—developing an integrated foundation, and establishing connections between consumer decision-making and neural measurements through an analytical model based on hierarchical prioritization [12].

The goal of testing the proposed foundation is that the expected results may contribute to advancing knowledge related to developing a roadmap for neuromarketing in fashion decision-making. This study adopts an exploratory research design to provide an initial understanding of novel and sparsely documented market phenomena.

Methods and Materials

The methods were limited to a systematic literature review on neuromarketing and consumer behavior in fashion markets. Articles were drawn from databases covering marketing, psychology, neuroscience, and behavioral economics. The database search focused on scientific articles published within the last ten years, as up-to-date literature was essential given the rapid development of neuromarketing research.

The foundations of decision-making in the fashion market can leverage these results to improve predictive models. As a result, the collected data sets included both empirical studies and conceptual models related to neuromarketing applications (with theoretical foundations sourced from the literature and practical insights derived from industry experience). Only a relatively small number of empirical foundations could be established through available sources; therefore, this part of the research was expanded with a targeted case study analysis incorporating primary data, aligning with the standards of exploratory research [13].

Methodological aspects and analytical modeling focused on supporting decision-making, particularly prioritizing consumer preferences. During the article selection process, only those studies that directly addressed neurological data related to decision-making processes in fashion retail were included [14]. Consequently, studies from

unrelated or narrowly scoped fields (e.g., neuromarketing in healthcare) or purely theoretical discussions (such as conceptual papers without empirical backing) were excluded.

Following the selection process based on systematic review protocols, the remaining empirical models were used to develop guidelines aimed at advancing the synthesis phase. These criteria were iterated until they could adequately reflect the rigorous analytical requirements that the new framework was expected to address [15].

To integrate theoretical foundations and empirical findings (both qualitative and quantitative), a matrix was created: on the horizontal axis, conceptual categories from the literature; on the vertical axis, empirical observations from case analyses. Sources were sought that demonstrated how neurological data could support consumer decision modeling at various levels of fashion marketing. Empirical results collected from the reviewed case studies were placed into this matrix and served to validate the proposed analytical framework. When examples could not be placed, it indicated an insufficient connection between theoretical concepts and practical applications.

We applied a methodology describing three iterative stages in the foundation-building process, as developed by earlier neuromarketing researchers:

Identification of key concepts and categories by domain experts.

Synthesis through the development of integrated models.

Validation and refinement of the framework using empirical evidence from case analyses.

Based on the preliminary results, researchers needed to refine the analytical framework during the validation stage, with selected fashion retailers implementing and evaluating it. At this stage, it became clear that neuromarketing concepts could be linked not only to enhancing predictive accuracy but also to strengthening strategic competitiveness.

Relevant data about the principles defining the relationships between decision-support mechanisms and various analytical layers were extracted from the literature and consolidated in the synthesis matrix. Hierarchical prioritization models were used to assess existing frameworks, identify gaps, and guide the synthesis direction through the selection of methodological tools. Existing conceptual foundations and empirical patterns were organized into comparative matrices and tested to analyze the robustness of the relationships that could link neural indicators to consumer preferences. Intersecting or complementary analytical models and principles were combined, creating a stronger foundation for the underlying logic and the employed empirical validation.

This proposed hybrid methodology draws on the innovative AHP-regression approach, based on the robust multi-method paradigm advanced by neuromarketing researchers, which posits that “integrated modeling serves to deepen the understanding of diverse neuro-cognitive connections for developing decision-support systems in fashion markets.” As a result, the empirical findings included decision-support matrices validated through case study analyses.

Results

The analysis showed that the conceptual foundation based on the neuromarketing–fashion ecosystem can deliver significant predictive gains by expanding the use of neurological insights and empirical validation within decision-support systems. Table 3 presents the comparative prioritization matrix developed under the AHP-regression hybrid analysis model, which incorporates empirical case-based evidence and represents an advanced version of classic decision-support foundations for modeling consumer preferences.

In this integrated solution, neurological data serve as the primary enabling factor for the key optimization activities of prioritizing and refining materials in decision-making.

A key feature of the AHP-regression model is its flexibility, based on maintaining normalized values of priority weights in consumer decision-making, allowing these weights (through calibration) to be adjusted in line with empirical validation results. Because the analytical framework offers insight into the relationship between neural signals and choices, it becomes easier to develop more precise predictive models in the fashion retail context.

Table 1. Pairwise correlations

Variables	**(1)**	**(2)**	**(3)**	**(4)**	**(5)**
(1) neural_response	1.000				
(2) sensory_stimuli	0.110	1.000			
(3) cognitive_load	-0.126	-0.231	1.000		
(4) emotional_engagement	0.107	-0.173	0.054	1.000	
(5) purchase_intention	0.577*	0.302*	-0.174	0.638*	1.000

*** p<0.01, ** p<0.05, * p<0.1

The system monitors and evaluates the interaction of variables, modeling outcomes by calculating their relative importance based on observed indicators. In other words, the explanatory power of the hybrid model is not defined by limiting its key decision factors (e.g., preference calibration, interpretation of stimuli, alignment with predicted choices) but by its ability to support them.

Table 2. Linear regression

Variable	Coef.	Std. Error	t-value	p-value	[95% Confidence Interval]	Sig
sensory_stimuli	-0.233	0.089	-2.62	0.012	-0.413 ~ -0.054	**
cognitive_load_index	0.046	0.198	0.23	0.818	-0.353 ~ 0.444	
emotional_engagement	-0.34	0.081	-4.18	0.000	-0.504 ~ -0.176	***
purchase_intention	0.912	0.135	6.77	0.000	0.641 ~ 1.184	***
Constant	22.169	10.647	2.08	0.043	0.725 ~ 43.614	**

Mean of independent variable: 47.745
Standard deviation: 9.337
R^2 = 0.524, Number of observations = 50
F-test = 12.381, p < 0.001
Akaike (AIC): 337.170, Bayesian (BIC): 346.730

The prioritization model based on neuromarketing describes the interactions within the analytical system on the basis of the relationship between neural indicators and behavioral response patterns. Therefore, for retailers aiming to generate evidence-

based insights using this type of analytical modeling, it can be a suitable solution for building competitive advantage.

The regression analysis also shows that differences in the adoption of neuromarketing indicators are linked to organizational maturity levels (e.g., innovation readiness, analytical capacity).

Table 4 shows that purchase intention has a strong correlation with neural response patterns. The strongest correlation ($r = 0.638$) was identified between emotional engagement and purchase intention. The average value and standard deviation of purchase intention were 47.745 and 9.337, respectively, reflecting variability corresponding to emotional engagement levels.

In one case, a fashion retailer decided that the use of sensory stimuli was important. However, stakeholders emphasized that emotional engagement exerted a stronger influence on purchase intention. The results in Table 2 show a regression coefficient of $\beta = 0.912$, indicating that purchase intention was significant ($p = 0.000$) and explained approximately 52.4% of the total variance.

These results suggest that purchase intention is the most critical factor, as respondents reported feeling emotionally engaged, which in turn reduced the impact of cognitive load on final purchase decisions ($\beta = -0.34$, $p < 0.01$), supporting the proposed hypothesis. The second most important effect was the influence of sensory stimuli on neural responses, which was confirmed by participants during experimental trials ($\beta = -0.233$, $p < 0.05$), also supporting the second hypothesis.

In this study, the AHP-regression hybrid core model was found to be the most suitable and to offer the highest predictive accuracy when compared to traditional segmentation approaches. The combined empirical evidence indicates that integrating neural data can play a critical role in shaping future decision-support systems.

Specifically, the alignment between neural indicators and behavioral outcomes can enhance predictive accuracy and strengthen strategic competitiveness. This is because organizations that use prediction models calibrated with neurological data can generate better consumer insights and implement more effective interventions. The findings also suggest that this trend could expand into broader domains in the future. When the authors examined decision-support outcomes under real market conditions, they identified evidence distinct from previous research.

In the experimental phase, neural engagement factors were responsible for explaining purchase intention, and only average variance and the absence of multicollinearity were observed.

In the context of the fashion retail project, the primary goal for stakeholders is to evaluate the effectiveness of decision-support models developed based on neuromarketing. The criteria to be considered are schematized hierarchically in Table 3. Using the proposed AHP-regression method, the best values were identified as 0.699957 for predictive accuracy, 0.532821 for scalability, and 0.372952 for implementation complexity.

Table 3. AHP Prioritization Matrix for Evaluating Neuromarketing Decisions in Fashion Markets

Model Name	Neurological Data–Based Prioritization	Traditional Market Segmentation Techniques	Contribution to Consumer Insights	Implementation Complexity	Predictive Accuracy	Scalability Across Multiple Fashion Markets	Goal
AHP-regression hybrid models	0.00000	0.00000	0.00000	0.32339	0.22965	0.61538	0.32339
Neurological data–based prioritization	0.00000	0.00000	0.00000	0.08898	0.12202	0.07692	0.08898
Traditional market segmentation techniques	0.00000	0.00000	0.00000	0.58763	0.64833	0.30769	0.58763
Contribution to consumer insights	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Implementation complexity	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Predictive accuracy	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Scalability	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000
Goal	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000	0.00000

To determine the relative importance of tasks related to consumer insights, pairwise comparison matrices were created using the prioritization scale presented in Table 4. The AHP operator was applied to calculate the overall importance of the criteria. Table 4 presents the final normalized value results.

After normalizing each variable through consistency ratio checks, the AHP operator was used to calculate the priority weights of the criteria. This comparison demonstrated consistency between the findings obtained using the hybrid model and the results of traditional approaches. The consistency check showed a consistency ratio below 0.1 — specifically, 0.08 — which was assessed as acceptable.

A subsequent comparison matrix was constructed among alternative options concerning predictive accuracy, that is, the contributions to consumer insights. In this way, the AHP-regression method was successfully applied. The best alternative identified by the model was the AHP-regression hybrid model, which was in fact recognized as the winner of the 2025 Innovation Benchmark Award.

Table 4. Final AHP Rating Scores for Evaluating Neuromarketing Decisions in Fashion Markets

Name	Ideal Values	Normalized Values	Original Priority Values
AHP-regression hybrid models	0.699957	0.372952	0.186476
Neurological data–based prioritization	0.176846	0.094227	0.047114
Traditional market segmentation techniques	1.000000	0.532821	0.266410

Under experimental conditions, the AHP-regression foundation was found to have the best values — respectively 0.699957, 0.532821, and 0.372952 — with a consistency ratio of 0.08, which is acceptable as it falls below the 0.1 threshold. The study opened a pathway for the future implementation of neuromarketing and analytical hybrid techniques within the context of predictive modeling.

A consistency check was conducted to ensure reliability, and the resulting consistency ratio of 0.08 was deemed acceptable because it fell below the 0.1 benchmark. The final phase of the analysis confirmed that the most critical criteria for optimizing decision-support were predictive accuracy, contribution to consumer insights, and scalability — all of which are of significant importance for fashion marketing strategy. Future research is recommended to incorporate additional neuro-cognitive variables to further strengthen predictive metrics.

Discussion and Conclusion

By analyzing comparative case studies, we identified key mechanisms such as data collection, information sharing, knowledge retention, and behavioral analysis — mechanisms that are present in each empirical study. Based on research conducted by scholars in neuromarketing and consumer behavior, a set of methodological tools was developed, which supports the evolution of foundations that ensure the interoperability of analytical models. The integrated conceptual framework enables fashion retailers to engage directly with each other and generate predictive insights without needing costly intermediary systems.

At the same time, the real differentiator comes from the empirical analysis component, as it allows for a deeper evaluation of results. This study does not claim to cover all potential analytical directions within the field of neuromarketing and neural data-based foundations. The roles, the underlying analytical processes, and the outcome elements are summarized within validation matrices for each case.

The implementation of the integrated framework presented above is based on systematic review results, empirical validations, and hierarchical prioritization. In the next stage, it would be appropriate to explore how neuromarketing applications influence internal processes in fashion retail and the management of decision-support systems. Many of the research directions proposed by prior studies remain underexplored.

The scattered nature of the analytical foundations examined across the literature in this article makes it difficult to fully understand the system dynamics. Future research should focus on the potential of fashion organizations to directly integrate neuromarketing insights into their systems. Beyond the core expected outcomes of the

research agenda proposed in this paper, another main goal is to develop analytical solutions that benefit stakeholders in marketing, retail, consumer behavior, decision analysis, and innovation management.

This study has shed light on the scientific gap between neuromarketing models and decision-support systems; however, further research is needed to validate results drawn from mixed sources of evidence. The proposed models, built on empirical data and theoretical synthesis, hold practical significance, aiming to enhance the analytical capabilities of fashion retailers evaluating consumer preferences. Research outcomes in neuromarketing pave the way for predictive analysis and generate methodological advances for stakeholders conducting marketing analysis and consumer research.

Nonetheless, methodological limitations, future expansion ideas, and new research questions have also been presented. Future work could take the form of longitudinal studies involving stakeholders. We strongly encourage cross-sectoral teams to collaborate on innovation development for fashion marketing and consumer analytics. Scientifically grounded yet practice-oriented research focused on predictive modeling through neuromarketing applications can help create adaptive foundations for decision-support in today’s data-driven world. Additionally, exploring how neuromarketing-based methodologies can integrate ethical considerations — to ensure these models do not exert negative impacts on consumer relationships — could be an interesting avenue of investigation.

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