PressAcademia
www.pressacademia.org/journals/jmml
JMML
ISSN 2148-6670
Journal of Management, Marketing and Logistics YEAR 2025 VOLUME 12 ISSUE 1

THE ROLE OF NEUROMARKETING IN UNDERSTANDING THE COUNTRY-OF-ORIGIN EFFECT: A SYSTEMATIC REVIEW

DOI: 10.17261/Pressacademia.2025.1968
JMML- V.12-ISS.1-2025(2)-p.15-34

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Date Received: February 5, 2025 **Date Accepted:** April 29, 2025

To cite this document
Sargin, M. O., (2025). The role of neuromarketing in understanding the country-of-origin effect: a systematic review. Journal of Management, Marketing and Logistics (JMML), 12(1), 15-34.
Permanent link to this document: http://doi.org/10.17261/Pressacademia.2025.1968

ABSTRACT

Purpose- In the country of origin (COO) topic, the limitations of traditional methods highlight the need for more innovative approaches in this field. This study aims to examine how neuromarketing techniques, which provide unique insights beyond traditional research methods, are integrated into the analysis of the COO effect, a key factor influencing consumer behavior in global marketing.

Methodology- A systematic literature review was conducted, analyzing articles from the Scopus database. The research identified studies employing neuromarketing techniques to investigate the COO effect, followed by content analysis of selected articles.

Findings- The year 2022 marked the most productive period for studies examining the COO effect using neuromarketing techniques. Among the journals where these studies were published, the Journal of Retailing and Consumer Services and Neuroscience Letters were particularly prominent. China stood out as the leading country in terms of author contributions and the volume of research conducted in this field. The systematic review revealed that EEG was the most frequently used neuromarketing technique in COO studies, followed by limited applications of fMRI and eye tracking. Furthermore, it was observed that a significant focus was placed on brain imaging techniques within these studies. Studies that examine the COO effect using neuromarketing techniques have focused on consumer behavior, particularly in terms of consumer preferences, purchase intention, and consumer behavioral responses. Additionally, they have focused on consumer characteristics, specifically in terms of consumer ethnocentrism and consumer involvement.

Conclusion- This research underscores the significant potential of neuromarketing techniques, which provide insights into consumers' subconscious responses, in advancing the understanding of the COO effect. It highlights gaps in the literature that future research can address. Nevertheless, this research will significantly contribute to motivating and shaping future investigations in the field. Consequently, the study contributes to both theoretical advancements and practical applications in global marketing strategies.

Keywords: Neuromarketing, consumer neuroscience, country of origin effect, systematic review, content analysis
JEL Codes: M31, M39, L19

1. INTRODUCTION

With consumers being exposed to products from different countries, COO has become a significant cue shaping consumer behavior (Agrawal and Kamakura, 1999). As a result, COO has emerged as an important research topic in the field of international marketing (Fan and Zhang, 2019). Initially defined as the country where a product was manufactured, the concept of COO has become increasingly complex with the proliferation of multinational production processes (Bilkey and Nes, 1982; Hien et al., 2020; Blanco-Encomienda et al., 2024). In this context, COO can be defined as the country that consumers associate with a product. The COO effect, on the other hand, refers to the influence of the image of the associated country on consumer behavior (Zheng et al., 2023; Blanco-Encomienda et al., 2024).

In recent years, studies on the COO effect have debated its strength and significance (e.g., Usunier, 2006; Samiee, 2011; Josiassen and Harzing, 2008). However, recent studies on the COO effect have sparked debates regarding the strength and significance of this influence (e.g., Usunier, 2006; Samiee, 2011; Josiassen and Harzing, 2008). Consequently, the topic requires further investigation in light of these debates. However, limitations associated with traditional research methods have been highlighted (e.g., Herz and Diamantopoulos, 2017; Halkias et al., 2022). In this regard, exploring the topic with alternative research methods may provide new and deeper insights into the debated the COO effect.

In recent years, neuromarketing has attracted significant attention in the field of marketing (Yadete and Kant, 2023). Neuromarketing differs from traditional research methods as it uses brain imaging and physiological techniques to obtain insights into consumer behavior (Kiran and Prabhakar, 2021; Zhu et al., 2022). Accordingly, employing neuromarketing techniques to examine the COO effect may yield novel findings and contribute to ongoing debates. In this context, the current state of research addressing the COO topic through neuromarketing techniques has become a matter of interest. Therefore, this study aims to explore the question, "What is the present status of research on the COO topic conducted using neuromarketing techniques?" by systematically reviewing studies that examine the COO topic through the application of neuromarketing techniques. This study contributes to identifying gaps in the existing literature and providing a foundation for future research.

The study first reviews the relevant literature. Then, in November 2024, articles available in the Scopus database that examine the COO topic using neuromarketing techniques were identified. The identified studies were subjected to content analysis, with their findings evaluated to reach conclusions. Lastly, suggestions for future research are provided.

2. LITERATURE REVIEW

2.1. COO Effect

Consumers are exposed to products from different countries as globalization enables them to transcend the borders of their country of manufacture. Therefore, COO of products has been important for consumers. Schooler's (1965) research revealed the COO effect and drew attention to its importance. As a result, COO has been an important field of study in global marketing over time (Zheng et al., 2023).

COO is defined as the place where a product is manufactured and indicated on the 'Made in' label (Bilkey and Nes, 1982; Thakor and Katsanis, 1997). The COO effect denotes the impact of a country's image, encompassing stereotypical beliefs based on its attributes, on consumers' attitudes and behaviors toward products manufactured in that country (Oduro et al., 2024). However, the manufacturing country, brand country, design country, and assembly country have diverged due to the rise of multinational production, making COO of a product more complex (Hien et al., 2020; Blanco-Encomienda et al., 2024). In this context, COO may be defined as the country that the consumer associates with or attributes to a product. The influence of the image of COO that the consumer associates with or attributes to the product on consumer behavior is referred to as the COO effect (Zheng et al., 2023; Blanco-Encomienda et al., 2024). In other words, the consumer's perceptions, behaviors, and decisions are influenced by the cognitive and sensory associations they have with COO (Artêncio et al., 2022).

When evaluating a product, consumers rely on both extrinsic and intrinsic information cues (Oduro et al., 2024). Intrinsic cues include the physical features of a product, such as smell, taste, and design, while extrinsic cues do not include physical features and instead refer to elements such as brand, price, and COO (Thakor and Katsanis, 1997; Rezvani et al., 2012). Therefore, as an extrinsic cue, COO shapes consumer behaviors such as quality perception and purchase intention (Blanco-Encomienda et al., 2024; Farina et al.,2024).

2.2. The Role of COO Effect in Marketing

COO has become a significant area of interest for both companies and researchers in the field of global marketing. For businesses aiming to establish a presence in global markets, COO is a critical factor due to its influence on consumer behavior (Blanco-Encomienda et al., 2024). For instance, COO has the potential to influence consumers' willingness to pay, purchase intentions, and perceptions of risk and value (Casado-Aranda et al., 2020). The origin of a product may offer benefits or pose challenges for companies in areas like entering international markets and choosing strategic partners (Suter et al., 2021). For this reason, interest in this area has continued to rise since Schooler's (1965) study.

The effect of COO on consumer behavior has been explored from various aspects, with increasing interest in this topic, such as purchase intention (e.g., Ghalandari and Norouzi, 2012; Kim et al., 2017; Bhattacharya et al., 2023), product quality (e.g., Kalicharan, 2014), product evaluation (e.g., Bilkey & Nes, 1982; Insch & McBride, 2004), consumer privacy, and consumer trust (Bhattacharya et al., 2023). Moreover, disagreements have emerged regarding the continued existence of the COO effect. Among the prominent views on this subject, Usunier (2006) argues that the influence of COO has weakened due to factors like international brand development, transnational manufacturing, and WTO standards related to origin labeling. Samiee (2011) criticizes COO research for lacking adequate research designs and failing to provide sufficient managerial insights and in-depth contributions, while indicating that COO is not strongly linked to consumer decisions as is commonly believed. However, it is also emphasized that some consumers continue to view COO as a relevant cue in their purchasing decision process (Herz and Diamantopoulos, 2017). Moreover, Josiassen and Harzing (2008) argue that COO remains a subject

of significant interest, as previous research highlights the presence of both consumers who evaluate a product without considering its COO and those who emphasize its importance.

In conclusion, the topic of COO is a well-researched and debated area in academic research. A recent study by Samiee et al. (2024) reviewed over 400 articles published in the past 60 years. This reflects the high level of interest in the COO topic within the literature. Despite ongoing debates, interest in this subject within the field of marketing appears likely to persist.

2.3. Neuromarketing

Recently, neuromarketing has gained increasing attention in the field of marketing, as it provides insights into understanding consumers through new and diverse methods. The field of neuromarketing emerged as studies in the 1920s, which initially used physiological devices to better understand consumers, were expanded to include various physiological and brain imaging techniques (Shaw and Bagozzi, 2018). Thus, neuromarketing, as an applied discipline that utilizes neuroscientific techniques for marketing research, and consumer neuroscience, as a research field focused on understanding the brain's role in consumer decision-making processes, have both reached their current significance (Briesemeister and Selmer, 2022).

Neuromarketing is described as an emerging field within marketing that examines the unconscious dimensions of consumer responses to marketing stimuli by utilizing advanced technology (Kumar, 2015). It is stated that neuromarketing relies on understanding the underlying brain structures involved in the cognitive functions and perceptual processes of consumer responses in various situations (Levallois et al., 2021). Thus, neuromarketing contributes to generating insights into consumer behavior by providing information on brain structures and neural processes (Iloka and Onyeke, 2020). In this context, neuromarketing is defined as a cross-disciplinary marketing approach that employs brain imaging and physiological techniques to obtain knowledge (Kiran and Prabhakar, 2021; Zhu et al., 2022).

Neuromarketing employs various techniques to access subconscious information, including brain imaging and physiological tools. The brain imaging techniques encompass functional magnetic resonance imaging (fMRI), functional near-infrared spectroscopy (fNIRS), positron emission tomography (PET), electroencephalography (EEG), and magnetoencephalography (MEG) (Alsharif et al., 2021a). fMRI is a method where an individual is positioned inside a large magnetic machine to monitor neural activity, track oxygen levels in the blood, and observe hemoglobin changes, allowing for almost immediate visualization of brain function (Penrod, 2023). As a non-invasive neuroimaging method, fNIRS employs near-infrared light to measure cerebral oxygenation and deoxygenation levels, enabling the indirect assessment of neural activity by detecting changes in haemoglobin absorption within human tissue (Krampe et al., 2018). PET detects gamma emissions resulting from pre-administered radioactive substances, enabling detailed spatial assessment of brain metabolic processes; however, its invasive nature, limited temporal accuracy, and high cost make it generally unsuitable for studies with healthy participants (Daugherty and Hoffman, 2017). EEG is a method that records electrical activity in the brain through sensors attached to test subjects, visualizing brain functions through graphical outputs or brain maps (Penrod, 2023). Magnetoencephalography (MEG) utilizes helmet-mounted detectors to measure brain activity through magnetic fields, unaffected by factors such as blood or bone, and is typically used in a magnetically shielded laboratory environment (Siddique et al., 2023).

These physiological tools include eye-tracking (ET), galvanic skin response (GSR), facial expressions and heart rate (HR) (Alsharif et al., 2021a). ET is a method that enables tracking of the specific points or objects that participants' eyes focus on at any given moment (Kumar, 2015). GSR measures the level of electrical resistance or conductance in human skin, based on the concept that increased resistance from sweat gland activation indicates heightened arousal (Daugherty and Hoffman, 2017). There are two methods for identifying facial expressions: facial coding, which uses software to detect movements in forty-three facial muscles to determine subjects' moods, and facial electromyography (EMG), which captures emotional responses by assessing electrical signals through electrodes placed on two facial muscles (Kiran and Prabhakar, 2021). HR is a technique that examines the number of heartbeats occurring within a single minute (Kumar, 2015) and cardiovascular responses are measured through the use of ECG (Electrocardiogram) and pulse oximeters (Küçün et al., 2020). However, fMRI, EEG and ET are the most preferred techniques in neuromarketing research (Alsharif et al., 2021b).

2.4. The Role of the Neuromarketing in Marketing

In today's increasingly competitive business environment, understanding the consumer holds substantial importance in shaping both local and global marketing strategies effectively. Gaining more detailed insights into consumer behavior is a crucial factor for achieving a competitive advantage in marketing activities. Moreover, it is stated that consumers may not always act rationally during their decision-making processes (Zurawicki, 2010). In this context, neuromarketing, which provides deeper insights into consumer behavior, has increasingly gained prominence (Zhu et al., 2022).

Neuromarketing utilizes technology to provide insights into consumers' subconscious, which traditional research methods (e.g., interviews, surveys) cannot access, allowing businesses to acquire a deeper insight into consumer behavior (Siddique et al., 2023). Moreover, neuromarketing delivers more reliable and impactful outcomes in understanding consumers compared to traditional methods (Kiran and Prabhakar, 2021). Neuromarketing enables the real-time identification of consumers' responses to marketing stimuli (Bercea Olteanu, 2015). For instance, businesses can identify consumers' physical and cognitive responses to any marketing stimulus and analyze the role they play in shaping decisions (Misra, 2023).

Neuromarketing aids businesses in comprehending and anticipating consumer behavior in marketing research, while also contributing to the optimization of product innovation, packaging design, price strategies, and the assessment of advertising effectiveness (Misra, 2023). In addition, it enables the acquisition of insights through the use of advanced technologies in areas such as effective communication and promotional activities within the context of the consumer purchasing decision process (Öztürk, 2024). The practical applications of neuromarketing also aid in advancing theoretical progress within the marketing discipline by encouraging the emergence of novel perspectives and bolstering pre-existing concepts. Neuromarketing extends beyond merely offering insights into consumer behavior; it also enhances marketing as an academic field by enabling the formulation of innovative marketing theories and reinforcing established frameworks (Lim, 2018). In this regard, neuromarketing holds a pivotal role in both the formulation of marketing strategies and the reassessment of current knowledge through the valuable data it generates.

2.5. Neuromarketing into COO Effect Studies

Technological advancements across the globe have led to significant changes in global market dynamics. Today, it is not merely the trade of products manufactured in different countries that is observed but also products whose components are produced in various countries, while their design and branding originate from entirely different nations. Consumers, who were previously exposed to products produced solely in one country, now encounter goods involving production processes spanning multiple countries. Due to current global market dynamics, it has been explicitly stated that COO, which once played a significant role in consumer decision-making, may no longer exert the same influence (Usunier, 2011). Therefore, it is emphasized that the topic needs to be revisited (Usunier, 2006). Furthermore, the existing literature highlights that studies examining the COO effect using traditional research methods lack precision and reliability (Herz and Diamantopoulos, 2017).

Examining whether the influence of COO on consumers' decision-making processes persists through traditional methods leads to inconclusive results, creating contradictions in marketing strategies that are developed using the knowledge obtained through these methods (Halkias et al., 2022). Therefore, it is important to revisit the subject using research techniques that differ from traditional methods. Neuromarketing holds a pivotal role in the reassessment of current knowledge through the data it generates using techniques different from traditional methods (Lim, 2018). Neuromarketing utilizes various techniques to capture consumers' immediate responses to marketing stimuli (Zhu et al., 2022). Thus, it enables a comprehensive insight into consumers' responses, regardless of their awareness of these responses (Siddique et al., 2023). Unlike traditional methods that fail to measure unconscious and emotional responses, neuromarketing integrates neuroscience, psychology, and marketing to offer a comprehensive understanding of the underlying mechanisms of consumer behavior (Casado-Aranda et al., 2020). In this domain of lively debate, integrating neuromarketing techniques into COO studies holds importance in demonstrating the potential of both the COO effect and neuromarketing methods.

3. DATA AND METHODOLOGY

3.1. The Research Aim, Scope, and Significance

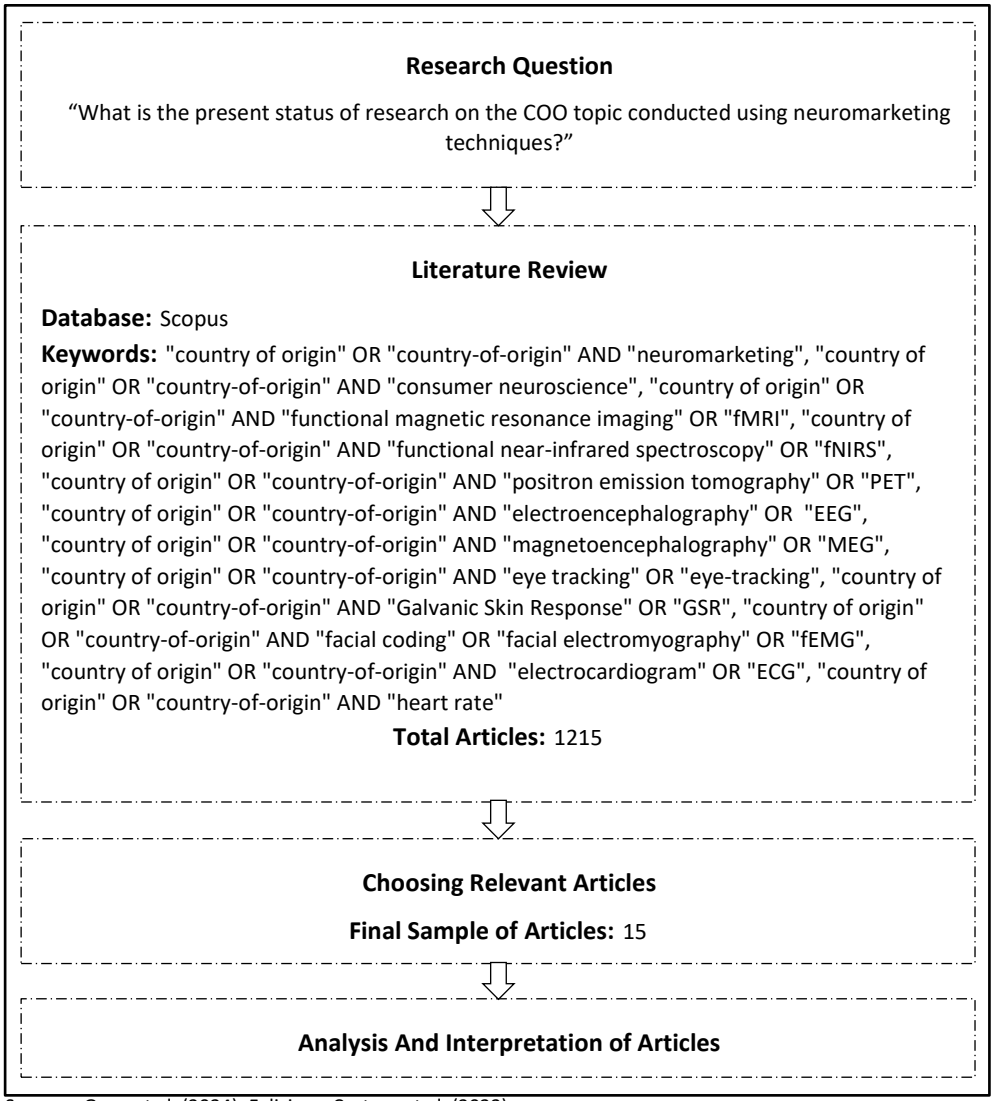
In the lively debate surrounding the COO topic, the limitations of traditional methods highlight the importance of integrating neuromarketing techniques into related studies (Casado-Aranda et al., 2020; Halkias et al., 2022; Casado-Aranda et al., 2021). Accordingly, the current state of research addressing the COO topic through neuromarketing techniques has emerged as a significant area of inquiry. This situation has resulted in the research question: “What is the present status of research on the COO topic conducted using neuromarketing techniques?”. Building on this research question, this study aims to systematically examine studies that explore the COO topic through the application of neuromarketing techniques.

Evaluating the existing literature from this perspective provides significant contributions to both COO and neuromarketing literature. This assessment offers a comprehensive understanding of how the limitations of traditional research methods in COO literature have been addressed. Furthermore, it highlights how neuromarketing techniques, which are predominantly applied to marketing aspects such as advertising, branding, and decision-making (Özkara, 2017), have been adapted to measure the effects of COO. In this way, it contributes to identifying gaps in the existing literature and plays a significant role in encouraging future research in the field. In this context, this study is designed to make a substantial contribution to academic research and inspire further exploration in this domain.

3.2. Identification of Relevant Articles for Analysis

Research conducted in various regions around the world continues to expand the accumulated knowledge within the existing literature. The advancement of research in the literature relies on the examination, comparison, and holistic evaluation of prior studies (Paul and Criado, 2020). In this context, systematic literature reviews, by following specific steps, provide researchers with a comprehensive evaluation of the existing body of research while uncovering unexplored areas in the literature and supporting the initiation of further studies (Paul and Barari, 2022). This research conducted a systematic review to assess the existing trends in studies on the COO topic using neuromarketing techniques. The steps outlined in Figure 1, which were adapted from the frameworks proposed by Gong et al. (2024) and Feliciano-Cestero et al. (2023), were followed.

Figure 1: Systematic Literature Review Process



Sources: Gong et al. (2024); Feliciano-Cestero et al. (2023)

In the study, the Scopus database was systematically searched to identify studies related to the COO topic conducted using neuromarketing techniques. Because, Scopus is a comprehensive database that serves as a resource for large-scale global studies and bibliometric analyses, encompassing peer-reviewed scientific content as well as various indexes such as publication titles, abstracts, and keywords (Baas et al., 2020). In this context, the Scopus database was examined using the predefined keywords.

Initially, the keywords ‘"country of origin" OR "country-of-origin" AND "neuromarketing"’ and ‘"country of origin" OR "country-of-origin" AND "consumer neuroscience"’ were constructed to represent general terms related to neuromarketing, an applied discipline, and consumer neuroscience, a research field focused on understanding the role of the brain in consumer decision-making processes. To provide more detailed information about the studies, and considering that article titles, keywords and abstracts often specify the exact techniques used rather than general terms like neuromarketing or consumer neuroscience, the following keywords were constructed to include specific neuromarketing techniques: ‘"country of origin" OR "country-of-origin" AND "functional magnetic resonance imaging" OR "fMRI"’, ‘"country of origin" OR "country-of-origin" AND "functional near-infrared spectroscopy" OR "fNIRS"’, ‘"country of origin" OR "country-of-origin" AND "positron emission tomography" OR "PET"’, ‘"country of origin" OR "country-of-origin" AND "electroencephalography" OR "EEG"’, ‘"country of origin" OR "country-of-origin" AND "magnetoencephalography" OR "MEG"’, ‘"country of origin" OR "country-of-origin" AND "eye tracking" OR "eye-tracking"’, ‘"country of origin" OR "country-of-origin" AND "Galvanic Skin Response" OR "GSR"’, ‘"country of origin" OR "country-of-origin" AND "facial coding" OR "facial electromyography" OR "fEMG"’, ‘"country of origin" OR "country-of-origin" AND "electrocardiogram" OR "ECG"’, ‘"country of origin" OR "country-of-origin" AND "heart rate"’. This approach allowed for a more detailed search focused on the specific techniques utilized in the studies. While constructing these keywords, attention was paid to different typing and abbreviations. Additionally, scenarios where different methods are used to measure the same response were considered. For instance, emotional facial expressions can be measured using both "facial coding" and "facial electromyography" (Höfling et al., 2021). Moreover, cardiovascular responses are measured using ECG (Electrocardiogram) and pulse oximetry, with the data obtained from these devices providing information about heart rate (Küçün et al., 2020). Therefore, it has been observed that studies on cardiovascular responses typically refer to the technique as either ECG or Heart Rate. Accordingly, both ECG and Heart Rate were included as keywords in the process.

To identify more studies, the 'search within' option was set to 'all fields,' and the search was conducted in November 2024. Duplicate entries among the initial results were removed, resulting in an initial dataset comprising 1,218 articles. The titles and abstracts of the articles in this dataset were evaluated based on specific criteria: the study being written in English, addressing the COO effect, and utilizing neuromarketing techniques. After following this procedure, relevant articles were identified. Following the initial evaluation, 20 articles were selected; however, a detailed review revealed that 5 of these articles did not meet the required criteria and were excluded from the dataset. Ultimately, 15 articles were selected for detailed content analysis, and analysis was conducted using the MS Excel program. Table 1 provides detailed information regarding the dataset. Table 2 presents selected relevant articles for the analysis.

Table 1: Summary of the Dataset

Keywords	Total Articles Found
"country of origin" OR "country-of-origin" AND "neuromarketing"	99
"country of origin" OR "country-of-origin" AND "consumer neuroscience"	54
"country of origin" OR "country-of-origin" AND "functional magnetic resonance imaging" OR "fMRI"	198
"country of origin" OR "country-of-origin" AND "functional near-infrared spectroscopy" OR "fNIRS"	20
"country of origin" OR "country-of-origin" AND "positron emission tomography" OR "PET"	368
"country of origin" OR "country-of-origin" AND "electroencephalography" OR "EEG"	179
"country of origin" OR "country-of-origin" AND "magnetoencephalography" OR "MEG"	46
"country of origin" OR "country-of-origin" AND "eye tracking" OR "eye-tracking"	338
"country of origin" OR "country-of-origin" AND "Galvanic Skin Response" OR "GSR"	47
"country of origin" OR "country-of-origin" AND "facial coding" OR "facial electromyography" OR "fEMG"	7
"country of origin" OR "country-of-origin" AND "electrocardiogram" OR "ECG"	53
"country of origin" OR "country-of-origin" AND "heart rate"	118
Total Initial Search Results	**1527**
Distinct Articles After Removing Duplicates	**1218**
Relevant Articles After Preliminary Evaluation	**20**
Selected Relevant Articles for Analysis	**15**

Table 2: Selected Relevant Articles for Analysis

Reference	Article Title	Journal	Neuro-marketing Technique Used	Research Objective	Research Findings
Artêncio, Giraldi, and de Oliveira, (2022)	A cup of black coffee with GI, please! Evidence of geographical indication influence on a coffee tasting experiment	Physiology & Behavior	EEG	To investigate the impact of Geographical Indication (GI) information on neural reactions, the moderating roles of sex differences and the degree of involvement in these effects, and consumer choices.	Women exhibited greater neural activity and sensitivity to GI information compared to men, who demonstrated more limited responses; while the influence of involvement level was weaker than that of gender, men generally preferred GI-labeled coffee, whereas women tended to favor non-GI coffee, despite frequently expressing orally the opposite preference.
Casado-Aranda, Sánchez-Fernández, Ibáñez-Zapata, and Liébana-Cabanillas, (2020)	How consumer ethnocentrism modulates neural processing of domestic and foreign products: A neuroimaging study	Journal of Retailing and Consumer Services	fMRI	To evaluate the effects of local and imported products on brain activation in relation to levels of consumer ethnocentrism.	Highly ethnocentric consumers demonstrated heightened activity in neural areas associated with reward and self-referential processes when assessing local products, whereas imported products triggered higher responses in areas connected to risk evaluation.
Casado-Aranda, Dimoka, and Sánchez-Fernández, (2021)	Looking at the brain: Neural effects of “made in” labeling on product value and choice	Journal of Retailing and Consumer Services	fMRI	An investigation into the neurological basis of consumers' perceptions of local and imported products, considering cultural similarities/differences and levels of product involvement.	The outcomes indicate that local products consistently elicit rewarding neural responses, whereas negative reactions toward imported products emerge only under conditions of cultural differences and heightened involvement.

Cheng and Wang, (2018)	Impact of COO and Brand ogo on the Acceptance of Luxury Price Based on Brain Evoked Potential Analysis	NeuroQuantology	EEG	To investigate the impact of COO and brand logo on consumers' evaluation of luxury prices and the underlying brain mechanisms using the Event-Related Potentials (ERP) method.	It was found that products with only one COO were evaluated by consumers at higher prices, and the presence of a brand logo enhanced the evaluation of luxury prices.
Escandon-Barbosa and Rialp-Criado, (2019)	The Impact of the Content of the Label on the Buying Intention of a Wine Consumer	Frontiers in Psychology	Eye Tracking	To examine how the information presented on wine bottle labels impacts consumers' purchase intentions for wine.	It has been demonstrated that participants, when grouped based on their wine consumption experience, interpret label information (the denomination of origin, nutritional information, and health warnings) differently, and these variations, along with the interactions between label components, have a significant impact on purchase intention.
Fan and Zhang, (2019)	Does the aura surrounding healthy-related imported products fade in China? ERP evidence for the country-of-origin stereotype	PLoS ONE	EEG	An exploration of the perceptions of young Chinese consumers toward domestic and imported products and the potential shifts in COO stereotypes at the brain activity level.	Chinese young consumers continue to perceive imported products, particularly health-related ones, more favorably than domestic products; this is evidenced by longer reaction times and greater neurological activation when associating imported products with negative adjectives.
Halkias, Florack, Diamanto poulos, and Palcu, (2022)	Eyes Wide Shut? Understanding and Managing Consumers' Visual Processing of Country-of-Origin Cues	British Journal of Management	Eye Tracking	To investigate whether consumers notice COO labels, how this recognition impacts their subsequent behavioral responses, and whether their visual focus on these labels can be influenced from outside sources.	The results indicate that most COO labels on product packages are indeed noticed by consumers, with their impact on behavioral intentions depending on the duration of visual attention.

Huang, Wan, Peng, and Sui, (2020)	Grey matter volume and amplitude of low-frequency fluctuations predicts consumer ethnocentrism tendency	Neuroscience Letters	fMRI	To explore the neural basis of individual variations in consumer ethnocentrism tendency (CET), brain functionality and anatomy were examined using fMRI techniques.	The results revealed that different brain regions play significant roles in consumer ethnocentrism.
Liu, Sharma, Xu, Gonzalez Viejo, Fuentes, and Torrico, (2022)	Influence of Label Design and COO Information in Wines on Consumers' Visual, Sensory, and Emotional Responses	Sensors	Eye Tracking	To assess how origin information on wine labels impacts purchase intentions, as well as hedonic and unconscious emotional reactions, through eye-tracking.	COO information slightly influences purchase intentions and hedonic responses.
Ma, Abdeljelil, and Hu, (2019)	The influence of the consumer ethnocentrism and cultural familiarity on brand preference: Evidence of event-related potential (ERP)	Frontiers in Human Neuroscience	EEG	To understand the behavioral and neurological aspect of consumer ethnocentrism on brand choice by examining the role of ethnic group and cultural familiarity.	Chinese participants clearly preferred recommendations from individuals of their own ethnic group, while African participants familiar with foreign cultures showed no difference in their preferences between logos suggested by Chinese and African individuals, and same-group suggestions triggered a significantly lower N200 component compared to different-group recommendations.
Min, Cho, Sung, and Cho, (2014)	Neurophysiological evidence for the country-of-origin effect: an event-related potential study	NeuroReport	EEG	To examine neural activity related to the COO effect and consumers' assessment of product design.	The study demonstrates a notable relationship between the COO effect and design choice with respect to response times and provides neuropsychological information highlighting the substantial role of COO in shaping design choice.

Pagan, Giraldi, Maheshwari, de Paula, and de Oliveira, (2021).	Evaluating cognitive processing and preferences through brain responses towards country of origin for wines: the role of gender and involvement	International Journal of Wine Business Research	EEG	To examine how the wines' COO influences cognitive assessment and consumer choice by analyzing neural activity, taking into account the effects of sex and degree of involvement.	The findings indicate that COO had no notable overall impact on cognitive processing or preferences, except for heightened cognitive processing of Brazilian wines among men and low-involvement consumers.
Wang, Lyu, Liu, Liu, Gao, and Jin, (2022)	Country-Brand Fit: The Effect of COO Stereotypes and Brand Positioning Consistency on Consumer Behavior: Evidence From EEG Theta-Band Oscillation	Frontiers in Neuroscience	EEG	To examine how the compatibility between COO stereotypes and brand positioning affects consumer behavior, along with the role of brand positioning strategies and the associated cognitive processes, utilizing electroencephalography (EEG).	The results offer neural insights into how the alignment between COO stereotypes and brand positioning shapes consumer purchasing behavior, emphasizing the threshold effect and the critical role of the competence dimension.
Xie, Chen, Zhang, and Cui, (2018)	Neural correlates of country-of-origin image (COI) stereotype	Neuroscience Letters	EEG	To explore the neural processes underlying country of origin image (COI) stereotypes in the context of product evaluation.	The study revealed that COI stereotypes shape product evaluation via neural mechanisms, highlighting the roles of automatic emotional priming and cognitive monitoring in decision-making.
Zhang, Palma, Jin, and Yuan, (2019)	US consumer reactions to China's Shuanghui acquisition of Smithfield Foods and its neural basis	Agribusiness: An International Journal	EEG	To investigate the impact of a Chinese firm's purchase of a US company on consumer choice and the neural mechanisms underlying these effects.	The purchase reveals that it decreased consumers' choice for the U.S. brand while increasing their preference for the Chinese brand and that U.S.-origin products led to a decline in neural responses despite an increase in willingness to pay.

3.3. Analysis of Relevant Articles

"Content analysis is a research technique for making replicable and valid inferences from texts to the contexts of their use" (Krippendorff, 2004, p.18). Furthermore, content analysis refers to a set of research techniques used to produce results that prioritize validity, reproducibility, and transparency (Drisko and Maschi, 2016). The quantitative content analysis approach has been utilized in this study. Quantitative content analysis is a quantitative approach that systematically aims to count the frequency of specific elements or categories within a given text (Taylan, 2011). In quantitative content analysis, where objectivity and systematicity are prioritized, analytical elements are identified and interpreted using quantitative components (Sallan Gül and Nizam, 2021).

4. FINDINGS

4.1. Basic Analyses and Trends

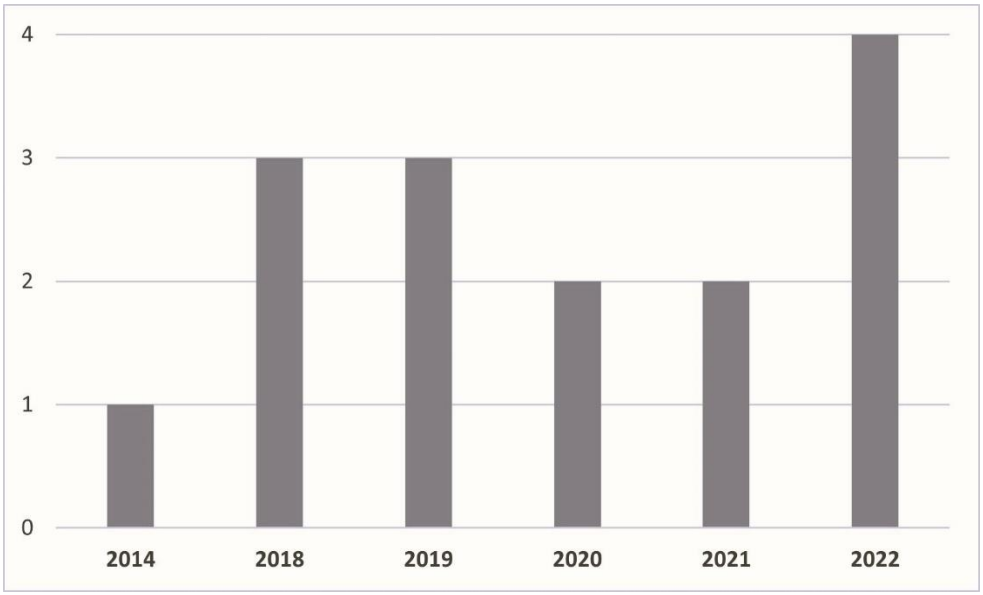
4.1.1. Publication Trends Over the Years

Graph 1 illustrates the yearly distribution of studies examining the COO effect using neuromarketing techniques. The graph indicates that the first study on this topic was performed in 2014. However, between 2014 and 2018, studies on this topic remained absent. Nonetheless, existing research highlights a sustained interest in the COO topic (Lu, et al., 2016; Samiee and Chabowski, 2021). This absence of studies may be attributed to a lack of interest or certain reservations regarding the integration of neuromarketing techniques into COO research.

The number of studies published in 2018 demonstrates a notable increase in research investigating the COO effect using neuromarketing techniques. This growth can be linked to the rising interest in neuromarketing research (Alsharif et al., 2021b). However, a decline in the number of studies is observed in 2020 and 2021, which can largely be attributed to the COVID-19 pandemic. Given that neuromarketing research typically requires a laboratory setting, pandemic-related restrictions may have disrupted planned studies during these years.

The year 2022 emerged as the most productive year for research in this field. However, this momentum did not continue beyond 2022, as no studies were published in 2023 or 2024. This suggests that the topic has lost prominence and that research interest has diminished. Nevertheless, considering the continued interest in the COO topic and the ongoing advancements in neuromarketing techniques driven by technological developments, there is strong potential for significant research contributions in this area in the future.

Graph 1: Number of Studies by Year



4.1.2. Publication Trends in Journals

Table 3 presents the distribution of articles across journals. According to the table, the relevant articles were published in 13 different journals. This indicates that the studies are not concentrated in a specific journal but are instead distributed across various journals. The fact that these journals belong to different disciplines further highlights the multidisciplinary nature of the topic.

Among the journals where the studies were published, “Journal of Retailing and Consumer Services” and “Neuroscience Letters” stand out, with two articles published in each. In contrast, the other journals each feature only one article. This suggests that “Journal of Retailing and Consumer Services” and “Neuroscience Letters” could serve as focal points for the publication of future research in this field.

Table 3: Article Distribution Across Journals

Journal Name	Number of articles
Agribusiness: An International Journal	1
British Journal of Management	1
Frontiers in Human Neuroscience	1
Frontiers in Neuroscience	1
Frontiers in Psychology	1
International Journal of Wine Business Research	1
Journal of Retailing and Consumer Services	2
NeuroQuantology	1
NeuroReport	1
Neuroscience Letters	2
Physiology & Behavior	1
PLoS ONE	1
Sensors	1
Total	**15**

4.1.3. Trends in Publication Citations

Upon examining Table 4, the study by Casado-Aranda et al. (2020) emerges as the most cited work, with a total of 35 citations. This is followed by the studies of Escandon-Barbosa and Rialp-Criado (2019) with 25 citations and Ma et al. (2019) with 24 citations. These findings indicate that these studies have served as significant reference points for subsequent research in the field. In contrast, the studies by Cheng and Wang (2018) and Huang et al. (2020) received only 1 citation each, which may suggest that these works focus on narrower topics or specific areas of interest.

When analyzing the total citations of publications by year, it is observed that 2019 stands out as the most cited year, with a total of 57 citations. This highlights 2019 as the most productive and impactful year for research examining the COO effect using neuromarketing techniques.

Table 4: Publication Citations

Authors and Year Published	Citations
Casado-Aranda, Sánchez-Fernández, Ibáñez-Zapata and Liébana-Cabanillas (2020)	35
Escandon-Barbosa and Rialp-Criado (2019)	25
Ma, Abdeljelil and Hu (2019)	24
Casado-Aranda, Dimoka and Sánchez-Fernández (2021)	14
Pagan, Giraldi, Maheshwari, de Paula and de Oliveira (2021)	12
Liu, Sharma, Xu, Gonzalez Viejo, Fuentes and Torrico (2022)	12
Artêncio, Giraldi and de Oliveira (2022)	9
Halkias, Florack, Diamantopoulos and Palcu (2022)	6
Min, Cho, Sung and Cho (2014)	5
Xie, Chen, Zhang and Cui (2018)	5
Fan and Zhang (2019)	4
Zhang, Palma, Jin and Yuan (2019)	4
Wang, Lyu, Liu, Liu, Gao and Jin (2022)	4
Cheng and Wang (2018)	1
Huang, Wan, Peng and Sui (2020)	1

4.1.3. Trends in Distribution of Authors by Country and Institution

Table 5 provides an overview of the number of authors per country. The table reveals that 21 authors are affiliated with institutions in China, marking the highest number of authors among all countries. This highlights China's prominence in studies examining the COO effect using neuromarketing techniques, positioning it as a significant center in this field. Furthermore, it indicates a strong interest among Chinese researchers in this topic, and their substantial contributions to the field are noteworthy.

China is followed by Brazil, Spain, and the USA, each contributing 5 authors. Researchers from these countries have made significant contributions to studies exploring the COO effect using neuromarketing techniques. New Zealand (4), Austria (3), and South Korea (3) are categorized as countries providing moderate contributions. These findings suggest a notable interest in the subject within these countries, though not as extensively as in China, Brazil, Spain, and the USA. The table also shows that Australia and the UK each contribute with 2 authors. These relatively low numbers of authors indicate that researchers from these countries demonstrate limited contributions to studies focusing on the COO effect using neuromarketing techniques. The lowest contributions, at 1 author each, are from Germany and Colombia. This indicates that researchers from these countries have provided minimal input into studies examining the COO effect through neuromarketing methods.

In conclusion, research on the COO effect using neuromarketing techniques is predominantly concentrated in China. While there is heightened interest in specific countries, the overall engagement in this field remains limited. Nevertheless, the findings offer useful information about potential countries for fostering future collaborations.

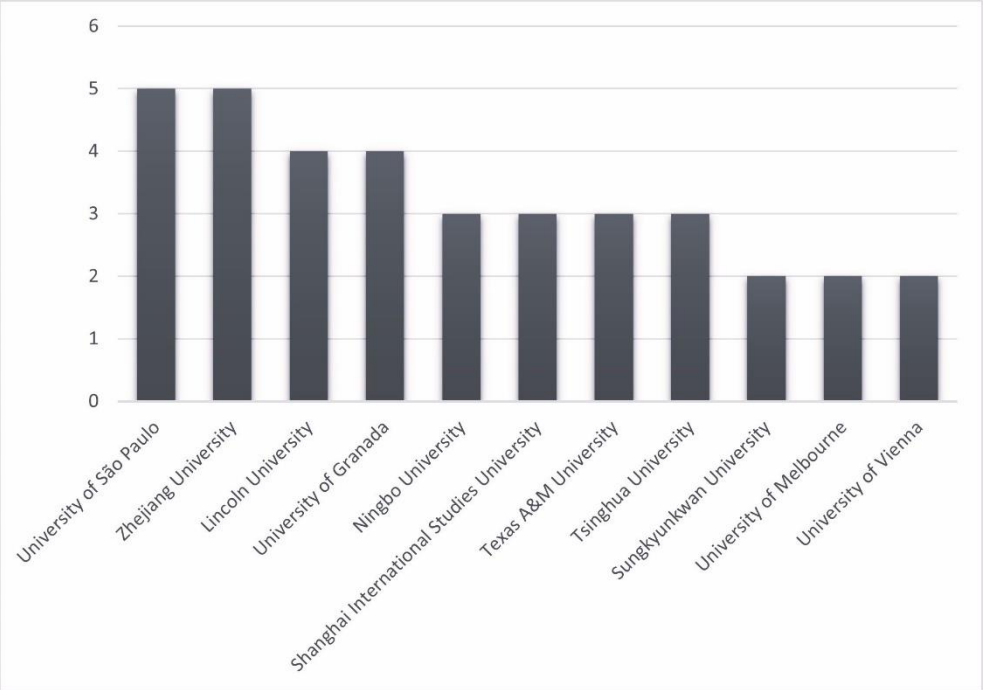
Table 5: Distribution of Authors by Country

Countries of Authors	Number of Authors
Australia	2
Austria	3
Brazil	5
China	21
Colombia	1
Germany	1
New Zealand	4
South Korea	3
Spain	5
UK	2
USA	5
Total	**52**

Graph 2 provides an overview of the institutional distribution of authors. However, to keep the list concise and meaningful, only institutions with two or more contributing authors are included in the graph. The results reveal that the most significant contributions to studies examining the COO effect using neuromarketing techniques come from authors affiliated with Zhejiang University and University of São Paulo. These two institutions clearly stand out as leading contributors to this research area. Lincoln University and University of Granada follow closely, making substantial contributions to COO and neuromarketing research. Furthermore, Ningbo University, Shanghai International Studies University, Texas A&M University, and Tsinghua University have provided moderate contributions to this field. In contrast, University of Vienna, University of Melbourne, and Sungkyunkwan University have made more limited contributions.

In conclusion, certain institutions have played a prominent role in advancing this research area by providing significant contributions. Furthermore, the involvement of universities from diverse countries and regions highlights the international interest in COO and neuromarketing studies within the global academic literature. This global engagement provides a strong foundation for potential future collaborations.

Graph 2: Distribution of Authors by Institution



4.2. Analyses and Trends in Research Details

4.2.1. Trends in Research Techniques

The neuromarketing techniques used in the relevant articles were examined. It was identified that EEG was utilized in 9 articles, while fMRI and eye tracking were each used in 3 articles. Among these techniques, EEG and fMRI are classified as brain imaging techniques, whereas eye tracking is considered a physiological method.

EEG is a frequently used technique in neuromarketing studies (Alam, 2024). Therefore, its prevalent use in the examined articles is an expected outcome. EEG presents a financial benefit as it is more affordable than other neuromarketing techniques (Siddique et al., 2023). Additionally, it offers advantages because it is both non-invasive and easy to use (Alam, 2024). These characteristics may explain why EEG was preferred more frequently among the examined studies.

In contrast, fMRI, another brain imaging technique, was utilized in only a few studies. This can be attributed to certain constraints associated with fMRI. Compared to other neuromarketing techniques, fMRI is more expensive, imposes significant restrictions on participants' movement, and is relatively less accessible (Casado-Aranda et al., 2023). Although fMRI provides detailed insights into the brain's deeper areas, the complexity of its data makes analysis challenging for researchers (Siddique et al., 2023). These limitations may have negatively impacted the preference for fMRI in research.

The physiological technique eye tracking was also employed in only a few studies. Eye tracking is a less expensive and non-invasive method compared to other neuromarketing techniques (Alam, 2024). It enables the observation of attention and eye movements (Siddique et al., 2023). However, while it provides information about where a consumer looks, it is insufficient to explain the reasons behind their gaze (Casado-Aranda et al., 2023). This limitation might explain why eye tracking has been less frequently employed in studies examining the COO effect.

The reviewed articles show that EEG, fMRI, and eye tracking were the primary neuromarketing techniques used. However, these techniques were predominantly employed independently. Moreover, brain imaging techniques were more commonly utilized, while physiological methods were less frequently applied. Therefore, in future studies, the variety and frequency of neuromarketing techniques could be expanded. The use of physiological methods alongside brain imaging techniques could also be beneficial. Furthermore, research prioritizing physiological methods may provide valuable insights.

4.2.2. Review of Products Used in Experiments

The products used in the experiments conducted in the analyzed articles have been categorized and reviewed as presented in Table 6. Upon examining the categories, it is evident that the Food & Beverages and Technology Products categories encompass a wide range of items. Furthermore, the experiments predominantly featured products from these two categories. The most frequently presented items include wine, pen, pen drives, photo camera, and watch.

The studies utilized products from various categories, likely reflecting an effort to select items that align with the study framework. For example, in the study by Casado-Aranda et al. (2020), technological products were selected because of their strong link to COO labeling effect. Similarly, Wang et al. (2022) selected products that were neutral and less likely to vary across individual preferences, aligning with their research objective of minimizing the influence of product type. In another example, Cheng and Wang (2018) selected wallet as the product because they were accessible to participants, commonly used in daily life, suitable for displaying logos in the experiment, and held a significant share in the sales of luxury leather goods. Consequently, it is evident that the products used during the experimental phase span a wide range. However, product selection is primarily driven by their relevance to the research objectives and context.

Table 6: Distribution of Products Used in Experiments by Category

Categories	Products	Frequency	Categories	Products	Frequency
Food & Beverages	Beef	1	**Stationery & Office Supplies**	Laptop Bag	1
	Coffee	1		Notebook	1
	Energy Drink	1		Pen	2
	Jam	1	**Technology Products**	Bluetooth headset	1
	Meat	1		Bluetooth speaker	1
	Milk	1		Computer keyboard	1
	Milk powder	1		Computer mouse	1
	Potato Chips	1		Earphone	1
	Tea	1		Mobile phone	1
	Wine	3		Mp3 Player	1
Health & Medical Products	Antibiotic	1		Pen drives	2
	Calcium	1		Photo camera	2
	Vaccine	1		Radio	1
Home & Daily Use Products	Towel	1		Toaster	1
Outdoor Equipment	Bicycle	1	**Wearables & Accessories**	Running Shoes	1
Personal Care Products	Electric toothbrush	1		Wallet	1
	Hairspray	1		Watch	2
	Hand Lotion	1			

4.2.3. Trends in Geographical Distribution of Studies

The countries where the experimental studies in the analyzed articles were conducted have been reviewed. Accordingly, six studies were conducted in China, two each in Brazil and Spain, and one each in Colombia, New Zealand, South Korea, and the USA.

A significant portion of the experiments were conducted in China. This indicates that China plays a leading role in research examining the COO effect using neuromarketing techniques and reflects a high level of academic interest in this area. Following China, Brazil and Spain show noticeable interest in this topic, while Colombia, New Zealand, South Korea, and the USA demonstrate relatively limited engagement.

In conclusion, these findings provide insights into potential focal points for future studies and suggest that research on the COO effect could be extended to include a variety of geographical contexts. Thus, broadening the geographical scope of research will also lead to a better understanding of how the COO shapes consumer behavior across different cultures.

4.2.4. Analysis of Research Objectives

Themes and codes were developed to analyze the objectives of studies examining the COO effect through neuromarketing techniques. This approach aims to better identify how studies approach the topic, the elements they investigate, existing gaps, and emerging trends. The frequencies of the developed codes and themes are presented in the table 7 below.

A review of the table shows that the codes 'COO' and 'Product Category (Local/Imported)' have the highest frequencies. Additionally, the use of the codes 'COO Label' and 'COO Stereotypes' suggests that these aspects are frequently analyzed in existing studies. Conversely, codes such as 'COO Image Stereotypes,' 'International Company Acquisition', and 'Production Country', which appear only once, demonstrate significant potential for future research. Notably, distinctions such as 'country of manufacture', 'brand origin', and 'country of design' have been underexplored, signalling a need for further investigation into these aspects and their implications.

Within the Neurological and Physiological Responses theme, 'Neurological Responses' emerges as the most frequently observed code. This result demonstrates that existing studies mainly concentrate on brain imaging techniques. However, the relatively lower frequency of 'Physiological Responses' codes highlight a gap in research addressing physiological response measurement. This highlights the potential for future studies to utilize techniques aimed at capturing physiological responses.

In the Consumer Behavior theme, the 'Consumer Preferences' code appears most frequently, followed by 'Purchase Intention' and 'Consumer Behavioral Responses'. These results show that studies often focus on fundamental aspects of consumer behavior. Furthermore, the inclusion of codes such as 'Product Design Evaluation,' 'Hedonic Responses', and 'Price Acceptance' indicates that some studies incorporate more nuanced analyses.

In the Consumer Characteristics theme, 'Consumer Ethnocentrism' and 'Consumer Involvement' are the most prominent codes. This finding underscores the frequent association of the COO effect with ethnocentric tendencies and consumer involvement. These results also indicate that consumer characteristics play a significant role in evaluating the COO effect.

For the Demographic Characteristics theme, 'Gender' has a higher frequency compared to other codes, suggesting that gender differences are more frequently studied, while 'age' and 'ethnic group' differences are less commonly explored.

Themes with fewer codes, such as 'Marketing Strategies', 'Product Features', and 'Other Elements', also exhibit lower frequencies. For example, the infrequent appearance of codes like 'Brand Positioning' and 'Brand Logo' suggests that these topics are underrepresented in the literature, pointing to potential areas for future research.

In conclusion, studies examining the COO effect from a neuromarketing perspective show a broad scope, with a predominant emphasis on how COO shapes consumer behavior. While demographic characteristics are addressed to a limited extent, individual characteristics are more frequently analyzed. Additionally, the findings underscore the importance of focusing on themes such as Marketing Strategies and Product Features, which offer significant potential for future exploration.

Table 7: Frequencies of Codes and Themes Related to Research Objectives

Themes	Codes	Frequency	Themes	Codes	Frequency
Demographic Characteristics	Gender	2	**Marketing Strategies**	Brand Positioning	1
	Ethnic Group	1	**Consumer Behavior**	Price Acceptance (Luxury)	1
	Age Group (Young Consumer)	1		Hedonic Responses	1
Other Elements	External Sources	1		Brand Preference	1
Country of Origin Elements	Geographical Indication	1		Purchase Intention	2
	Label Information	1		Consumer Behavioral Responses	2
	Country of Origin	4		Consumer Preferences	3
	Country of Origin Label	2		Consumer Awareness	1
	Country of Origin Image Stereotypes	1		Product Evaluation	1
	Country of Origin Stereotypes	2		Product Design Evaluation	1

	International Company Acquisition	1	**Consumer Characteristics**	Individual Differences	1
	Country of Manufacture	1		Cultural Familiarity	1
	Product Category (Local/ Imported)	3		Cultural Similarities/ Differences	1
Neurological and Physiological Responses	Subconscious Emotional Responses	1		Consumer Ethnocentrism	3
	Visual Attention	1		Consumer Involvement	3
	Neurological Responses	11	**Product Features**	Brand Logo	1
	Cognitive Responses	2			

5. CONCLUSIONS AND IMPLICATIONS

The COO topic is a prominent and debated issue in the field of global marketing. Therefore, addressing this topic through various research techniques is crucial for obtaining new and in-depth insights. In this context, research carried out a systematic literature review of studies that examine the COO topic using neuromarketing techniques. The findings provide an in-depth overview of the present status of this niche field, highlight gaps in the literature, and establish a valuable foundation for future research.

Overall, 2022 stood out as the year with the highest research output. Neuroscience Letters and Journal of Retailing and Consumer Services stood out as the primary journals where the studies appeared. China emerged as the country with the highest number of author contributions and the most research conducted. EEG was the most commonly used neuromarketing technique. In experimental designs, products such as wine, pens, USB drives, cameras, and watches were frequently used based on the research context. Studies examining the COO effect from a neuromarketing perspective primarily focused on how consumer behavior is influenced by the COO, showcasing a broad scope.

The results of this research underscore significant considerations for both future studies and practical implementation. First, future research involving collaborations from diverse geographical regions could significantly contribute to the literature. Additionally, employing a wider range of neuromarketing techniques could provide varied findings and enable the exploration of different aspects of the COO effect. Studies targeting different consumer segments and comparing these segments could make valuable contributions to both the COO and neuromarketing literature. Moreover, the research outcomes will offer valuable insights for COO-related applications within global marketing, enhancing the effectiveness of strategies in international markets.

6. LIMITATIONS

Several limitations are present in this research. It focuses solely on studies available in the Scopus database, which excludes articles from other databases. Moreover, the analyzed articles are limited to those indexed as of November 2024, excluding articles published after this date. The reliance on specific keywords is another limitation, as it may have led to the omission of some relevant research. Furthermore, the study only includes articles written in English, potentially overlooking contributions from studies published in other languages.

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