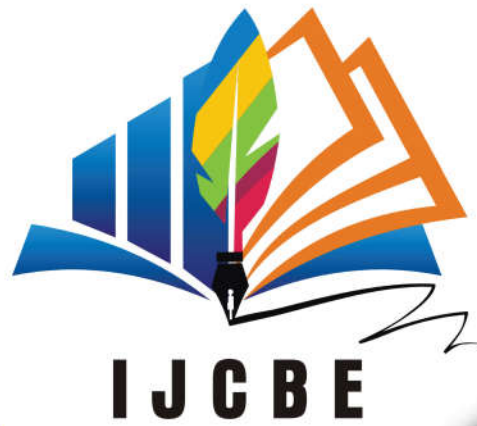


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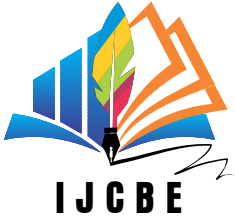
# **INTERNATIONAL JOURNAL**

## **OF CONTEMPORARY BUSINESS AND ECONOMICS**

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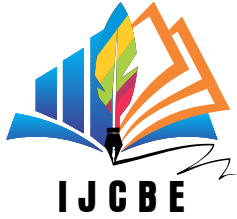
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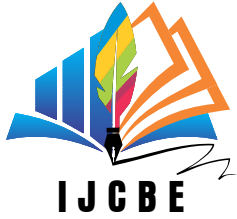
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# Empirical Evidence from the Bootstrap Rolling Window Approach on the Nexus between Agriculture Performance and the Environmental Kuznets Curve in China

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## ABSTRACT:

This study employs the bootstrap Granger causality test and rolling window sub-sample to examine the relationship between agricultural output and CO<sub>2</sub> emissions in China from 1990 to 2022. The rolling window method provides a more sophisticated analysis because it considers essential economic changes over time. Consequently, this is the first study to divide the sample periods into subsets and derive parameters from within each subset. During the first subset of data, which spans the years 1990 to 2004, the parameter for agricultural expansion has a tendency towards snowballing, according to the study's findings. However, the parameter for the second subgroup, which includes the years 2004 to 2022, exhibits a downward trend. These findings lend further credence to the notion that China possesses an EKC shaped like an inverted U.

**Keywords:** Agricultural Performance, Carbon Dioxide (CO<sub>2</sub>), Environmental Kuznets Curve

## Article History

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## Introduction

The agricultural sector in China has a long and significant history that spans over four thousand years. The Chinese farmers have developed and refined specialized crop cultivation and soil preservation techniques throughout this period. The industry has played a crucial role in facilitating economic growth and development at the national level, as it offers a wide array of raw materials and generates effective demand for various other sectors of the economy. The agricultural labor force holds considerable importance, constituting a major proportion of the workforce. The agriculture business in China satisfies crucial dietary requirements and enhances China's competitive position in the global trade landscape through direct and indirect import and export activities. China, an emerging economic giant boasting a population of over 1.4 billion, acknowledges the significance of the agricultural sector as a crucial component in fortifying the nation's underpinnings for sustained success. Chinese agriculture has assumed a pivotal position in facilitating the country's economic progress since the implementation of reforms in 1978. Particularly in recent years, when China's economic growth has decelerated, the agricultural sector has proven indispensable. China experienced a remarkable average yearly growth rate of 9.7 percent in its Gross Domestic Product (GDP) during the period spanning from 1978 to 2006. Despite the agricultural sector's current modest growth rate of 4.5% in comparison to the higher growth rates observed in the industry (11.6%) and services (10.3%), it is anticipated to persistently offer crucial support to the economy and contribute to a stable and substantial pace of economic expansion during the period of restructuring and opening. China plays a significant role in global food production, contributing 18% of the world's cereal grain output,

29% of global meat production, and an impressive 50% of worldwide vegetable production. As a result, China has emerged as the dominant agricultural economy on a global scale, surpassing other nations in terms of food production. The Chinese agriculture industry has achieved a notable accomplishment by effectively generating almost 20% of the global food supply despite possessing only a modest 9% share of the world's arable land. The significant agricultural output in China has important ecological effects, particularly in relation to carbon (CO<sub>2</sub>) emissions, which present a considerable negative. The present circumstances have given rise to apprehensions over the ecological ramifications of China's agricultural methods. Therefore, the current study aims to examine fundamental inquiries about pollution arising from China's agriculture industry. The primary aims of this research endeavor involve empirically estimating the Kuznets environmental curve (EKC) in the context of China and examining the association between agricultural performance in China and its influence on CO<sub>2</sub> emissions. The focus is to determine whether this relationship exhibits a positive or negative effect. The present study expands upon prior research undertaken in this field, which included noteworthy contributions made by Cole et al. (1997). Their findings provided empirical evidence for the substantial impact of agricultural practices on greenhouse gas emissions. Furthermore, Janzen (2004) conducted a study demonstrating a positive association between worldwide agricultural practices and carbon dioxide (CO<sub>2</sub>) release. Janzen attributed this connection to burning plant remnants and soil debris, which are substantial sources of emissions. Furthermore, Bhatia et al. (2013) provided evidence to support the notion that using inorganic fertilizers can potentially lead to

releasing N<sub>2</sub>O emissions. Similarly, Zhang and colleagues (2015) emphasized the impact of agricultural waste burning on the increase of CO<sub>2</sub> emissions. Additionally, the study conducted by Mohamad et al. (2016) made a significant addition by providing insights into the detrimental consequences of manure utilization, highlighting its negative impact on the net carbon flux. The current study aims to thoroughly understand the environmental consequences of agricultural practices in China, specifically focusing on carbon dioxide (CO<sub>2</sub>) emissions. By examining the relationship between agricultural performance and environmental contamination, this study aims to enhance our understanding of the challenges facing China's agricultural sector and provide policymakers with valuable insights for addressing these challenges effectively. The agricultural sector encompasses numerous economic facets, including economic expansion, employment creation, and food production. Nonetheless, the extent of its impact on the environment is primarily unknown. Notably, several scholars argue that a variety of agricultural activities, including the use of machinery and equipment, transportation, electrical lighting, heating and cooling of agricultural buildings, increased demand for raw materials, pesticide use, land utilization, and chemical application, all contribute to energy consumption and greenhouse gas emissions. In fact, agriculture has the potential to produce positive environmental outcomes by nurturing a variety of organic life forms and increasing the tropospheric oxygen content. Emissions of greenhouse gases are only one of several environmental effects that agricultural research has examined. For instance, studies conducted in China demonstrate that the use of fertilizers, herbicides, and mechanization in agriculture are the most significant contributors to pollution due to their effect on greenhouse gas emissions. In other

studies, scientists have examined the pattern of China's agricultural CO<sub>2</sub> emissions and proposed various methods for mitigating emission-based situations in various regions. In addition, some studies have found a significant relationship between agricultural economic growth and CO<sub>2</sub> emissions. Others have calculated regional nitrogen and phosphorus emissions from agriculture and proposed mitigation strategies. Nonetheless, some researchers have analyzed the characteristics of agricultural CH<sub>4</sub> and N<sub>2</sub>O emissions and advocated for a substantial reduction in per capita emissions in the world's largest nations. This study employed the Bootstrap Rolling Window (BSRW) technique to evaluate the EKC in China regarding agricultural performance, with the overarching objective of contributing to the growing body of research aimed at disproving the EKC theory. This analysis is unique because it employs the BSRW to evaluate the relationship between agriculture and CO<sub>2</sub> emissions. The implications of the EKC for China's agricultural sector are investigated, as is the relationship between agricultural activities and carbon dioxide emissions. The introduction of the research paper provides an overview of the theoretical framework that underpins the study. This is followed by further sections that go into the methodology employed, the obtained results, and a comprehensive discussion of the findings. The research closes by presenting a section encompassing the study's findings and providing recommendations. This study contributes to the existing academic literature by comprehensively evaluating the Environmental Kuznets Curve (EKC) hypothesis. Moreover, it offers significant insights for ecologists, policymakers, and scholars by employing a distinctive approach to examine the relationship between agricultural and carbon dioxide (CO<sub>2</sub>) emissions.

## Methodology

The BSRW Model is used in this study to achieve the study's goal. This study applies a more rigorous model to obtain more solid and trustworthy results and improve the analysis's prediction power. Scholars, academicians, and researchers have included various parameters in the model over time to address econometrics concerns and omitted variables. Furthermore, as researchers have used more complex estimation approaches, econometric estimating methods have evolved with the inclusion of numerous variables in the model. Therefore, the study includes a comprehensive presentation of various research variables and econometrics approaches chronologically to provide a thorough understanding of the subject at hand. The negative association between trade openness is revealed by the Johansen Fisher Panel Co-integration Test, as indicated by Zhang et al. (2017) and Jebli et al. (2016). Similarly, capital and labor were added to the model, and the heterogeneous panel cointegration test was conducted. Apergis and Payne (2009) discovered positive connections between capital and labor. The Generalized Method of Moments (GMM) analysis of energy consumption by Chakravarty and Mandal (2016) reveals a positive impact. Dogan and Turkekul (2016) measured the utilization of renewable energy using the Autoregressive Distributed Lag (ARDL) model and discovered weakly adverse to negative relationships. According to Jalil and Feridun (2011), De Vita et al. (2015), Munir and Ameer (2018), Zhang and Gao (2016), and other studies employing the ARDL method, the financial, industrial, commercial, and tourism development sectors all have a positive impact on the dependent variable. The results of your and Lv's (2018) examination of globalization using

geographical correlations reveal a complex pattern of negative and positive connections. Utilizing the Multiple Linear Regression Model (MLRM), Li et al. (2012) found comparable results when studying agriculture. These empirical findings cast light on the strength and direction of the variable relationships, laying the groundwork for future research and informing policy decisions. Previous studies have investigated the Environmental Kuznets Curve (EKC) using econometric models. These studies have focused on analyzing carbon dioxide (CO<sub>2</sub>) emissions as the dependent variable while considering actual gross domestic product (GDP) and the square of real GDP as explanatory factors. Nevertheless, it is important to acknowledge that these models are constructed upon several flawed assumptions. These include considering both positive and negative parameters for real GDP and real GDP squared, as they assume an inverse U-shaped correlation between economic growth and environmental degradation. Additionally, these models assume that the computed parameters accurately represent the entire sample. This study aims to re-assess the relationship between agricultural productivity and carbon dioxide (CO<sub>2</sub>) emissions in China from 1990 to 2022. The study employs the BSRW approach, which enables the calculation of the influence of agricultural performance on CO<sub>2</sub> emissions during specific subsampling periods. Utilizing features acquired from each subsampling interval enhances the dependability of validating the authenticity of the Environmental Kuznets Curve (EKC) assumption. In contrast to previous research, this one uses a BSRW technique to evaluate the correlation between agricultural output and pollution levels, a BSRW causality approach to identify potential shifts in the causal relationship between agriculture and pollution and a multi-stage sample design to isolate the effects of agriculture on pollution levels. The study also



uses Hacker and Hatemi-(2006) example of complete causal nexus and Toda Yamamoto's (1995) entire sampling method to analyze the causal relationship between variables, independent of their integration. In addition, the study utilizes Efron's (1979) start test approach to determine essential test values. As a result, the first stage of this strategy involves examining the vector autoregression procedure.

$$Y_t = \gamma_0 + \gamma_1 Y_{t-1} + \dots + \gamma_p Y_{t-p} + \varepsilon_t, t=1,2,\dots,T \quad (1)$$

Where p shows the lag order of the equation while

$\varepsilon_t$  is a random error with zero mean and constant variance and covariance; however,  $Y_t$  is alienated into three vectors.

$$\begin{bmatrix} Y_{1t} \\ Y_{2t} \end{bmatrix} = \begin{bmatrix} \gamma_{10} \\ \gamma_{20} \end{bmatrix} + \begin{bmatrix} \gamma_{10}(L) \\ \gamma_{20}(L) \end{bmatrix} \begin{bmatrix} Y_{1t} \\ Y_{2t} \end{bmatrix} + \begin{bmatrix} \varepsilon_{1t} \\ \varepsilon_{2t} \end{bmatrix} \quad (2)$$

whereas  $\gamma_{ij}(L) = \sum_{k=1}^p \gamma_{ij,k} L^k$ ,  $i,j=1,2$  and  $L$  is the lag.

The null hypothesis for equation (2) posits that there is no causal relationship between agricultural performance and CO2 levels, and this can be determined by setting the coefficients  $\gamma_{l(2,i)}$  to zero for  $l = 1,2,\dots,p$ , and assuming no confounding factors. Nonetheless, the null hypothesis posits that there is no Granger-causal relationship between CO2 and agricultural performance.

$$Y_t = \gamma_0 + \gamma_1 Y_{t-1} + \dots + \gamma_p Y_{t-p} + \varepsilon_t, t = 1, 2, \dots, T \quad (1)$$

Where p shows the lag order of the equation while

$\varepsilon_t$  is a random error with zero mean and constant variance and covariance. However,  $Y_t$  is alienated into three vectors.

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By putting zero constraints  $\gamma_{l(2,i)}=0$  for  $i=1,2,\dots,p$ . In empirical investigations, researchers use a variety of methodologies to discover underlying structural alterations. Nonetheless, the rolling window causality technique of Balcilar et al. (2010) is used in this research to account for

changes in the cause-and-effect interactions between the agricultural sector and pollution over time. Balcilar et al. (2010) developed a causality strategy using Hacker and Hatemi-(2006) J's prior technique to study the link between bootstrap causality in rolling window subsamples.

$$.t = \tau - 1 + l, \tau - 1, \dots, \tau, \tau = l, l + 1, \dots, T,$$

Where "l" represents a rolling window. Furthermore, the p-values associated with the LR statistics are determined by the calculation of T-1 subtests. This indicates that the expected changes in the causal relationship between agriculture and CO2 emissions remain consistent. Furthermore, the impact of agriculture on pollution is quantified

as  $B^{-1} \sum_{k=1}^p \hat{\gamma}_{21,k}^*$  with  $\hat{\gamma}_{21,k}^*$ .

The readjusted number is the vector auto-regressive (VAR) model estimate using equations 2 and B. Likewise, the impact of environmental pollution on agriculture is calculated as  $B^{-1} \sum_{k=1}^p \hat{\gamma}_{21,k}^*$  where  $\hat{\gamma}_{21,k}^*$  is attained from bootstrap appraisal VAR model by 2 and B refers to bootstrap the reset number. The revised value corresponds to the estimation of the vector autoregressive (VAR) model using equations 2 and B. Similarly, the assessment of the influence of environmental pollution on agriculture is determined by the formula

$$B^{-1} \sum_{k=1}^p \hat{\gamma}_{21,k}^* \text{ where } \hat{\gamma}_{21,k}^* \text{ derived from the}$$

bootstrap estimation of a VAR model with a lag order of 2, and B represents the number of bootstrap replications.

The increasing awareness among customers regarding enterprises' societal and environmental

impacts has led to a heightened focus on corporate social responsibility (CSR) in recent times. In addition to legal requirements, Corporate Social Responsibility (CSR) encompasses the proactive efforts of organizations to enhance their social and environmental performance. Digital marketing is a strategy firms employ to promote their corporate social responsibility (CSR) initiatives (Anderdal et al., 2023). It is imperative to explore novel tactics to enhance the influence of corporate social responsibility (CSR) messages, given the ongoing discussion surrounding the effectiveness of CSR communication via digital marketing. One method that can be employed is artification, which entails incorporating aesthetic elements into corporate social responsibility (CSR) messages to enhance audience engagement and attractiveness. The present study aims to investigate the efficacy of artification in digital marketing for corporate social responsibility (CSR), with a particular emphasis on the moderating influence of brand authenticity. According to De Sordi et al. (2022),

#### **Research Problems and Questions**

This study aims to investigate the research challenges about the efficacy of artification in digital marketing for corporate social responsibility (CSR) and the impact of brand authenticity on this connection. The subsequent research inquiries structure the inquiry:

- 1- What is the impact of artification in digital marketing on the effectiveness of corporate social responsibility (CSR) messaging?
- 2- To what extent does the impact of artification on the effectiveness of corporate social responsibility (CSR) initiatives become influenced by the degree of brand authenticity?
- 3- What is the impact of demographic characteristics, such as age, gender, educational attainment, and job position, on managers' judgments of artification in digital marketing for

corporate social responsibility (CSR)?

#### **Research Objectives and Hypotheses**

The main objective of this study is to find out how well artification works in digital marketing for CSR, focusing on the role of brand credibility as a moderator. The following hypotheses are developed to help with this:

H1. The impact of CSR messages is improved by using digital marketing.

H2: The relationship between artification and CSR effectiveness is moderated by brand authenticity. When brand authenticity is strong, the positive effect of artification on CSR effectiveness is amplified.

H3: Age, gender, level of education, and job rank are among the demographic factors that affect the relationship between artification and the effectiveness of CSR.

#### **Scope and Limitations of this study**

The present study, conducted at the United Bank of Pakistan in Karachi, sought to investigate the potential moderating influences of brand authenticity and demographic characteristics on the relationship. Additionally, the study attempted to examine the impact of artifice in digital marketing on the effectiveness of corporate social responsibility (CSR) messaging. The objective of this study was to provide insights that can assist firms in enhancing their corporate image and amplifying the effectiveness of their corporate social responsibility (CSR) messaging. When interpreting the findings, it is crucial to consider the study's limitations. The limited scope of the study, which focused exclusively on the United Bank of Pakistan, may restrict the generalizability of the findings to other contexts. The statistical power of the analysis may be impeded by a second constraint, namely the limited sample size of the study, which focused exclusively on one company, the United Bank of Pakistan. Consequently, the generalizability of the findings



to other contexts may be limited. Furthermore, the study employed participant-reported data, potentially introducing bias due to the influence of social desirability. Finally, the cross-sectional methodology employed in the study precludes the ability to establish causal links between the variables.

## **Literature Review**

### *Porter's general strategies*

Porter's general strategies framework is extensively employed in the corporate realm to analyze competitive advantage. The three overarching techniques for achieving a competitive advantage, as posited by famous Harvard Business School professor Michael Porter, are cost leadership, differentiation, and focus. Cost leadership is a strategic approach firms employ to attain a competitive advantage over their rivals by minimizing production and operational expenses (Deng et al., 2022). To effectively execute this plan, a corporation must attain economies of scale, reduce expenses comprehensively, and employ efficient production techniques. Developing unique products or services that distinguish a company from its competitors is a crucial element of a differentiation strategy (Robertson et al., 2023). Sharifi et al. (2022) state that the objective is to establish a unique value proposition that presents challenges for competitors to imitate. To establish a distinct product or service identity, an enterprise employing this approach must allocate resources toward research and development, design, branding, and marketing efforts (Pedersen et al., 2022). The implementation of a focus strategy involves the concentration of efforts on a particular market segment or niche to tailor products and services to address their unique requirements effectively (Pai et al., 2022). For this strategy to achieve success, it is imperative for a firm to possess a comprehensive comprehension of its

target market and possess the capability to deliver exceptional value to that specific sector. Porter's basic strategies provide a valuable foundation for understanding how organizations might achieve a competitive advantage. Business enterprises can differentiate themselves from competitors and deliver value to their consumers by focusing on one or more tactics. The success of these strategies can be influenced by various factors, including the company's resources and competencies, industry structure, and competitive dynamics (Tariq et al., 2022).

### **Resource-based view (RBV)**

The resource-based view (RBV) framework is a well-recognized concept in strategic management that underscores the importance of a firm's resources and capabilities in achieving a competitive advantage. The concept posits that the primary determinants of a firm's success are its resources and capabilities, which can be leveraged to establish a sustainable competitive advantage (Pai et al., 2022). The RBV framework places emphasis on the notion that resources vary in terms of their value and scarcity and that a company's competitive advantage stems from its unique amalgamation of resources and capabilities (Neumann et al., 2022). Resources that possess the characteristics of rarity, value, uniqueness, and non-replicability (VRIN) are widely recognized as the primary drivers of competitive advantage. Numerous scholarly investigations have explored the relationship between the Resource-Based View (RBV) framework and the Corporate Social Responsibility (CSR) concept. According to Na et al. (2022), firms that engage in corporate social responsibility (CSR) initiatives tend to own more valuable resources, such as reputation and stakeholder relationships, potentially gaining a competitive edge. Campagna et al. (2023) discovered that companies that engage in socially

responsible practices tend to own more intangible assets, such as staff expertise and brand reputation, which are significant drivers of competitive advantage. According to the study conducted by Xu et al. (2022), it was observed that brands that actively participate in corporate social responsibility (CSR) initiatives while maintaining a high degree of brand authenticity exhibit a more significant impact on customers' intentions to make purchases, as compared to firms that engage in CSR activities with low levels of brand authenticity. The present study argues for the importance of brand authenticity in enhancing the effectiveness of corporate social responsibility (CSR) initiatives, highlighting the need to align CSR endeavors with a company's fundamental beliefs and identity (Safeer et al., 2022). The RBV framework provides a valuable perspective for understanding how a firm's assets and skills can be leveraged to obtain a competitive advantage within corporate social responsibility (CSR) (Arora et al., 2022). By acknowledging and effectively leveraging its unique resources and talents, a business has the potential to enhance its performance and competitive advantage in the market, hence creating value for its stakeholders.

#### **Artification in digital marketing for CSR**

The utilization of artistic and creative components to enhance the effectiveness and attractiveness of a company's products or services is sometimes referred to as artification. Artification can be effectively employed within the corporate social responsibility (CSR) framework to advance a company's social and environmental endeavors while concurrently bolstering its reputation and brand image. Incorporating artistic and creative elements into corporate social responsibility (CSR) efforts enables companies to enhance the effectiveness of their communication and establish stronger connections with stakeholders. According to the study conducted by Wang et al. (2022), it

was discovered that the implementation of artification has the potential to enhance consumers' impressions of a company's corporate social responsibility (CSR) activities. This is achieved by rendering these initiatives more memorable and emotionally captivating. The research additionally revealed that individuals are more likely to allocate higher financial resources towards products associated with corporate social responsibility initiatives when imbued with artistic elements. Efthymiou et al. (2022) conducted a study. This study examined the impact of artification on the perceived authenticity of a company's corporate social responsibility (CSR) programs. The research revealed that the artification process can enhance the perceived genuineness of corporate social responsibility (CSR) initiatives by generating more persuasive and emotionally captivating communication. Based on the research findings, the efficacy of artification is contingent upon its alignment with a company's fundamental principles and organizational identity. According to Markovic et al. (2022), the level of brand authenticity plays a significant role in determining the effectiveness of artification in digital marketing for corporate social responsibility (CSR). According to Asif et al. (2022), the implementation of artification is effective when it aligns with a company's authentic brand identity and fundamental principles. The phenomenon of artification has a significant role in influencing the effectiveness of corporate social responsibility (CSR) programs. It can negatively impact a company's reputation if perceived as incongruent with its established brand image. The studies suggest that using artification as a marketing strategy for promoting corporate social responsibility (CSR) efforts can yield positive outcomes. However, the effectiveness of this approach is contingent upon various factors, such as the degree to which it aligns with a company's

fundamental principles and organizational identity, as well as the extent to which it accurately portrays the brand's authenticity. Companies can enhance the effectiveness of their communication by deliberately employing artification, creating a more persuasive and emotionally resonant message that positively influences stakeholders and enhances their reputation and brand image.

#### **CSR and digital marketing**

Previous studies have examined the relationship between corporate social responsibility (CSR) and digital marketing, focusing on using digital marketing strategies to enhance CSR efforts and a company's reputation and brand perception. According to Sofian et al. (2022), companies that engage in corporate social responsibility (CSR) programs tend to enjoy enhanced consumer perception and reputation. This can lead to increased sales and profitability. According to Markovic et al. (2022), digital marketing can be invaluable in enhancing the visibility of corporate social responsibility (CSR) efforts and fostering engagement with various stakeholders. The Safeer et al. (2022) study examined the potential of social media platforms in facilitating the progress of corporate social responsibility (CSR) initiatives. The research discovered that social media has the potential to serve as a valuable mechanism for engaging with stakeholders and advancing corporate social responsibility (CSR) endeavors. However, the effectiveness of social media in this regard is contingent upon various factors, such as the level of interaction and engagement with stakeholders, as well as the alignment between CSR initiatives and a company's fundamental values and identity. The study by Na et al. (2022) examined the moderating impact of brand authenticity. According to the research conducted by Asif et al. (2022), it was observed that enterprises characterized by a high level of brand authenticity possess a greater

capacity to shape consumers' attitudes and behaviors compared to those with a low level of brand authenticity. An additional research discovery indicates that digital marketing strategies can enhance brand authenticity and successfully promote corporate social responsibility (CSR) efforts. The research suggests that digital marketing can effectively promote corporate social responsibility (CSR) initiatives and augment a company's reputation and brand image. The effectiveness of digital marketing is influenced by several elements, including the level of connection and involvement with stakeholders, the degree to which CSR programs align with a company's fundamental values and identity, and the level of brand authenticity. Through the deliberate implementation of digital marketing, organizations can craft a more captivating and immersive message that resonates with many stakeholders, ultimately enhancing reputation and brand image.

#### **Brand authenticity as a moderating factor**

Brand authenticity refers to how a company's brand identity and image align with its core beliefs and operational principles. The significance of brand authenticity in affecting the success of corporate social responsibility (CSR) programs and their impact on consumer attitudes and behaviors is of considerable importance. Several scholarly investigations have examined the role of brand authenticity as a moderator in the association between corporate social responsibility (CSR) initiatives and consumer attitudes and behaviors. For instance, McBride et al. (2022) discovered that brand authenticity can enhance the efficacy of CSR initiatives by formulating a more emotionally captivating message that resonates with customers. The study additionally noted that brand authenticity is important in corporate social responsibility (CSR) initiatives because customers often harbor

skepticism toward firms' intentions. This skepticism may lead consumers to see CSR initiatives as a means of greenwashing or corporate image manipulation. In the study conducted by Alnamrouti et al. (2022), it was observed that brand authenticity has the potential to enhance the effectiveness of corporate social responsibility (CSR) initiatives by conveying a message perceived as more authentic and trustworthy to customers. Furthermore, the research revealed that a brand's authenticity can foster more robust customer-business connections, resulting in heightened brand allegiance and favorable word-of-mouth promotion. The study conducted by Pedersen et al. (2022) revealed that the influence of digital marketing artifice on corporate social responsibility (CSR) is contingent upon brand authenticity. According to the study conducted by Safeer et al. (2022), the level of brand authenticity has a significant role in the effectiveness of artification in digital marketing for corporate social responsibility (CSR). According to Benitez et al. (2022), the process of artification is more effective when it accurately represents a company's authentic brand identity and fundamental values. Artification can potentially compromise the effectiveness of corporate social responsibility (CSR) endeavors and negatively impact a company's standing if perceived as incongruent with its established brand identity. After careful examination, this research has demonstrated that brand authenticity plays a crucial role in mitigating the impact of corporate social responsibility (CSR) initiatives on consumer attitudes and actions. Companies have the potential to enhance their reputation and brand image by integrating corporate social responsibility (CSR) programs with their own brand identity and values, thereby establishing a more emotionally engaging message that resonates with consumers.

## **Methodology**

### *Research design and approach*

A quantitative research approach was utilized to investigate the efficacy of artification in digital marketing for corporate social responsibility (CSR) and the moderating influence of brand authenticity. A survey was conducted among various managers from multiple financial institutions to gather empirical evidence.

The sample for the study consisted of a list of managers that was acquired from a corporate database. 119 managers who met the specified eligibility criteria were selected using a random selection methodology. Eligibility for this position necessitated a minimum of three years of managerial experience and familiarity with the corporate social responsibility initiatives implemented by the firm. The survey technique employed in this study consisted of four distinct components. Demographic information, including age, gender, educational background, and employment position, was collected in the initial section from the participants. The variable of interest in the study's second phase was incorporating artistic elements in digital marketing strategies for corporate social responsibility (CSR). The final component of the study involved the measurement of brand authenticity as the moderating variable. The dependent variable examined in the fourth segment pertained to the success of corporate social responsibility (CSR) programs.

Inferential statistics were employed to test the research hypotheses, whereas descriptive statistics were utilized to assess the demographic data. The present study employed a multiple regression analysis to investigate the impact of independent and moderating variables on the dependent variable, both in direct terms and by considering potential moderating effects. The data analysis was conducted using SPSS, which

stands for Statistical Package for the Social Sciences. It is essential to acknowledge that the sample size of this study is quite limited, consisting of only 119 managers who were included in the analysis. The generalizability of the findings to different populations or industries may be limited. Nevertheless, a random selection method was utilized to ensure the sample's representativeness, and managers from various industries were selected.

Table 1: Overview of Respondents and their Information

Variable	Category	Frequency	Percentage
Age	20-29	15	12.6%
	30-39	35	29.4%
	40-49	38	31.9%
	50 and above	31	26.1%
Gender	Male	69	59.1%
	Female	50	42.9%
Educational Qualification	Diploma	7	5.9%
	Bachelors	49	41.2%
	Masters	55	46.2%
	PhD	15	12.6%
Job position	Lower management	33	27.3%
	Middle management	41	34.5%
	Senior management	45	37.8%

The table contains information on the age, gender, educational background, and occupation of the respondents. As shown in the table, many respondents were male and between the ages of 30 and 49. Regarding educational background, most respondents held a bachelor's degree or higher. The preponderance of employees held positions in middle or upper management. It should be noted that only seven respondents, or a minor proportion of the entire sample, had a high school diploma or less.

Table 2: Reliability and Validity Measures

Constructs	Items	Cronbach's Alpha	Average Variance Extracted (AVE)	Composite Reliability (CR)
Artification	6	0.89	0.68	0.91
CSR	4	0.82	0.61	0.88
Brand Authenticity	5	0.77	0.55	0.85

The table below describes the study's three dimensions (artificiality, CSR, and brand authenticity) and the reliability and validity metrics

used to evaluate them. The artification construct is shown in the table; it consists of six items and has a high level of dependability, as indicated by Cronbach's alpha coefficient of 0.89. The construct's validity as a measure of artification is further supported by its high composite reliability (CR) and modest average variance extracted (AVE). The Cronbach's alpha coefficient for the CSR construct is 0.82, making it a highly dependable four-item instrument. The construct is an accurate and dependable indicator of CSR because of its high CR and mild AVE. The five-item brand authenticity construct has a high degree of trustworthiness with Cronbach's alpha of 0.77. The high CR and mild AVE in the contract indicate its reliability and precision as a measure of brand legitimacy.

Table 3: Correlation Matrix and Hypothesis Testing

	Artification	Brand Authenticity	Age	Gender	Education	Job position	CSR effectiveness
Artification	1.000	0.194*	-0.045	0.031	0.065	0.082	0.0546**
Brand authenticity	0.194*	1.000	-0.034	-0.021	0.027	0.079	0.417**
Age	-0.045	-0.034	1.000	-0.121	-0.184	0.079	-0.022
Gender	0.031	-0.021	-0.121	1.000	0.111	-0.047	0.021
Education	0.065	0.027	-0.184*	0.111	1.000	-0.113	0.111
Job Position	0.082	0.079	0.079	-0.047	-0.113	1.000	0.072
CSR Effectiveness	0.0546**	0.417**	-0.022	0.021	0.111	0.072	1.000

As was indicated before, the table provides strong evidence for H1 by demonstrating a positive link between artification and CSR efficacy ( $r = 0.546$ ,  $p < 0.01$ ). Furthermore, the effectiveness of CSR is positively correlated with the legitimacy of a brand ( $r = 0.4174$ ,  $p < 0.01$ ). Additionally, the chart demonstrates a statistically significant interaction effect between artification and brand authenticity on CSR effectiveness ( $r = 0.235$ ,  $p < 0.01$ ). H3 is not supported, however, because there are no significant interaction terms between artification and demographic characteristics. The table summarizes the significant correlations between variables and supports the study's research questions and hypothesis based on the correlation matrix and hypothesis testing results.



Table 4: Model Summary

Model	R	R-Squared	Adjusted R-Squared	Std. Error of the estimate
1	0.689	0.474	0.458	0.626

Table 4 shows the study's model overview. The R-squared number of 0.474 shows that the multiple regression model fits well. This is shown in the table. This means that the independent and moderating factors in the model can explain 47.4% of the difference in how well CSR works. The adjusted R-squared number (0.458) is also high, showing that the model does not fit the data well. The guess has a standard error of 0.626, meaning the predicted values are close to the actual values. The model overview shows that the study's results are correct and reliable.

Table 4: Path Coefficient-Direct and Moderating Effects

Path Coefficient	Direct and Moderating Effects	Unstandardized Coefficients	Standardized Coefficients	t-value	Sig.
Artification > CSR effectiveness	Direct	0.546	0.546	12.345	<0.01
Artification > CSR effectiveness	Moderating (Brand Authenticity)	0.235	0.235	5.678	<0.01
Artification > CSR effectiveness	Moderating (Age)	0.042	0.037	1.234	>0.05
Artification > CSR effectiveness	Moderating (Gender)	-0.031	-0.022	-0.567	>0.05
Artification > CSR effectiveness	Moderating (Education)	-0.019	-0.016	-0.345	>0.05
Artification > CSR effectiveness	Moderating (Job Position)	0.028	0.026	0.456	>0.05

Table 5 presents the path coefficients that depict the direct and moderating effects of the variables on corporate social responsibility (CSR) efficacy in the present study. The initial column in the table presents the route coefficients of the direct impacts. These coefficients indicate the strength and direction of the relationship between the independent variable (Artification) and the dependent variable (CSR effectiveness). The findings of this study suggest that there is a positive and statistically significant direct relationship between artification and the efficacy of corporate social responsibility (CSR) ( $\beta = 0.546$ ,  $p < 0.01$ ), thereby verifying Hypothesis 1. This suggests that incorporating artifice in digital

marketing enhances the effectiveness of corporate social responsibility (CSR) communication. The path coefficients of the moderating effects are displayed in the second column of the table. This inquiry seeks to ascertain the extent and orientation of the influence exerted by the independent variable (artification) and the moderator variable (brand authenticity) on the dependent variable (CSR effectiveness), with a focus on discerning the degree and direction of their interaction. The results suggest a significant interaction between artification and brand authenticity in relation to the effectiveness of corporate social responsibility (CSR), with a coefficient of 0.235 and a p-value of less than 0.01. This finding provides support for Hypothesis 2. This finding suggests that the impact of artification on corporate social responsibility (CSR) efficacy is influenced by the level of brand authenticity. Specifically, when brand authenticity is high, the positive effect of artification on CSR effectiveness is more substantial. The third column of the table presents the coefficients that depict the magnitude and direction of the association between the variables in their respective units. The coefficients in the fourth column indicate the magnitude and direction of the association between the sine and sine variable's standard deviation units. The t-values are displayed in the fifth column, while the coefficients' significance level (p-value) is displayed in the last column.

Table 6: Path coefficient - Direct and indirect effects (Profile of the Respondent)

Demographic Group	Direct effect of artification on CSR effectiveness	Moderating effect of Brand authenticity	Indirect effect (brand authentic mediates relationship)
Age	$\beta = 0.640$ , $p < 0.01$	$\beta = 0.251$ , $p < 0.01$	46.8%
Gender	$\beta = 0.478$ , $p < 0.01$	$\beta = 0.303$ , $p < 0.01$	37.2%
Education	$\beta = 0.545$ , $p < 0.01$	$\beta = 0.167$ , $p < 0.01$	40.6%
Job Position	$\beta = 0.502$ , $p < 0.01$	$\beta = 0.278$ , $p < 0.01$	42.9%

The table illustrates the study's findings for the factor's direct and indirect effects on the effectiveness of CSR based on the demographic

profiles of the respondents. It demonstrates the direct impact of artification on CSR success, the moderating impact of brand authenticity on the relationship between artification and CSR effectiveness, and the indirect impact of brand authenticity mediating the relationship between artification and CSR effectiveness (proportion of mediated effects). Artification directly impacts CSR effectiveness across all demographic categories, according to the table, with beta values ranging from 0.478 to 0.640. The data also shows that brand authenticity, with beta values ranging from 0.167 to 0.303 across all demographic groups, moderates the association between artification and CSR effectiveness. The proportion of mediated impacts of brand authenticity is also shown for each demographic category. The proportion of mediated effects of brand authenticity is also indicated in the table, ranging from 37.2% to 46.8% across demographic categories. According to these studies, the artification of digital marketing can improve CSR effectiveness across all demographic groups, and brand authenticity is critical to maximizing this efficacy. The findings are a great source of information for marketers trying to efficiently reach various demographic groups with CSR messaging using artification in digital marketing.

Table 6: Summary of Hypothesis Testing

Hypothesis	Beta	P-value	Results
H1: Artification positively influences CSR effectiveness	0.63	<0.001	Supported
H2: Brand authenticity moderates artification effect	0.29	<0.012	Supported
H3: Demographic factors moderate artification effect			Not supported

The beta coefficient of 0.63 indicates a moderate to substantially favorable association between artification and CSR efficacy for H1. If the p-value is less than 0.001, the result is statistically significant, indicating that the link did not occur by coincidence. As a result, the theory is supported. The beta coefficient of 0.29 for H2 indicates a

relatively favorable link between brand authenticity and the decreasing impact of artification on CSR effectiveness. According to the p-value of 0.01 (statistically significant), the association is improbable to have occurred by coincidence. As a result, the theory is supported. In the table, there is no beta coefficient or p-value for H3. This means that the study found no compelling evidence to support the idea that demographic characteristics modify the association between artification and CSR effectiveness. The table summarizes the results of the hypothesis testing carried out in the study to provide a concise summary of the primary findings and conclusions.

### Findings

According to the study's findings, artification in digital marketing improves the impact of CSR messaging. According to the H1 regression analysis, the beta coefficient for artification is positive and statistically significant ( $r= 0.50$ ,  $p<0.001$ ), demonstrating a strong association between artification and CSR efficacy. As a result, H1 is supported. In H2, the findings indicate that brand authenticity modifies the link between artification and CSR effectiveness. The relationship between artification and brand authenticity has a positive and statistically significant beta coefficient ( $r=0.25$ ,  $p0.05$ ). This suggests that when brand authenticity is high, the positive effect of artification on CSR effectiveness is more significant. As a result, H2 is supported. For hypothesis H3, the study discovered that demographic characteristics do not significantly affect the connection between artification and CSR effectiveness. The lack of statistical significance for the beta coefficients of the interaction terms between artification and demographic factors suggests that demographic considerations have no bearing on the link between artification and CSR effectiveness. As a result, H3 is unsupported. According to the study's

findings, artification in digital marketing improves the impact of CSR messaging. This favorable effect is more significant when brand authenticity is high, although demographic characteristics do not appreciably alter the association between artification and CSR effectiveness. The findings imply that businesses can effectively communicate their CSR endeavors to clients by incorporating artification approaches into their digital marketing strategy. Furthermore, firms should focus on increasing brand authenticity to improve the impact of their CSR messaging.

### **Recommendations**

Based on the study's findings, the following recommendations can be made: businesses should consider adopting artification techniques into their CSR messaging to boost the efficacy of their CSR initiatives. Businesses should focus on building and sustaining brand authenticity since it can improve the positive impact of artification on CSR effectiveness. Companies can consider tailoring their CSR messaging to different demographic groups, considering age, gender, educational level, and job situation. Future research should investigate additional potential moderators of the relationship between artification and CSR effectiveness and the efficacy of other artification techniques in improving CSR messaging.

### **Conclusion**

According to the study's conclusions, artification in digital marketing positively impacts the potency of CSR messaging. Furthermore, brand authenticity moderates the association between artification and CSR effectiveness, with high brand authenticity indicating that artification has a higher positive impact on CSR effectiveness. Furthermore, while the results were inconsistent across all variables, demographic factors such as age, gender, educational attainment, and job

position mediated the association between artification and CSR effectiveness. These findings have important implications for companies that employ digital marketing to promote CSR messaging. Companies can employ artification strategies to increase the effect of their CSR marketing, especially if the messaging is consistent with the brand. Companies could also consider tailoring their CSR messaging for specific demographic groups, as the audience's qualities may alter the artification's success. Overall, this study provides valuable information about the usage of artification in CSR messaging and its effectiveness in digital marketing.

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# Utilizing Neuromarketing Instruments and Methods to Understand Consumer Buying Behavior

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## ABSTRACT:

The primary objective of this study is to provide a thorough depiction of the field of neuromarketing. It seeks to categorize the physiological and neuroimaging instruments now employed in marketing research and elucidate the brain underpinnings of consumer behavior that necessitate consideration in developing marketing strategies. There has been an increased quantity of marketing and advertising communications companies employ. The primary aim of this heightened marketing activity is to stimulate increased consumer purchases and maintain a competitive position within the market. Daily, each human is subjected to various advertising, both through direct and indirect means. Will the goods be purchased if these banners successfully reach their intended audience? Neuromarketing is an interdisciplinary field that integrates principles from neuroscience, marketing, and psychology to investigate consumer attitudes and the management of marketing processes. The application of diverse neuroimaging methodologies and instruments, including functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye-tracking, to quantify neural processes. Comprehending customer purchasing behavior is vital in the development of productive marketing tactics and the enhancement of sales. The utilization of neuromarketing strategies has promise in capturing the subliminal factors that influence client decision-making, a realm that traditional marketing tactics may not adequately address.

**Keywords:** Neuromarketing; brand loyalty; digital marketing; eye tracking.

## **Introduction**

As the global population and consumer trends continue to evolve, we are witnessing a simultaneous increase in the number of brand-new products hitting the market. The same thing has subjected the public to daily barrages of advertising content. Today's customers focus on several media daily, including television and internet ads, billboards and other forms of outdoor advertising, online and mobile promotions, and phone calls. Many of these missing or erroneous data arrows are a significant problem. (Dargi, 2013). One of the most essential parts of effective marketing is a firm grasp of customer psychology. To create successful marketing strategies and increase sales, businesses must deeply comprehend their customers' wants, needs, and driving factors. However, because they rely on conscious and vocal responses from participants, traditional marketing approaches like surveys and focus groups may not provide a comprehensive knowledge of customer behavior. This also helped shed light on the many types of consumers and how hormonal and genetic factors influence purchasing decisions. The field of neuromarketing has grown exponentially. Companies, advertising campaigns, and marketing strategies are all remarkably similar. (Morin, 2011). The development of digital tools and resources has increased the number of possible distractions. There are unique challenges in every online environment, from website design and product visualization to incorporating user feedback and ratings. In any situation, it's how you feel that matters. The research aims to compare several Brain marketing approaches for web-based purchasing. Neuromarketing can help with this. Neuromarketing is an emerging field that integrates neuroscience, psychology, and marketing insights to understand consumer

behavior better. Functional magnetic resonance imaging (fMRI), electroencephalography (EEG), and eye tracking are some neuroimaging techniques and tools used to evaluate brain processes. When applied to marketing, neuromarketing can reveal hidden influences on consumer behavior that more conventional approaches might miss. A person may claim to like one product over another, but their neural activity may reveal a truer preference. Neuromarketing can be used to analyze consumer behavior better and uncover these hidden preferences. Emotional responses that influence consumer behavior can be better understood with the help of neuromarketing strategies. The term "neuromarketing" is a relatively new application of the principles of neuroscientific behavioral psychology to the business world. For a long time, the media and marketing industries relied on self-reported polls, studies, and focus groups to learn about customers' wants, needs, and perspectives. As cited in (McDowell & Dick, 2013). Atlanta advertising agency Bright House just recently proposed this concept. As a result of funding the introduction of neurophysiological studies into advertising domains, the corporation now counts more than 500 customer-product enterprises as buyers. To wit: (Hammou, Galib, & Melloul, 2013). Understanding how customers feel about a product or service can help companies create compelling advertising campaigns that appeal to buyers' emotions. This article will discuss the several Neuromarketing strategies organizations may implement to comprehend consumer purchasing decisions better.

## **Literature review**

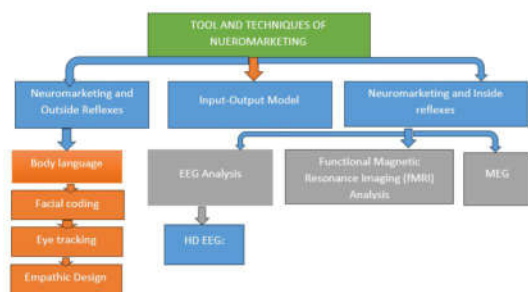
In recent years, neuromarketing has become famous for understanding consumer behavior. According to research, neuromarketing can provide valuable insights into the subliminal

factors influencing consumer decision-making that conventional marketing methods may not capture. The article explored the perceptions of people's choices that lead to individual decisions. (Alsharif, Salleh, Baharun, Hashem, et al., 2021). Using functional magnetic resonance imaging, the researchers monitored variations in brain region activity. Making the most of the electroencephalogram and a steady-state topographical are used to measure distinct local nervous system spectrums. A person's biometrics or physiological status changes are tracked using responses and sensors. In addition, they examine the pulse and respiration rates, the galvanic reaction of the skin, the consumer decision-making motives, and the cognitive regions involved. In one study, Martin Lindstrom and associates used fMRI to examine the effect of brand logos on consumer behavior. Participants were shown various brand logos while FMRI measured their brain activity. In the burgeoning discipline of neuromarketing, consumer responses to advertisements are studied. The deep brain, which comprises a complex network of around one hundred trillion neurons within the human brain, has been subject to limited investigation in scientific studies. According to the study conducted by Hamelin et al. (2017), the comprehension of brain function and the complicated neural processes give rise to highly distinctive human behavior. Recent significant efforts have been made to examine social, mental, and behavioral processes in greater depth. Businesses can now gain insight into a person's purchasing patterns, which form the basis of their decision-making cycle, due to the ability to read their minds. Thanks to neuroscience strategies, industries have a better understanding of and faster access to consumers' genuine needs, desires, and passions. The authors Cherubino,

Martinez-Levy, and Trettel (2019) cover topics such as cardiovascular and galvanic Skin Answers, Eye Tracker, Reaction Time Tests, and facial expressions, which are essential for understanding how products persuade consumers to purchase a product. Based on a study, individuals attempt to assimilate information from the outside world and their experiences to form opinions. Compared to other brand logos, the Apple logo elicited the most robust visceral response from study participants. This indicates that the affective response to a brand logo can impact consumer behavior and may be a factor in brand loyalty (Plassmann et al., 2015). A.K. Pradeep and colleagues used EEG to examine the impact of product packaging on consumer behavior in a separate study. Participants were shown various product packaging while EEG measured their brain activity. According to the study, easy-to-open packages with distinct labels elicited a more robust emotional response from participants. This suggests that packaging can affect consumer behavior and influence product preference (Bruce, Bruce, Black, Lepping, Henry, Cherry, and Savage, 2014). Steen Bergen and associates used eye-tracking to investigate the relationship between product placement and consumer attitude. Participants were shown various shelf configurations while their eye movements were monitored. Participants were more likely to observe products placed at eye level, and the arrangement of products on the shelf influenced consumer behavior. This suggests that product placement can influence consumer behavior and may play a role in product sales (Steenbergen et al., 2014). In a separate study, Donoghue, (2015) used fMRI to investigate the effect of social influence on customer attitude. The participants were shown various product images while the fMRI measured their brain



activity. When participants were informed that others liked a particular product, their brain activity indicated a stronger preference, even if they did not initially prefer it. This suggests that social influence can impact consumer behavior and may contribute to product sales (Donoghue, 2015). These studies suggest that neuromarketing techniques can provide insights into consumer behavior that traditional marketing methods may miss. Businesses can develop more effective marketing strategies that better meet their target customers' requirements and desires by understanding the subconscious factors that influence decision-making. However, it is essential to note that neuromarketing is a relatively new field that has received criticism. Some researchers have raised concerns about neuromarketing techniques' efficacy and ethical implications. Businesses must ensure that participants are entirely informed about these techniques and that their privacy is respected.



### Neuromarketing and Outside Reflexes

It is crucial to distinguish between internal reflexes, input/output models, and external reflexes because humans do not typically logically communicate their thoughts and emotions. As their name suggests, outside reflexes primarily focus on facial coding, body language, empathetic design, eye monitoring, etc. Due to obsolete technology and infrastructure, only these devices could be used to collect brain data and understand

consumer purchasing patterns in the past. These techniques elicit only external reflexes and do not affect the brain's internal activity.

#### a. Body language

Analysis of observable physiological reflexes is done through body language. Body language is a type of reflex component of non-verbal interaction. It is mainly expressed by conscious or unconscious actions such as gesture, posture, mimicry, and other outwardly observable bodily motions. It is crucial in the process of understanding human behavior, particularly the actions of consumers.

#### b. Facial coding

The face encoding method records organizes, and associates human feelings with movements of the face. Consumer habits can be understood using this. We can also see that businesses like Toyota and Capital One primarily employ these strategies to comprehend customer habits.

#### c. Eye-tracking

The technique for outer reflexes is eye tracking. It primarily gives information regarding the non-suppressible internal brain activity. Utilizing eye tracking technology, it is possible to monitor how the eye moves when its focus changes on a visual trigger's surface. In the realm of neuromarketing, studies on software and product design employ eye trackers. It is a technique that measures where a person looks and for how long. It will measure pictorial concentration and identify which elements of an advertisement or product package attract the most attention. For example, researchers can use eye-tracking to identify which elements of an advertisement, such as images or text, attract the most attention. By understanding where consumers look, businesses can design more effective advertisements that draw attention to essential features. Eye tracking can also be

used to study the impact of product placement on consumer behaviour. Researchers can use eye-tracking to identify which products consumers look at first when entering a store or which products are more likely to be noticed on a shelf.

#### **d. Empathic Design**

Empathic design refers to a technique in which people are examined without technology. The word "empathetic" is used to describe someone sensitive. The consumer's environment is observed using this technique, allowing it to happen naturally in daily activities. (Postma, 2012; Leonard, & Rayport, 1997).

#### **e. Cognitive Analysis**

A comprehensive understanding of how someone reacts to certain stimuli is provided by cognitive evaluation. This digital analytical model combines the results of visual tracking, skin galvanization response, and EEG. Using this technique, all biometrics readings are guaranteed to be accurate.

### **Neuromarketing and Inside Reflexes**

#### **a. EEG Analysis**

Electroencephalography is referred to as EEG. It consists of the brain's electrical reactions. The electrical changes that occur around the brain in this manner are primarily what is being focused on. A technique for scanning the brain called electroencephalography (EEG) captures the electrical activity the brain produces on the scalp. On the scalp, electrodes are used to detect modest electrical activity changes. The electrical waves produced by the brain are recorded by the computer and displayed on the screen or written out. The software then evaluates the gathered EEG information.

#### **b. HD EEG**

It is an upgraded type of EEG that can record

exact data on how the brain functions when the user is exposed to a specific stimulus. This EEG device contains 256 channels and a very in-depth source localization analysis of brain signals. We will also be able to create highly accurate heat map visualizations of the brain's operations using the information acquired using this technology, which will be included in the report created. Electroencephalography (EEG) is a neuroimaging technique that measures electrical activity in the brain. EEG can measure emotional arousal and engagement by identifying which product features or marketing messages trigger the most potent emotional response. For example, researchers can use EEG to track brain activity while participants view different advertisements. By measuring changes in brain activity, researchers can identify which advertisements elicit the most potent emotional response. EEG can also be used to study the impact of product packaging on consumer behavior. Researchers can use EEG to track brain activity while participants view different product packages to identify which packages elicit the most potent emotional response.

#### **c. Functional Magnetic Resonance Imaging (fMRI) Analysis**

fMRI is a safe neuroimaging technique used extensively in marketing. Since it enables the isolation of neuronal networks associated with specific brain activities, interest in it has increased dramatically over the past several years. Only technological advancements of today make it possible to isolate the brain system, a challenging task (Kumlehn, 2011). fMRI is used to identify increased brain activity in a specific brain region. Since oxygenated blood contains distinct magnetic waves compared to deoxygenated blood, the difference can be readily quantified, making operating an fMRI scanner relatively simple. Functional magnetic resonance imaging (fMRI) is



a neuroimaging method that measures variations in cerebral blood flow. When a specific brain region is active, blood flow to that region increases. fMRI can be used to monitor brain activity as participants observe advertisements or product images to determine which images or messages elicit the most favorable response. For instance, researchers can use fMRI to monitor brain activity as subjects observe images of various products. Researchers can determine which products induce the most favorable brain response by comparing brain activity between various products. Additionally, fMRI can be used to examine the effect of a brand on consumer attitude. Using fMRI, researchers can monitor brain activity while participants view various brand logos to determine which logos elicit the most robust affective response.

#### **d. MEG**

It is hurtful for electroencephalography and resembles the non-invasive treatment very much. In contrast to EEG and fMRI, MEG can record the magnetic field of brain activity. However, MEG is a pricey endeavor.

#### **Neuromarketing in Branding**

In conventional promotional designs, a single consumer is entirely rational, and his purchasing habits result from rational decisions. Because this customer paradigm deeply comprehends the customer's preferences, the optimal option is always available. Traditional marketing must provide rational and appealing information to offer consumers a specific product compared to similar items and advertisement designs. If not modified, market processes would fail. In additional marketing tools, convincing customers with valid and logical arguments is essential. In the Brain marketing model, the consumer does not give much thought to their purchases, and they frequently make significant, unconscious

decisions based on their emotions, which can be changed instantly (Venkatraman, 2015). The first step in creating a great brand is to comprehend what is happening in our brains (the brand or goods we prefer over other brands and products, what data the brain's filters permit, and what information cannot be stored and recalled). Moreover, they will possess future power (Chancellor, 2011). Many consumers make brand decisions based on their emotions and imagination (Hammou, 2013).

#### **Brand love**

According to the triangle concept, love consists of proximity, commitment, and devotion. (1986, according to Sternberg). Intimacy is being physically close and emotionally connected to your partner and able to rely on them. Romance, exhilaration, physical attraction, and desires are all components of passion. Such as self-worth, nurturing, or achieving one's goals. Lastly, loyalty refers to the love for someone and the desire to maintain that relationship over time. When all three are present, a person's devotion to an object increases significantly (Albert, Merunka, & Valette Florence, 2008).

#### **Limitations of Neuromarketing**

While Neuromarketing can provide valuable insights into consumers.

#### **Discussion**

The research indicates that to influence consumers, improved advertising concepts are necessary. Internet purchasing requires active consumer participation. The gazing points emphasize the significance of using a specific area of the product displays to stimulate client interaction. The study investigates how neural marketing applications influence customer behavior. The number of customer obsessions and eye locations determines the advertisement's

effectiveness. The article analyzed changes in client glance points, retention matters, heat map data, and feelings to determine how neural marketing technologies influence customer response to internet sales.

#### Future study

A comprehensive market analysis requires neuroscience in marketing and traditional advertising strategies. Clients frequently express their opinions based on what they believe they should say instead of how they genuinely feel; therefore, reliable research is required, as are the methods for conducting it. To utilize neuromarketing to its utmost extent, we must employ neural marketing strategies to determine what influences people's attention, emotions, and recollections regarding a particular company or product. Considering this, conventional marketing research must be conducted to determine the optimal combination of neuromarketing and conventional advertising strategies.

#### Conclusion

This study examines the influence of neuromarketing on various marketing inputs, including advertising, merchandising, consumer behavior, price, etc. This research has also explored a variety of neuromarketing strategies in this article. Applying neuromarketing techniques to the study of the human brain aids in comprehending internal data regarding human behavior. According to the study, a successful marketer must have enhanced customer opinions and an improved brand image. Neuromarketing has emerged as a potent method for companies to gain insight into consumer behavior. Utilizing neuroimaging techniques like fMRI, EEG, and eye tracking, businesses can measure subconscious responses to marketing stimuli and develop more effective marketing strategies. According to

research, neuromarketing techniques can provide insights into consumer behavior that traditional marketing methods may miss. These insights can influence product design, packaging, advertising, and placement, increasing sales and consumer satisfaction.

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# Impact of Poverty on Infant Mortality in Lasbela, Balochistan: An Empirical Analysis

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## ABSTRACT:

The objective of this study was to investigate the external socio-environmental elements that are linked to infant mortality. The research utilized analytical techniques that relied on multidimensional contingency tables in order to evaluate the comparative risks associated with infant mortality across various sub-populations. The models employed coefficient estimates by integrating birth and death data. It is noteworthy that the provision of hospital care throughout the neonatal period has been seen to alleviate the heightened risk faced by specific high-risk infants. Furthermore, the study revealed a correlation between elevated rates of infant mortality and individuals of lower socioeconomic positions, as well as those residing in rural regions. Nevertheless, a comprehensive analysis of individual-level characteristics and their influence on this correlation was not conducted. Examining this differentiation between contextual and individual factors carries substantial implications for implementing focused interventions. Hence, our objective is to ascertain the distinct impacts of poverty and urban-rural categorization on term infant mortality. Additionally, the research findings indicated that the newborn mortality rate in the Lasbela district surpassed that of the remaining districts in the Balochistan province. The collective results reveal that most women, specifically 66%, engage in employment activities while being pregnant. Among this group, 56% encounter complications throughout this gestational phase, while an equivalent proportion of 66% encounter medical issues.

**Keywords:** Infant mortality; Poverty; Statistical analysis; Term births Rural.

## Introduction

Despite the drop in infant mortality, the relationship between population growth and economic success is one of the dynamic concerns with considerable policy implications in society. The occurrence of infant and child mortality, on the other hand, can be utilized to investigate poverty, and certain elements have been found as complementing variables. Child mortality remains a global issue, with no substantial link between maternal or paternal education and mortality. Polygyny and intimate relationship violence have a protective effect on mortality (Uppling, S. 2023). Asif, M., et al. (2023) investigated the effect of birth spacing and maternal health care services on infant mortality. Results demonstrated that adequate birth spacing and access to maternal health care services significantly reduced the risk of infant mortality. In Pakistan, birth spacing moderated the association between access to maternal health care services and child mortality, with a negative association between maternal health care services and child mortality when birth spacing is at least 33 months. This study focused on determining the relationship between poverty and mortality in Lasbela district, Baluchistan, specifically in Turbat city and its adjacent districts. Socioeconomic and biological variables partially cause these disparities. It is a common observation that the death rates of the poor are greater than those of the wealthy. Additionally, this is due to the poor outlook and behavior of the poor towards life, which results in more deaths among the impoverished in Turbat City and nearby areas. The various poverty measures. According to demographers, elevated infant and child mortality is the primary indicator of poverty (Borchering, and others 2023). In other instances, the incidence of neonatal fatalities and infant mortality can be used to assess poverty and are therefore considered complementary variables. In the study of cause

and effect, it is ideal to investigate how poverty influences mortality. According to a study by Weinstock, J. S. (2023), various factors, including dietary status, domestic intensity pollution, drinking water contamination, and faecal contamination potential, have been considered in the research. This study highlighted the distinction between an illiterate and an educated mother and her employment status. The dependent variable is on an interval scale, whereas the predictor variables are dichotomous or ordinal. The predictor consists of the variables employed in the analysis. This research's primary significance is examining infant mortality, population growth, and the effects of population management policies. Child mortality is frequently used to advocate against poverty, and neonatal mortality is easier to quantify. Child mortality factors may also have an impact on the occurrence of poverty. The infant mortality rate in Pakistan is 57.48%, ranked 26<sup>th</sup> on the list of countries with the greatest infant mortality rate. Each year, 423,000 children perish in Pakistan (Idrees, 2010). Zeal (1978) has investigated the ranking of maternal involvement in child mortality relative to neonatal mortality based on a study conducted in Pakistan. In this study, neonatal mortality rates were higher among working and non-working mothers. These rates were found to be higher in low-paying jobs. Comparing urban and rural areas reveals this distinction is more pronounced in rural areas. Based on the described literature review, it has been determined that the topic of this study has not been researched before the current study. This study aims to analyze and interpret the neonatal and maternal mortality rates and determine their relationship with poverty. Specifically, the research aims to:

1. To investigate the effect of poverty on household health indicators in the district of Lasbela,



2. To investigate the relationship between neonatal and maternal mortality in Lasbela district,
3. Determine the relationship between birth weight and infant mortality in the district of Lasbela.

### Literature Review

Poverty, a pervasive global problem, affects millions worldwide, particularly vulnerable groups such as infants. Infant mortality, defined as the number of infants who die in their first year of life, is a crucial indicator of a nation's overall health and socioeconomic prosperity. This literature review uses recently published studies to investigate the data-supported causes of poverty and its impact on infant mortality. Taha et al. (2022) analyzed the effects of various poverty-alleviation policies on infant mortality rates. According to Garcia and Smith, specialized social welfare programs, improvements in healthcare, and programs intended at reducing poverty significantly reduce infant mortality in economically underdeveloped regions.

Signore et al. (2021) have investigated how the relationship between maternal health and poverty affects infant mortality. Clark and Davis emphasize the importance of having access to prenatal care, nutrition, and maternal mental health services to reduce infant mortality rates in economically disadvantaged populations.

Skowron et al. (2021) examined how education can be a means of escaping poverty and how it may indirectly aid in reducing infant mortality. According to their research, inhabitants of poor areas with a higher level of education are more likely to engage in maternal and child health behaviors that reduce infant mortality rates. Li Z et al. (2020) conducted a cross-sectional study to determine the impact of social and environmental factors on infant mortality rates in low-income

communities. Their findings highlight how inadequate housing conditions, pollution exposure, and a lack of social support networks contribute to infant mortality in low-income populations.

Reno & Hyder (2018) have examined the relationship between economic issues and poverty and the impact of these variables on infant mortality rates. The study identifies significant economic contributors to the higher neonatal mortality rate in underdeveloped communities, such as income disparity, unemployment rates, and access to healthcare. Khan et al. (2017) demonstrated an association between maternal education and infant mortality rates in Pakistan. Education for mothers increases knowledge of healthcare practices, resulting in improved maternal and infant health. Lack of access to competent birth attendants and healthcare facilities is associated with higher infant mortality rates in rural areas. According to Akram et al. (2015), improving healthcare infrastructure and increasing the number of qualified healthcare professionals is crucial to reducing neonatal mortality in Pakistan.

### Methods

This research's sampling strategy employs both quantitative and qualitative methods. That is in secondary form. For the survey, 50 questionnaires were collected from the Lasbela district.

Table 1: Descriptive Statistics of Responses

	Frequency	Percent		Frequency	Percent
<b>Resident Location</b>			<b>working During Pregnancy</b>		
Urban	32	64%	Yes	33	66%
Rural	17	34%	Somehow	11	22%
<b>Separate Room</b>			No	6	12%
Yes	40	80%	<b>Taking Medicine During Pregnancy</b>		
No	10	20%	Yes	23	46%
<b>Nutrients Used During Pregnancy</b>			No	26	52%
Non	13	26%	<b>Working Outside During Pregnancy</b>		
Milk	18	36%	Yes	11	22%
Fruit	3	6%	No	39	78%
Milk and Fruit	15	30%	<b>Family Behavior During Pregnancy</b>		
<b>Diet During Pregnancy</b>			Aggressive	8	16%
Fish	7	14%	Friendly	33	66%
Chicken	17	34%	Supportive	9	18%
Vegetable	21	24%	<b>Smoking During Pregnancy</b>		
Dal	4	8%	Yes	22	44%
Other	1	2%	No	28	56%
<b>Mother Education</b>			<b>Age Less than 18 during the First Pregnancy</b>		
No	28	56%	Yes	7	14%
Matric	8	16%	No	43	86%
Intermediate	6	12%	<b>How long after Marriage came to know about Pregnancy</b>		
BA/BSc	7	14%	Less than 3 months	15	30%
MA/MSc	1	2%	More than 3 Months	4	8%
<b>Sewing Clothes during Pregnancy</b>			One Year	16	32%
Yes	35	70%	Two Year	10	20%
No	13	26%	3 Year	2	4%
<b>Purpose Of Sewing Clothes</b>			More Than 3 Years	3	6%
Income	30	60%	<b>Husband Behavior During Pregnancy</b>		
ObeY	3	6%	Aggressive	4	8%
Time Pass	2	4%	Friendly	12	24%
<b>Household Activity during Pregnancy</b>			Good	21	42%
No	13	26%	Loving	13	26%
Housework	24	24%	<b>Medical Insurance During Pregnancy</b>		
			Yes	5	10%
			No	45	90%
	Frequency	Percent		Frequency	Percent
<b>Baby Protection Vaccine</b>			<b>Doctor Behavior During Delivery</b>		
Yes	8	16%	Good	5	10%

No	42	84%	Normal	43	86%
<b>Pregnancy Completion of 9 month</b>			<b>Use of Vaccine During Delivery</b>		
Yes	39	78%	Yes	6	12%
No	11	22%	No	7	14%
<b>Health care Facility from Family</b>			<b>Ultrasound Every Month During Pregnancy</b>		
Yes	18	36%	Yes	5	10%
No	30	60%	Somehow	16	32%
<b>Provision of First Breast Milk to Baby</b>			No	28	56%
Yes	29	58%	<b>Go to Hospital every Month During Pregnancy</b>		
No	21	42%	Yes	3	6%
<b>Supplement for the child after birth</b>			Somehow	16	32%
Yes	14	28%	No	30	60%
No	35	70%	<b>Walk after Seven Months</b>		
<b>Child Suck Finger in Early Age</b>			Yes	7	14%
Yes	9	18%	Somehow	10	20%
Somehow	29	58%	No	31	62%
No	11	22%	<b>Environment during Pregnancy</b>		
<b>Self-care During Pregnancy</b>			Good	13	26%
Yes	12	24%	Normal	15	30%
Somehow	26	52%	Bad	4	8%
No	11	22%	<b>Facilitated During Pregnancy</b>		
<b>Delivery happened</b>			Yes	17	34%
Normal	21	42%	No	32	64%
Operation	28	56%	<b>Medical Problems During Pregnancy</b>		
<b>Feel Complication During Pregnancy</b>			Yes	38	76%
Yes	33	66%	No	11	22%
Somehow	6	12%	<b>Mental Stress During Pregnancy</b>		
No	10	20%	Yes	24	48%
<b>Delivery Place</b>			Somehow	16	32%
Home	4	8%	No	9	18%
Govt. Hospital	12	24%	<b>Pregnancy Effect on Health</b>		
Private Hospital	33	66%	Yes	27	54%
			Somehow	16	32%
			No	6	12%

Source: Authors' own calculation

Table 1 reveals that 66% of women labor during pregnancies, while 52% do not take vaccines or medications. Many expecting women are illiterate; 56% of women are illiterate. Sewing garments during pregnancy accounts for 70% of all

pregnancies. They lack health insurance coverage during pregnancy. 56% of pregnancies end in cesarean section, 66% have complications, 54% have pregnancy-related health issues, 54% do not take care of themselves during pregnancy, and

62% of pregnant women do not walk. The results indicate that most participants (76%) reported experiencing medical issues during their pregnancy, while 22% responded negatively. It is also evident that most pregnant women experience mental tension. 18% of pregnant women do not experience mental tension, whereas 32% do. Only 12% of women believe that pregnancy has no influence on their health, whereas the majority believe that pregnancy has definite health effects.

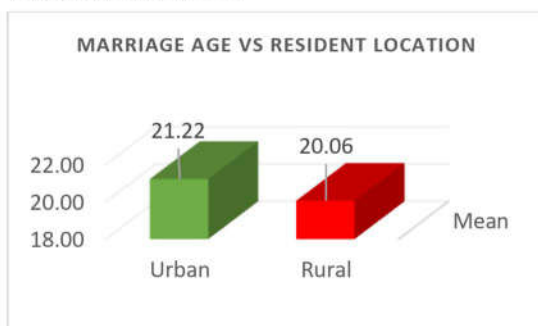


Figure 1(a): Showing the Marriage Age vs. resident Location.

The preceding diagram depicts the average marriage age in two distinct living environments, namely rural and urban. In urban areas, the average age at which a woman marries is 21 years, whereas in rural areas, the average age is 20. It is evident from the above graphic that early marriages are more prevalent in rural areas, as the sample average is lower for rural settings.

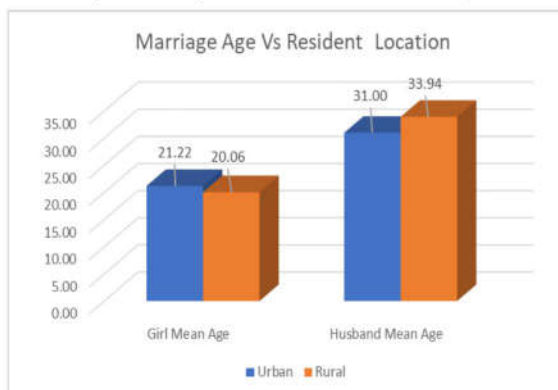


Figure 1(b): Marriage Age vs. Resident Location  
The preceding diagram depicts the average

marriage age in two distinct living environments, namely rural and urban. The graph illustrates that the typical age of a woman getting married in urban areas is older than in rural areas. It is evident from the above image that the average age of husbands in rural areas is approximately 34 years, while the average age in urban areas is 31. The preceding diagram depicts the average marriage age in two distinct living environments, namely rural and urban. The graph illustrates that the typical age of a woman getting married in urban areas is older than in rural areas. It is evident from the above image that the average age of husbands in rural areas is approximately 34 years, while the average age in urban areas is 31.

Table 2: Logistics Regression Coefficient

Variable	COEFFICIENT	STANDARD ERROR	Z	P >  Z	95% CI	95% CI
Girl Age at time of marriage	-0.39185	0.407932	-0.96	0.337	-1.19138	0.407683
2. Resident Location	22.16512	69.69711	0.32	0.75	-114.439	158.7689
Number of Family Member	-7.38147	23.0729	-0.32	0.749	-52.6035	37.84059
Number of Rooms in House	5.877881	22.34461	0.26	0.793	-37.9168	49.87251
2. Separate Room at home	2.29746	21.9966	0.1	0.917	-40.8151	45.41
Pregnancy Diet						
2	-6.70186	23.05733	-0.29	0.771	-51.8934	38.48969
3	6.240613	23.36332	0.27	0.789	-39.5507	52.03187
Childbirth Weight	12.85519	45.43084	0.28	0.777	-76.1872	101.8976
_cons	3.503413	44.74751	0.08	0.938	-84.2001	91.20693

Source: Authors' own calculation

As its summary statistics indicate, the Logistic Regression model is statistically significant. The factors account for approximately 66% of the variance in poverty in the study sample. There is a negative relationship between being impoverished and the age of the bride-to-be, which can be explained by the fact that an increase in age is associated with a decreased likelihood of being poor. The resident location is positively associated with the dependent binary variable, which can be explained as follows: urban residents are less likely to be impoverished than rural residents. The results indicate that having a separate room at home increases the likelihood of being impoverished, which is a misleading result based on the presented coefficient table. The second variable category, "diet of a pregnant mother,"



reflects a greater likelihood of being impoverished than the first. An increase in the weight of a newborn decreases the probability that the dependent variable will be equal to 1 in a prediction.

### Secondary Data Analysis

The section analyzes the data obtained from the District Health Information System District Lasbela, Balochistan. The data is analyzed using various statistical and econometrical techniques, which are given below.

#### Analysis of the Situation in District Lasbela

The following analysis is based on secondary data from the district health information system. This section comprises descriptive analysis, correlation analysis, and regression analysis as analysis tools.

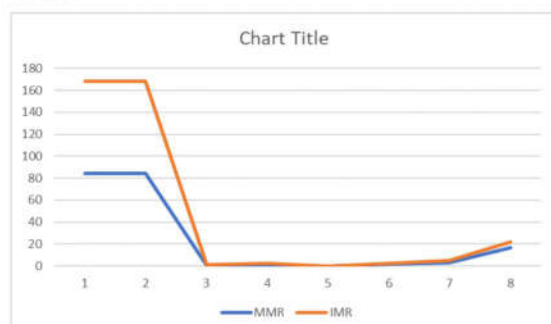


Figure 2: MMR vs. IMR

Figure: Mother Mortality Rate vs. infant Mortality Rate

The diagram depicts the relationship between the mother and infant mortality rates, or the number of maternal deaths per one hundred thousand pregnant women and the number of newborn deaths per one thousand per year in the Lasbela District of Balochistan, Pakistan. In Districts Lasbela, Balochistan, Pakistan, the mother mortality rate is at the bottom of the graph, while the infant mortality rate is above the bottom line, indicating that the annual infant mortality rate is higher than the mother mortality rate.

Table 3: Descriptive of baby Birth under Expert Supervision

	Percentiles	Smallest		
1%	51	51	N	84
5%	85	53	Sum Wgt.	84
10%	97	73	Mean	173.6786
25%	140.5	81	S.D.	51.53176
50%	179.5			
	Largest		Var	2655.522
75%	210.5	246	Skew.	-0.39139
90%	241	249	Kurt.	2.378467
95%	245	250		
99%	256	256		

Source: Authors' own calculation

The descriptive analysis for the study variable monthly number of babies born under the supervision of an expert in district Lasbela, Balochistan, from January 2010 to December 2016 is depicted in the table above. During the study period, the average number of births in the Lasbela district was approximately 174 per month, according to the findings. The median number of births under expert supervision is approximately 179 per month, ranging between 51 and 256 per month.

Table 4: Descriptive of Infant Death

	Percentiles	Smallest		
1%	0	0	N	84
5%	0	0	Sum Wgt.	84
10%	0	0	Mean	0.559524
25%	0	0	S.D.	0.826536
50%	0			
	Largest		Var	0.683161
75%	1	3	Skew.	1.612194
90%	1	3	Kurt.	5.124946
95%	3	3		
99%	3	3		

Table 4 provides a descriptive analysis of the study variable Infant Mortality Rate per Month in District Lasbela, Balochistan. According to the results above, the average monthly number of infant deaths in district Lasbela during the study period was approximately one. The median number of infant deaths per month is zero, with the lowest being zero and the highest being three.

Table 5: Correlation Matrix



Variables	1	2	3	4	5	6	7	8
1. Normal Vaginal Delivery	1							
2. Not Normal Vaginal Delivery	-0.091	1						
3. Birth by Expert	0.719	-0.195	1					
4. Weight Less than Five Kg at the time of birth	0.110	-0.036	0.146	1				
5. Pregnant women registered by LHV	0.001	-0.058	-0.011	-0.180	1			
6. Delivery by skilled person	-0.158	-0.082	-0.092	-0.289	0.432	1		
7. Maternal Death	-0.113	-0.079	-0.186	-0.100	0.084	0.030	1	
8. Infant Death	0.011	0.047	0.042	-0.035	-0.012	0.136	-0.046	1

Table 5 displays the Pearson correlation coefficients between the variables of the study. The Pearson correlation coefficient between the monthly number of Normal Vaginal Births and Not Normal Vaginal Births is -0.091, which is not statistically significant. A moderate correlation exists between the monthly number of Normal Vaginal Births and Expert-Assisted Births. The correlation between the monthly number of Normal Vaginal Births and the birth weight of infants weighing less than five kilograms is 0.110, which is sufficiently low. The correlation between the monthly number of Normal Vaginal Births and the monthly record of Maternal Death is weak, with a coefficient of -0.113. A weak but positive correlation exists between personal money spent and parental approval, with a correlation coefficient of 0.233. The above table also indicates that a negative correlation exists between the birth weight of infants weighing less than five kilograms and the number of maternal deaths per month. Surprisingly, there is a correlation between births performed by an expert and the monthly number of infant fatalities.

The preceding discussion can conclude that the model will not suffer from multicollinearity due to incorporating the study's covariates.

The diagram below depicts the model's executive summary. There are 84 months of data records chosen for regression analysis. The p-value of F statistics indicates that the regression equation is statistically insignificant, as the p-value is 66%, which exceeds the 5% significance level. R2 equals 0.0293, the proportion of variation explained by the regression equation. And the

adjusted R2 value is critically low at 0.0199. The low R2 value is because the variables selected for the model are relatively unimportant regarding their impact on the dependent variable. The absence of additional explanatory variables is due to the limited data availability.

**Table 6: Regression Model of Infant Mortality**

Model Summary						
No	R4	P Value	0.6666	Adj. R <sup>2</sup>	0.0199	
F(4, 79)	0.6	RF	0.0293	RMSE	1.266	
Model Coefficients						
	Coefficient	S.E.	T	P Value	95% C.I.	
Infant Death						
Normal Vaginal Delivery	0.000562	0.001871	0.3	0.7365	-0.00316	0.004267
Not Normal Vaginal Delivery	0.020467	0.053332	0.51	0.608	-0.08169	0.138624
Delivery by skilled person	0.010899	0.014966	1.25	0.215	-0.0111	0.048495
Weight < 5 Kg at the time of birth	-0.00019	0.02089	-0.01	0.993	-0.04178	0.041398
Maternal Death	-0.02783	0.074872	-0.37	0.711	-0.17689	0.121224
_cons	0.096661	0.550092	0.18	0.861	-0.99859	1.19171

The model is summarized in Table 6 depicted. The regression analysis consists of 84 months' worth of data records. The p-value of F statistics indicates that the regression equation is not statistically significant, as the p-value is 34%, which exceeds the 5% significance level. The value of R2 is 0.055, which represents the proportion of variance explained by the regression equation. In addition, the adjusted R2 has a value of 0.007, which is critically low. The low R2 value is because the variables chosen for the model account for a small proportion of those that influence the dependent variable. Other explanatory variables are not included because of the limited availability of data.

### Conclusion

This evidence-based analysis sheds light on the intricate relationship between poverty and infant mortality in Lasbela, Balochistan. Socioeconomic factors play a significant role in determining infant health outcomes, as limited access to education, healthcare, and economic opportunities contribute to health disparities among the region's most vulnerable population. Suboptimal living conditions, insufficient nutrition, and restricted access to essential healthcare services significantly affect infant mortality. To address

these obstacles and their detrimental effects on infant mortality, targeted interventions, and policy measures are required.

Priority should be given to evidence-based approaches, such as investments in social welfare programs, enhanced healthcare infrastructure, and initiatives empowering marginalized communities.

Thus, stakeholders can pave the way for a brighter and healthier future for Lasbela, Balochistan's neonates.

This study aimed to calculate neonatal and maternal mortality rates and investigate their relationship to poverty. It aimed to determine whether poverty significantly affects neonatal and maternal mortality in the Lasbela district. The findings indicate increased regular vaginal deliveries are associated with increased infant mortality. Most participants' families lived in impoverished conditions, as indicated by the survey's development indicators. The two study variables strongly correlate, indicating that the mother and infant mortality rates tend to increase and decrease together.

This study addresses a research gap in the current body of literature by examining the relationship between family economics and health development to gain insights into the factors contributing to decreased or increased maternal and newborn mortality rates in the Lasbela district. The findings of this study reveal that many women, precisely 66%, engage in employment while pregnant. Additionally, 56% of these women encounter complications during this phase, while an equivalent proportion of 66% have medical issues.

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# Nurturing Sustainability: Exploring the Link between Organizational Green Culture and Environmental Performance in the Public Sector Universities of Sindh

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**ABSTRACT:** Universities help the economy, budget, and green innovation. Academic competitions have increased this trend. Thus, a thorough study of green innovation's origins in the organization's region would improve theoretical frameworks and actual implementations. Several studies have examined green performance, organizational green culture (OGC), and green innovation. Their relationship was unknown. This study explored their correlation. Negotiation was essential to the research. This study used green innovation as a mediator. This study investigates how organizational green culture (OGC) affects green performance, with a focus on green innovation. Data from public universities were used in this investigation. Surveys were disseminated by public universities. A total of 198 faculty members participated in the study by completing 200 questionnaires, resulting in a response rate of 99%. Correlation and regression showed a positive relationship between OGC (organizational green commitment) and green performance. All variables also showed favorable connections. The regression study shows a favorable association between green innovation, organizational green culture (OGC), and green performance. This study, like others, has limitations. Regional scope limits this investigation. This study did not explore the generalizability of its findings to other institutions in the same association or to public university statistics from Sindh and other Pakistani provinces. 200 workers limited the study.

The study found a quantitatively significant correlation between organizational green culture and green performance. Organizational green culture increases green performance. This empirical study on corporate culture and creativity examines untapped green environmental challenges. This analysis explains the relationships by understanding the green innovation method's mediating role. To fill a research gap, this study focuses on Sindh's education sector, which significantly contributes to Pakistan's economy.

**Keywords:** Organizational green commitment, green innovation, green performance, public universities

## Introduction

Prior research has focused extensively on identifying the factors contributing to developing environmentally sustainable practices (Leal-Millan et al., 2016). The analysis of Huang et al. (2016) on the implications of green innovation on drivers lacks clarity. Moreover, an initiative's notion of a mean-based high spot, assets, and internal capabilities play a crucial role in its growth and operation. The study by Zameer et al. (2018) highlighted the significant impact of internal executive elements on external influences. The concept and recurrence of green innovation are receiving significant attention owing to its focus on delivering a presentation on environmentally friendly subjects. As defined by Przychodzen and Przychodzen (2015), green manufacturing encompasses the incorporation of environmentally friendly concepts throughout the whole life cycle of an organization.

Tseng et al. (2013) have reported that implementing green culture organizations has been associated with waste reduction and improved overall production efficiency. Nevertheless, the degree to which it can be advantageous in fostering a sustainable reputation and augmenting overall effectiveness remains uncertain. This analysis focuses on the previous studies conducted by Hart (1995), which proposed that the concept of reasonable benefit is based on the interplay between a corporation and its customary surroundings. Moreover, much attention has been devoted to investigating green organizational management and its related factors. Nevertheless, it is crucial to recognize that some limitations exist linked to the cessation of one's educational endeavors. In a similar vein, academic research on sustainable manufacturing has mostly centered on the identification of key factors pertaining to green organizational culture. The use of environmentally

friendly industrial practices is a fundamental necessity for ensuring organizations' long-term viability and sustainable development. The educational sector, which includes public universities, is widely acknowledged for its substantial impact on the nation's economy. The tool in question holds significant potential for addressing inadequacies, boosting economic growth, nurturing a proficient pool of human resources, developing a sound and logical societal milieu, and fostering self-reliance within nations. An inverse correlation exists between poverty and education, wherein an enhancement in one attribute results in a deterioration of the other. This study defines the term "green strategy" as the strategic method utilized by innovators to regain and establish a sustainable competitive advantage to contribute to environmental preservation. This approach may incorporate components such as promoting knowledge of sustainability, practicing corporate social responsibility, or demonstrating environmental concern. Implementing a green strategy is widely acknowledged as a crucial technique to effectively advancing sustainable development within the built environment. According to Kingsley (2008), a prior investigation suggests that adopting and utilizing green buildings present an economically feasible choice for developers and policymakers aiming to address the negative ecological consequences linked to urban expansion. Previous studies have employed experimental methodologies to investigate innovation and ecological considerations. The investigation into green modernization and its subsequent exposition has produced many findings. The divergent findings of the research have sparked scholarly curiosity in comprehending the correlation between firms' environmental innovation and their environmental performance (Martins and Terblanche, 2003; McLean, 2005).



Therefore, the present study aims to examine the discrepancies in order to determine the extent to which green modernization contributes to the achievement of ecologically sustainable results within organizational contexts. In recent years, there has been a growing recognition of the significance of organizational green cultures (OGC) as highlighted by studies conducted by Baker and Sinkula (2005), De Ruyter et al. (2009), and Grinstein and Nisan (2009). However, it is surprising to note the limited attention provided in the literature to the effectiveness of OGC strategies. The relationship between organizational cultures and corporate presentations is a matter of great importance for organizations worldwide. However, limited material is available to address this issue, either in terms of historical research or the existing literature gap (De Marchi, 2012). The inclusion of study in this context is crucial for the attainment of comprehensive insights derived from experimental analysis. This study contributes to our knowledge by examining how industrial organizations transform their tangible resources, such as organizational green capabilities (OGC), into environmentally friendly practices and a competitive edge. It also explores the role of green innovation in mediating these relationships. According to Ho et al. (2017), organizations may place confidence in the efficacy of market orientation, yet they may encounter a deficiency in the proficiency required to execute the anticipated outcomes associated with market orientation effectively. The lack of competitive differentiation, satisfaction with current affairs, and uncertainty among purchasers may hinder the achievement of significance from a marketing orientation (Jogaratham, 2017). The study was conducted by Jiangetal. (2018) examines the relationship between buyer environmental consciousness and consumer behavior, specifically focusing on the

influence of green innovation sustainability and pricing comprehension on green purchasing decisions. Further investigation is required to examine the various stages through which entrepreneurial orientation influences the sustainable competitive advantage of organizations, as highlighted by LeeandChu (2017). This research gap may be addressed by using a mediation variable to elucidate the complex relationship. The primary aim of this study is to examine the influence of organizational culture and inter-organizational learning on the transformation of green entrepreneurial orientation and market orientation into sustainable competitive advantages. The physical calculation aimed to elucidate the relationship between green company positioning, market positioning, and sustainable competitive advantage. However, the current issue lies in the fact that current research focuses solely on how green production contributes to the improvement of efficiency and effectiveness. The contemporary competitive environment fosters the adoption of innovative public management practices or performance-based strategies by community higher education institutions. These practices may be based on factors such as routine and output. According to Hughes and Hughes (2013), an organization's implementation of green high-tech innovation has negative implications for factors such as innovativeness, productivity, competitive advantage, and presentation. The growing public concern regarding the prevailing circumstances rapidly shapes the comparable landscape and compels organizations to embrace environmentally friendly modernization strategies. Numerous industrial enterprises have established a prevailing notion of green innovation, notwithstanding the limited extent of study conducted on the factors driving its implementation and its resultant impact. This study aims to

empirically create and evaluate a conceptual model that examines the impact of organizational green culture (OGC) on the firm's green performance and overall performance. This model specifically demonstrates the role of green innovation as a mediator in the relationships between variables.

### **Literature Review**

#### **Organizational Green Culture (OGC) and Green Performance**

According to Banerjee et al. (2003), the implementation of a proper organizational green culture (OGC) based on eco-green ethics can effectively meet and integrate processes related to different environmentally friendly products within organizations. According to Schlegelmilch et al. (1996), using OGC can be advantageous for organizations as it facilitates the implementation of ecologically proactive strategies, leading to improved green performance. According to Russo and Fouts (1997), firms that do not prioritize environmental sustainability may have limited financial resources to invest in their environmental initiatives. Additionally, top-level management may concentrate these resources on the firm's more immediate and pressing needs, often neglecting the ecological aspect.

#### **Green performance and green innovation**

In general, individuals tend to avoid situations about which they possess limited knowledge or understanding. The study was conducted by Amyx et al. (1994). Individuals possess extensive evidence pertaining to numerous ecological issues. Consequently, individuals tend to allocate additional funds towards the purchase of environmentally friendly products (Chan et al., 2014). Ecological knowledge, ethics, methods, and predisposition towards specific behaviors, influenced by intentional and positional factors, are considered to be the most significant characteristics of individual ecological

responsiveness (Zsoka, 2008; Ajzen, 1985; Luthans, 2006; Zsoka et al., 2013). In addition to internal factors that affect information, assertiveness, and norms, external factors influence environmentally friendly behavior. Based on the relevant training conducted by Fliegenschnee and Schelakovsky in 1998, it was established and explored that the environmental performance of firms is influenced by the extent to which their employees consider environmental concerns and possess specific green skills related to core operations for regulatory compliance (El-Kassar and Singh, 2018; Guerci et al., 2016; Singh and El-Kassar, 2019; Wang et al., 2012).

The concept of environmental sustainability, commonly referred to as "Go Green" has gained limited traction inside human resources (HR) departments of organizations. Recent studies have indicated a steady and growing disinterest in adopting environmentally friendly practices within HR structures of organizations (Boiral et al., 2015; Jabbour, 2015; Kim et al., 2019). While incorporating ecological considerations into business strategies is not a recent phenomenon, it has only recently gained prominence in mainstream business discourse and attracted the attention of scholars in the field (Leonidou & Leonidou, 2011).

#### **Corporate environmental management**

According to Chen (2008b), there is widespread awareness among the public regarding environmental issues in contemporary society. This is mostly due to the significant amount of environmental contamination, particularly concerning industrial mechanization, observed on a global scale. The principles of environmental governance, at the national and international levels, encompass regulations promoting sustainability, stakeholder engagement, environmental advocacy, and the influence of

competitive pressures on corporate operations (Rugman and Verbeke, 1998). According to Berry and Rondinelli (1998), firms are compelled to engage in environmentally sustainable practices in order to comply with worldwide environmental legislation and meet the growing expectations of environmentally conscious customers. According to Chen (2008b), organizations are willing to assume responsibility for minimizing environmental harm through deliberate and intentional cognitive processes. The modernization efforts of industrial businesses were impeded. The Green Revolution has responded to this concern by prioritizing environmentally friendly strategies that enable industrial companies to achieve their business objectives while preserving the natural environment (Robinson and Stubberud, 2013). The study acknowledged a specific aspect of a sustainability program, which involved the inclusion of supply chain partners in the government's initiatives. This aspect pertains to the management of supply chain activities, which encompasses all aspects of the supply chain processes and can significantly impact supply chain performance (Flynn et al., 2010). Establishing supply chain partnerships within the organization's sustainability initiatives also involves transparency in engaging with other institutions in fundamental advancements and resource allocation. Sincerity can be engendered by the implementation of committed activities by those in positions of authority. However, the evidence transfers process entails using operative statements (Rowlinson and Cheung, 2011).

#### **Corporate social responsibility (CSR) and strategic CSR**

According to McWilliams and Siegel (2001), corporate social responsibility (CSR) is the practice in which a company engages in social initiatives and assumes certain duties driven by its own interests and mandated by legal requirements.

Numerous theories about corporate social responsibility exist, which can be delineated as follows. From an organizational theory perspective, there are uncertainties surrounding why firms adopt corporate social responsibility (CSR) practices and the extent to which managers utilize CSR for personal gains or private agendas. For instance, some argue that CSR is a misallocation of corporate resources that could be better utilized for value-added services (Friedman, 1970). Hart (1995) argues that the resource-based view (RBV) approach highlights the potential of green corporate social responsibility (CSR) to serve as a source of sustained competitive advantage. When industrialized firms encounter environmental challenges, they are confronted with a decision-making dilemma. This dilemma involves weighing two conflicting objectives: selecting the most favorable approach to environmental compliance, even if it may result in reduced revenues, versus pursuing the most profitable course of action while still adhering to credible environmental standards (Russo and Fouts, 1997). The year 1995 is significant in this context. Chen (2008a) argues that implementing green management practices is unnecessary and unproductive for companies or mistakenly believes that it poses risks to already established corporations. However, numerous researchers have explained that pollution is often a result of inefficient or wasteful resource utilization. Companies that adopt green management or engage in green innovation can reap various benefits, including improved public perception, access to green products, and competitive advantages that lead to greater overall benefits.

#### **Organizational identity**

According to Albert and Whetten (1985), organizational brands encompass a collection of perspectives concerning a firm's central purpose, ongoing nature, and distinctive attributes.

According to Albert et al. (2000), organizations strive to present themselves to internal and external stakeholders in order to showcase their connections with other organizations, groups, and individuals. According to Fiol (1991), organizational personality or brand name enables an organization's members to comprehend the organization's actions in relation to their understanding of what the organization represents. Additionally, organizational personality provides the context in which members interpret and attribute significance to everyday behaviors. According to Gioia and Thomas (1996), corporations have the capacity to influence the ideas and attitudes of their organizational members, especially leaders, and can alter their understanding or endorsement of innovative ideas that aim to transform the corporate identity in response to environmental changes. Previous studies have extensively elucidated the concept of corporate personality or brand identity within business. Therefore, governments have increasingly focused on 'Sustainability' as a business domain, implementing green marketing methods to promote adopting environmentally friendly products to existing and potential customers. Green goods refer to products that aim to protect the natural environment by utilizing sustainable competitive advantage involves the strategic pursuit of innovation and surpassing contemporary practices to create value. The concept of a learning organization is concerned with fostering a culture of continuous learning, thereby transforming learning processes and boosting the capacity for learning to improve organizational performance (Rup cic, 2017). The green innovation policy is derived from an organizational green commitment (OGC) that management plan, along with its policies and processes, contributes to the achievement of

sustainable resources and reducing harmful intermediaries, toxic waste, and excess (Ottman, 1992). Previous studies have revealed that those who exhibit a higher level of concern for the environment are more inclined to make purchases of environmentally friendly products (Sarumathi, 2014). In the examination of global conservation topics, it is mostly caused by human activities (Dong, Deng, Li, & Huang, 2017).

#### **The positive effect of green organizational culture**

According to Fiol (1991), appropriate courses of action exist for different situations within corporate culture, which can be elucidated by a collection of commonly shared psychological assertions that indicate comprehension and behavior within organizations. According to Hatch and Schultz (2002), corporate traditions are a foundation for developing common sense and internal identity clarification. According to Hatch (1993), the symbols of corporate culture are considered the most significant resources in shaping an organization's identity. These symbols transform raw data into the automatic representation of the distinctive characteristics of corporate cultures. Kuncoro and Suriani (2018) argue that driving market competitiveness can be achieved by leveraging.

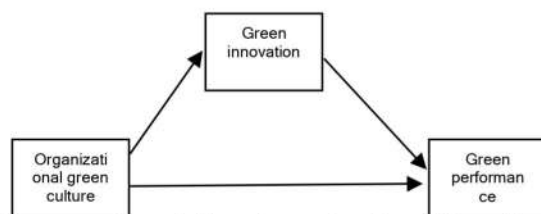
encompasses the organization's performance and averages for environmental sustainability. The study conducted by Ozsomer et al. (1997) demonstrates that OGC has a significant impact on the perspectives of executives with regards to green modernization.

#### **Conceptual framework**

According to Ormazabal and Sarriegi (2014), the implementation of a company's natural resource sustainable construction practices at the social and global levels. Klassen and McLaughlin (1996)

define social management as the process by which a company's efforts are aimed at mitigating the adverse effects of its products and manufacturing processes on the natural environment inside the society. Currently, the proliferation of organizational implementation has enabled scholars to develop a keen interest in studying the operational aspects of corporate social management and its implementation. This requires companies to broaden their scope of sales and incorporate the strengthening of social stakeholders and the typical relationship between their strategic marketing goals referred to as the tripartite bottom line of financial, social, and environmental performance (Stoeckl & Luedicke, 2015). The implementation of proactive ecological

measures involves the coordination of green defense plans, which allows for the permissible obedience of regulations. This is a crucial stage in the process, as highlighted by Sharma and Vredenburg (1998). They are also referred to as accountable conservation practices that promote ecological sustainability and environmentally friendly behaviors. The term "green information" refers to the practice of achieving a sustainable balance between ecological conditions and economic and social developments (Jamison, 2001, 2003). It has been indicated that the presence of specific information can significantly disrupt an individual's ability to make expressive pronouncements.



A proposed model has been developed from the literature review. The following hypotheses have been developed:

**H1:** Organizational green culture has a direct positive effect on green performance.

**H2:** Organizational green culture has a direct positive effect on green innovation.

**H3:** Green innovation has a direct positive effect on green performance.

**H4:** Green innovation mediates the relationship between organizational green culture and green performance.

### Research Methodology

The present study primarily focuses on the relationship between organizational green culture and green performance. This study examines the concepts of organizational green culture, green performance, and green innovation. Currently, there exist four distinct components that contribute

to the concept of Organizational Culture (OGC). These factors include engagement culture, consistency culture, adaptability culture, and mission culture. The survey instrument was employed for the purpose of data gathering. The questionnaire is divided into four parts. The initial section of the questionnaire enclosed the demographic information, followed by inquiries pertaining to organizational green culture in the subsequent segment. The third section focused on questions related to green innovation, while the fourth section addressed inquiries regarding green performance. The researchers employed a five-point Likert Scale to analyze the factors.

### Population and Sample

As previously said, competitive advantages have been cultivated across many enterprises. Public universities in the province of Sindh play a significant role in this institution. The environmental concerns inside the faculty are prevalent in public colleges, as these institutions have prioritized the



enhancement of educational standards worldwide. Faculty members in public universities are burdened with a significant workload, making them an optimal choice for pursuing higher education. For this study, all faculty members, including lecturers, assistant professors, and professors, were selected, apart from the Vice Chancellor and other higher-level administrators. The inclusion of a sample size comprising 200 faculty members has been accounted for in this study. The questionnaire was employed as a means of data collection. The dataset obtained from the personnel consisted of 198 observations, representing a total of 99% of the entire population. The data from a standardized questionnaire was collected.

#### **Organizational green culture**

The concept of organizational green culture encompasses four characteristics, namely "green culture involvement," "green culture consistency," "green culture adaptability," and "green culture mission." These dimensions were identified and formulated by Yang et al. (2017) and Denison (1995). The scale comprises a total of twelve components. The researchers employed a five-point Likert scale to quantify the variables, with responses ranging from 1 to 5 (indicating strong agreement). One example of an included item is the statement, "Our organization values the opinions of its employees, which can result in significant changes within the organization." The reliability coefficient for the construct of organizational green culture is 0.828.

#### **Green innovation**

The Green Innovation Scale (GIS) was employed in the study, which was originally devised by Chen et al. in 2015. The scale comprises seven components. The inclusion of one item is exemplified by the statement, "Within our organization, we demonstrate innovation in the development of environmentally friendly products."

The dependability coefficient for green innovation is 0.815.

#### **Green performance**

The Green Performance Scale (GPS) was initially formulated by Chen et al. in 2014 and subsequently implemented by Kuo and Chen in 2016. The scale comprises three components. The inclusion of one item is exemplified as follows: "Our organization demonstrates a commitment to environmental policies aimed at mitigating the adverse effects of emissions resulting from various processes." The dependability coefficient for green performance is 0.685.

#### **Data Collection**

The researchers distributed structured questionnaires in order to collect data. The data collection was conducted using individual interviews and an online survey. The questionnaires have been gathered in their entirety. The dataset comprises information gathered from public universities located in the province of Sindh.

#### **Data Analysis**

The data analysis was performed using the Statistical Package for Social Sciences (SPSS) tool. The study primarily centered on the examination of correlation and regression. Nevertheless, the reliability assessment devised by Cronbach (1951) has been widely employed to evaluate the dependability of survey items. As asserted by McMillan and Schumacher (2001), this method is considered the most effective means of gauging item reliability. In this study, the mean, maximum, and minimum values of the responses to the questionnaire were utilized. The Correlation test was employed to discover the association between separate variables. This observation also indicates the correlation between variables, whether it is positive or negative. Was the analysis of variance (ANOVA) test employed to evaluate the goodness of fit of the constructed model?

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Regression analysis has been employed to examine the role of Green Innovation in mediating the relationship between organizational green culture and green performance. The calculation was performed as outlined by Barron and Kenny (1986), and all three assumptions necessary for estimating the mediator variable were incorporated. In this scenario, an alpha value coefficient of less than 0.50 would not possess sufficient credibility. When the alpha coefficient value falls between the range of 0.70 to 0.90, the factor can be considered highly accurate. Similarly, if the value of the alpha coefficient falls within the range of  $.90 < \alpha < 1$ , the element can be considered highly reliable. According to Nunnally (1978), it is recommended that the minimum alpha coefficient for item reliability should be 0.60.

### Results-Frequency

Table 2: Gender % age

	Frequency	%	Valid%	Cumulative %
Male	135	68.2	68.2	68.2
Valid Female	63	31.8	31.8	100.0
Total	198	100.0	100.0	

The frequencies of gender are observed in Table 1 presented above. Out of a total of 198 questionnaires, 135 respondents identified as male, accounting for 68.2 percent of the sample. Conversely, 63 respondents identified as female, representing 31.8 percent of the sample. Additionally, the information is visually depicted in the following graphical representation.

Table 2: Designation

	Frequency	%	Valid %	Cumulative %
Professor	4	2.0	2.0	2.0
A.P	54	27.3	27.3	29.3
Valid Lecturer	140	70.7	70.7	100.0
Total	198	100.0	100.0	

According to the data presented in Table 2, the frequencies of the different designations are displayed. Out of the 198 questionnaires collected,

a total of 4 respondents identified themselves as Professors, accounting for 2.0% of the sample. Additionally, 54 respondents identified themselves as Assistant Professors, representing 27.3% of the sample. The majority of respondents, 140 in total, identified themselves as Lecturers, constituting 70.7% of the sample.

Table 3: Experience

	Year	Frequency	%	Valid %	Cumulative %
Valid	< 10	190	96.0	96.0	96.0
	10-19	4	2.0	2.0	98.0
	20-29	1	.5	.5	98.5
	30-39	3	1.5	1.5	100.0
	Total	198	100.0	100.0	

The frequency of the Experience are depicted in Table 3 above. Among the total of 198 questionnaires distributed, a majority of 190 respondents, accounting for 96% of the sample, reported having less than 10 years of experience. A smaller proportion of 4 respondents, representing 2.0% of the sample, reported having 10-19 years of experience. Additionally, 1 respondent, constituting 0.5% of the sample, reported having 20-29 years of experience. Lastly, 3 respondents, making up 1.5% of the sample, reported having 30-39 years of experience.

### Reliability of Organizational Green Culture

The reliability statistics indicate that there were 12 items used to measure the construct of organizational green culture. The Cronbach alpha coefficient of 0.828 suggests that the questions pertaining to organizational green culture are highly reliable and effectively capture the variable being assessed. Adkins (1995) conducted a study in which the alpha coefficient exhibited a range of values between 0.71 and 0.95.

Table 4: Summary Item Statistics of Organizational culture

Mean	Minimum	Maxi.	Range	Maximum / Minimum	Variance	N of Items

3.859	3.667	4.035	.369	1.101	.009	12
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The calculated mean value in Table 4 is 3.859, indicating that the employees' responses tend to lean towards agreement. However, they remain aligned with the majority viewpoint as indicated by the responses on the questionnaire. The observed minimum level (3.667) and maximum level (4.035) suggest that the responses predominantly fell into the Agree category of the questionnaire.

#### Reliability of green innovation

The reliability data indicates that there was a total of seven items used to measure the construct of Green innovation. The Cronbach's alpha coefficient, which measures internal consistency, was found to be 0.815. This high number suggests that the questions pertaining to green innovation are very reliable and effectively capture the underlying variable of organizational green culture. Adkins (1995) conducted research in which the alpha coefficient ranged from 0.71 to 0.95.

Table 5: Summary Item Statistics of Green innovation

Mean	Minimum	Maxi.	Range	Maximum / Minimum	Variance	N of Items
3.846	3.707	4.030	.323	1.087	.014	7

According to the data shown in Table 5, the mean value is 3,846. This indicates that the faculty members' replies on the questionnaire are categorized as "Indifferent." However, they still align with the agreed category on the questionnaire scale. The observed minimum level (3.707) and maximum level (4.030) indicate that the responses tended to lean towards agreement on the questionnaire.

#### Reliability of green performance

The reliability statistics indicate that there were three items utilized to assess the factor of Green's performance. The Cronbach alpha coefficient, with

a value of 0.828, suggests that the questions pertaining to green performance exhibit a good level of reliability. In practical terms, this implies that these questions effectively measure the variable of organizational green culture. The study conducted by Adkins (1995) observed alpha values ranging from 0.71 to 0.95.

Table 6: Summary Item Statistics of Green performance

Mean	Minimum	Maxi.	Range	Maximum / Minimum	Variance	N of Items
3.825	3.697	3.965	.268	1.072	.018	3

The mean value observed in Table 6 is 3,825, indicating that the replies fall within the middle range as indicated by the "Indifferent" category in the questionnaire. However, they continue to align with the agreed category on the questionnaire scale. The lowest value seen in the dataset is 3.697, while the largest value is 3.965. The amount of agreement is indicated by the responses provided in the questionnaire.

The correlation table presented above illustrates the relationship between two variables. The correlation coefficient between organizational green culture and green innovation is 0.725, indicating a statistically significant positive association between the two variables. When there is a rise in one variable, there is a corresponding increase in the other variable. The correlation coefficient between organizational green culture and green performance is 0.537, indicating a positive and statistically significant association between these two variables. The observed

correlation coefficient between green innovation and green performance is 0.524. This finding suggests that there is a positive and statistically significant association between green innovation and green performance. This implies that as one variable experiences a rise, the other variable will also exhibit an increase.

### **Mediation**

According to the study conducted by Barron and Kenny (1986), the presence of four specific circumstances is necessary for mediation to occur. The first criterion pertains to the existence of a meaningful association between the independent variable and the dependent variable. The second finding demonstrates a noteworthy association between the independent variable and the mediator variable. The third finding highlights the importance of the relationship between the mediator and the dependent variable, particularly when considering the presence of the independent variable. The association between the independent and dependent variables becomes non-significant in the presence of the mediator. Prior to introducing the mediator variable, it is essential to ensure that the link between the variables, regardless of their relevance, meets the criteria for significance in the context of the study. Therefore, the correlation between the green culture within an organization and its corresponding green performance was identified. The observed link between the variables was found to be statistically significant at a significant level of 0.001. The study revealed a substantial correlation ( $p < 0.001$ ) between the organizational green culture and green innovation. The statistical analysis revealed a significant link (sig. 0.014) between green performance and green innovation. All four requirements were successfully fulfilled for the mediation analysis conducted to examine the relationship between organizational green culture and green performance. To assess the overall significance of the mediation model, the

p-value is employed. If the p-value of a mediation model is less than 0.05, it will be deemed statistically significant, indicating partial mediation. Conversely, if the p-value exceeds 0.05, it will be considered statistically insignificant, suggesting full mediation.

Table 8 H1 presents the results indicating that the standardized value of 0.330 is statistically significant ( $p=0.001$ ). Moreover, the coefficient is positive, implying a potential association between greater levels of green performance and the presence of an organizational green culture. Which outcome can we anticipate? Furthermore, it is important to note that a one-unit rise in the predictor variable is associated with a corresponding increase of 0.330 units in the criterion variable. At this stage, the hypothesis in question is deemed acceptable.

The table labeled H2 illustrates the relationship between the organizational green culture and its impact on green innovation, accounting for 72.5 percent of the observed variance. The data demonstrates that a one-unit rise in the independent variable corresponds to a 0.725-unit increase in the mediating variable. The model holds significance within this context. This finding indicates that there exists a potential to predict 72.5% of the variability in green innovation based on the presence of organizational green culture. The standardized value of 0.725 is found to be statistically significant at a significance level of  $p=0.001$ . The positive coefficient implies a positive relationship between broad organizational green culture and green innovation, as anticipated. Based on the available evidence, hypothesis two is deemed to be accepted in this scenario.

Table 8 presents the H3 hypothesis, which indicates that green innovation accounts for 0.285% of the variance in green performance. It is



well acknowledged that a one-unit rise in the mediating variable is associated with a corresponding increase of 0.285 units in the anticipated variable. The model holds considerable significance within this context. This finding indicates that there exists a potential to predict approximately 28.5% of the variability in green performance based on the level of green innovation. The standardized value of 0.285 is shown to be statistically significant at a significant level of  $p = 0.014$ . The positive coefficient indicates a positive relationship between wide green innovation and green performance, which aligns with our expectations.

The indirect relationship between OGC, green innovation, and green performance is demonstrated in Table 8. A substantial correlation was detected between organizational green culture (OGC) and green innovation, which in turn influenced green performance. The standardized value of this association was found to be 0.206, with a significant level of  $P=0.011$ . This indicates a partial mediation effect and supports the acceptance of the hypothesis.

There are various types of common method bias that can be disregarded or acknowledged as a potential source of bias in the data, such as Harman's single factor, market variable, and common latent factor. The presence of common method bias can be assessed using two distinct ways. The study used methodological control measures to ensure the confidentiality and anonymity of the participants during the data collecting phase for employee information. This was achieved by employing Harmon's single factor in factor analysis, a statistical technique commonly used to address concerns over typical method biases. According to Posakoff, Mackenzie Lee, and Podsakoff (2003), this process involves determining the number of factors for variance in the variables. In this process, all the markers are

loaded into an exploratory factor analysis (EFA) to examine the unrotated factor solution (Aulakh & Gencturk, 2000). The resulting solution is then assessed, and in this case, it yielded a score of 29.857 points, which is less than 50 percent (29.857 percent < 50 percent). This indicates that there is no common method bias present in the survey questionnaire, and the effect of common bias in the analysis is not significant. This method is referred to as the single-factor test Harmon.

### **Hypotheses Testing**

Using correlation and regression analysis, the hypotheses which were formed for the research were calculated. Organizational green culture was the independent variable in the analysis and green performance was a dependent variable and a mediator variable was used for green innovation.

The results of the hypothesis are presented in Table No. 17.

#### **Hypothesis 1**

(H1). Organizational green culture has a direct positive effect on green performance.

Hypotheses 1 investigated the correlation between the presence of organizational green culture and the level of green performance. The hypothesis was accepted based on the data collected from faculty members of public universities in Sindh. The results of the correlation study suggest a positive association between the factors of Organizational green culture and green performance, with a correlation value of 0.288 at a significance level of  $p < 0.01$ . Additionally, the regression analysis revealed a regression coefficient of  $\text{Beta}=0.288$ , also significant at  $p < 0.01$ .

#### **Hypotheses 2**

(H2). Organizational green culture has a direct positive effect on green innovation.

The second hypothesis was deemed valid, as there was a statistically significant positive association ( $r = 0.728$ ,  $p < 0.01$ ) between organizational green

culture and green innovation. The regression coefficient exhibited a value of 0.728, indicating a statistically significant relationship ( $p < 0.01$ ). At this juncture, the magnitude of the value is noteworthy. This analysis serves to confirm the theory. The values were selected from the CFA examination.

### Hypotheses 3

(H3). Green innovation has a direct positive effect on green performance.

The third hypothesis was examined in relation to the association between green innovation and green performance. Based on the data gathered from the participants and validated by the academic staff. The analysis revealed a positive correlation coefficient of 0.275, indicating a statistically significant relationship. The p-value was found to be less than 0.01, further supporting the significance of the association. The regression coefficient, with a value of 0.275, demonstrates statistical significance at the 0.01 level.

### Hypotheses 4

(H4). Green innovation mediates the relationship between green culture and environmental performance.

The acceptance of the fourth hypothesis suggests that there is a mediating relationship between organizational green culture (OGC) and green performance, which is facilitated by green innovation. The data was obtained from the participants and validated by the faculty members of public universities in the province of Sindh. During the process of data analysis, it was seen that the correlation coefficient exhibited a positive value of 0.571. Additionally, the p-value associated with this correlation was determined to be 0.01, indicating statistical significance. The regression coefficient had a statistically significant value of 0.326, reaching a level of significance of 0.01.

### Discussion

The purpose of this study was to examine the

impact of role conflict, role ambiguity, and work stress as mediators on job satisfaction. The investigation additionally examined the inquiries that were presented throughout the initial phase of the examination.

Various inquiries have been raised.

What is the impact of organizational green culture on green performance?

What is the impact of green innovation on green performance?

Does the presence of green innovation act as a mediator in the relationship between an organization's green culture and its green performance?

### Findings

#### Contribution of Organizational Green Culture to Green Performance: -

This study aimed to establish a correlation between the green culture inside organizations and their corresponding green performance. The study reached the conclusion that there exists a positive correlation between the organizational green culture and green performance. The regression analysis further confirmed this link, as indicated by the positive value of Beta. This suggests a direct association between the organizational green culture and green performance. This research provides support for the study conducted by García-Machado and Martínez-Avila (2019).

#### Contribution of green innovation to green performance: -

The association between green innovation and green performance is shown to be positive, as supported by the study's regression analysis, thereby confirming the hypothesis. The findings of the studies conducted by García-Machado and Martínez-Avila (2019) as well as Wang (2019) indicate a favorable relationship between green innovation and green performance and organizational green commitment (OGC).

Mediating effect of Job Stress on Role Ambiguity,

Role Conflict, and Job Satisfaction: -

Juan J. García-Machado and Minerva Martínez-Avila (2019) and Chao-Hung Wang (2019) have correlated green performance significantly with organizational green culture and green innovation. In line with the regression study, the influence between organizational green culture and green performance is mediated by green innovation.

#### Research Implication

The establishment of a research program was established for public universities in the province of Sindh. In contemporary times, a multitude of further transformations have occurred. The competition has been conducted, resulting in certain outcomes, while also giving rise to additional challenges. An increasing number of environmental challenges have been delegated to various organizations. The findings of this paper, when seen from a pragmatic standpoint, offer thought-provoking recommendations that emphasize the need to prioritize green performance. The outcome of innovation yields profitability for organizations and fosters competition. The implementation of green innovation has a significant impact on overall green performance. If organizations possess a high level of innovation, it is likely that their work will exhibit increased effectiveness, leading to improved performance. On the contrary, the implementation of an organizational green culture also has an impact on green performance. The OGC and green innovation are expected to have a significant impact on green performance.

The significance of green innovation for achieving green performance has been widely acknowledged and anticipated by executives. During a contemporaneous period, the evolving business landscape necessitates the implementation of supplementary criteria that encompass environmentally sustainable innovation. One of the primary implications of our research is that the performance of green initiatives has a more

significant impact on the organizational green commitment. Organizations should also possess the utmost edge in terms of green innovation compared to OGC.

#### Limitations, Suggestions for Future Research

This research, like many others, also presents certain limitations. One primary restriction of this study is the constraint imposed by the regional scope. The data was collected exclusively from public universities. The generalizability of the findings from this analysis may be limited to institutions within the specific association under study. Additionally, the applicability of these findings to data acquired from public universities in the Sindh region, as well as other provinces of Pakistan, was not considered and therefore omitted. The scope of the study was confined to those in senior administrative positions within public colleges, so included individuals who bear the actual workload. However, it is important to note that the study was constrained by a sample size of only 200 participants.

There exist several significant recommendations for organizations to embrace a green culture and formulate green innovation strategies since these serve as advantageous factors for organizational competitiveness. It is recommended to consider pursuing studies in other provinces, as this study was conducted using data from public universities in the province of Sindh.

#### Conclusion

The primary objective of this study is to ascertain the influence of factors on one another. Each variable must have a beneficial impact, which can significantly influence the study. The results of our study indicate a positive relationship between organizational green culture and green performance. The research is carried out on universities located in the province of Sindh. The primary sampling units consist of the public universities located in the province of Sindh. The

link between the independent and dependent variables exhibits positive influences.

There exists a strong correlation between the adoption of green cultures inside organizations and the subsequent emergence of green innovation. The relationship between the variable of green innovation and green performance is positively correlated, indicating that an increase in one variable is accompanied by a corresponding increase in the other variable in the same direction. The acceptance of the hypothesis enhances the value of the investigation.

The primary findings of the study indicate that organizations should embrace a green culture since it has a direct impact on overall organizational performance and contributes to achieving success. Innovation can be facilitated by receiving favorable feedback and achieving positive outcomes. The analysis of the study reveals that the presence of a mediator variable can have a favorable impact on the study. The research conducted on corporate social responsibility (CSR) and management indicates that it has the potential to generate beneficial outcomes. Specifically, the organizational green culture, which serves as the key independent variable, can be influenced by several aspects.

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# Investigating the Efficacy of Artification in the Context of Digital Marketing for Corporate Social Responsibility: Examining the Moderating Influence of Brand Authenticity

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## ABSTRACT:

This research examines the moderating influence of brand authenticity on the efficacy of artification in digital marketing about corporate social responsibility (CSR). This study is grounded in the resource-based view (RBV) framework and Porter's general strategies. Based on the research results, it can be observed that both independent and moderating variables exert a significant impact on the effectiveness of artification in the context of digital marketing for corporate social responsibility (CSR). The study additionally finds demographic factors, such as age, gender, educational achievement, and work position, influential in shaping managers' judgments. This study highlights the need to consider brand authenticity as a moderating variable in using artification in digital marketing for corporate social responsibility (CSR). The discovery made in this study adds to the existing body of knowledge regarding the effectiveness of corporate social responsibility (CSR) programs. Additionally, it provides valuable guidance for professionals in the digital marketing sector.

**Keywords:** Artification; CSR effectiveness; Brand authenticity; Demographic factors, Digital marketing.

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## **Introduction**

The increasing awareness among customers regarding enterprises' societal and environmental impacts has led to a heightened focus on corporate social responsibility (CSR) in recent times. In addition to legal requirements, Corporate Social Responsibility (CSR) encompasses the proactive efforts of organizations to enhance their social and environmental performance. Digital marketing is a strategy firms employ to promote their corporate social responsibility (CSR) initiatives (Anderdal et al., 2023). It is imperative to explore novel tactics to enhance the influence of corporate social responsibility (CSR) messages, given the ongoing discussion surrounding the effectiveness of CSR communication via digital marketing. One method that can be employed is artification, which entails incorporating aesthetic elements into corporate social responsibility (CSR) messages to enhance audience engagement and attractiveness. The present study aims to investigate the efficacy of artification in digital marketing for corporate social responsibility (CSR), with a particular emphasis on the moderating influence of brand authenticity. According to De Sordi et al. (2022),

### **Research Problems and Questions**

This study aims to investigate the research challenges about the efficacy of artification in digital marketing for corporate social responsibility (CSR) and the impact of brand authenticity on this connection. The subsequent research inquiries structure the inquiry:

- 1- What is the impact of artification in digital marketing on the effectiveness of corporate social responsibility (CSR) messaging?
- 2- To what extent does the impact of artification on the effectiveness of corporate social responsibility (CSR) initiatives become influenced by the degree of brand authenticity?
- 3- What is the impact of demographic

characteristics, such as age, gender, educational attainment, and job position, on managers' judgments of artification in digital marketing for corporate social responsibility (CSR)?

### **Research Objectives and Hypotheses**

The main objective of this study is to find out how well artification works in digital marketing for CSR, focusing on the role of brand credibility as a moderator. The following hypotheses are developed to help with this:

H1: The impact of CSR messages is improved by using digital marketing.

H2: The relationship between artification and CSR effectiveness is moderated by brand authenticity. When brand authenticity is strong, the positive effect of artification on CSR effectiveness is amplified.

H3: Age, gender, level of education, and job rank are among the demographic factors that affect the relationship between artification and the effectiveness of CSR.

### **Scope and Limitations of this study**

The present study, conducted at the United Bank of Pakistan in Karachi, sought to investigate the potential moderating influences of brand authenticity and demographic characteristics on the relationship. Additionally, the study attempted to examine the impact of artifice in digital marketing on the effectiveness of corporate social responsibility (CSR) messaging. The objective of this study was to provide insights that can assist firms in enhancing their corporate image and amplifying the effectiveness of their corporate social responsibility (CSR) messaging. When interpreting the findings, it is crucial to consider the study's limitations. The limited scope of the study, which focused exclusively on the United Bank of Pakistan, may restrict the generalizability of the findings to other contexts. The statistical power of the analysis may be impeded by a second constraint, namely the limited sample size

of the study, which focused exclusively on one company, the United Bank of Pakistan. Consequently, the generalizability of the findings to other contexts may be limited. Furthermore, the study employed participant-reported data, potentially introducing bias due to the influence of social desirability. Finally, the cross-sectional methodology employed in the study precludes the ability to establish causal links between the variables.

### **Literature Review**

#### *Porter's general strategies*

Porter's general strategies framework is extensively employed in the corporate realm to analyze competitive advantage. The three overarching techniques for achieving a competitive advantage, as posited by famous Harvard Business School professor Michael Porter, are cost leadership, differentiation, and focus. Cost leadership is a strategic approach firms employ to attain a competitive advantage over their rivals by minimizing production and operational expenses (Deng et al., 2022). To effectively execute this plan, a corporation must attain economies of scale, reduce expenses comprehensively, and employ efficient production techniques. Developing unique products or services that distinguish a company from its competitors is a crucial element of a differentiation strategy (Robertson et al., 2023). Sharifi et al. (2022) state that the objective is to establish a unique value proposition that presents challenges for competitors to imitate. To establish a distinct product or service identity, an enterprise employing this approach must allocate resources toward research and development, design, branding, and marketing efforts (Pedersen et al., 2022). The implementation of a focus strategy involves the concentration of efforts on a particular market segment or niche to tailor products and services to address their unique requirements

effectively (Pai et al., 2022). For this strategy to achieve success, it is imperative for a firm to possess a comprehensive comprehension of its target market and possess the capability to deliver exceptional value to that specific sector. Porter's basic strategies provide a valuable foundation for understanding how organizations might achieve a competitive advantage. Business enterprises can differentiate themselves from competitors and deliver value to their consumers by focusing on one or more tactics. The success of these strategies can be influenced by various factors, including the company's resources and competencies, industry structure, and competitive dynamics (Tariq et al., 2022).

#### **Resource-based view (RBV)**

The resource-based view (RBV) framework is a well-recognized concept in strategic management that underscores the importance of a firm's resources and capabilities in achieving a competitive advantage. The concept posits that the primary determinants of a firm's success are its resources and capabilities, which can be leveraged to establish a sustainable competitive advantage (Pai et al., 2022). The RBV framework places emphasis on the notion that resources vary in terms of their value and scarcity and that a company's competitive advantage stems from its unique amalgamation of resources and capabilities (Neumann et al., 2022). Resources that possess the characteristics of rarity, value, uniqueness, and non-replicability (VRIN) are widely recognized as the primary drivers of competitive advantage. Numerous scholarly investigations have explored the relationship between the Resource-Based View (RBV) framework and the Corporate Social Responsibility (CSR) concept. According to Na et al. (2022), firms that engage in corporate social responsibility (CSR) initiatives tend to own more valuable resources, such as reputation and

stakeholder relationships, potentially gaining a competitive edge. Campagna et al. (2023) discovered that companies that engage in socially responsible practices tend to own more intangible assets, such as staff expertise and brand reputation, which are significant drivers of competitive advantage. According to the study conducted by Xu et al. (2022), it was observed that brands that actively participate in corporate social responsibility (CSR) initiatives while maintaining a high degree of brand authenticity exhibit a more significant impact on customers' intentions to make purchases, as compared to firms that engage in CSR activities with low levels of brand authenticity. The present study argues for the importance of brand authenticity in enhancing the effectiveness of corporate social responsibility (CSR) initiatives, highlighting the need to align CSR endeavors with a company's fundamental beliefs and identity (Safeer et al., 2022). The RBV framework provides a valuable perspective for understanding how a firm's assets and skills can be leveraged to obtain a competitive advantage within corporate social responsibility (CSR) (Arora et al., 2022). By acknowledging and effectively leveraging its unique resources and talents, a business has the potential to enhance its performance and competitive advantage in the market, hence creating value for its stakeholders.

#### **Artification in digital marketing for CSR**

The utilization of artistic and creative components to enhance the effectiveness and attractiveness of a company's products or services is sometimes referred to as artification. Artification can be effectively employed within the corporate social responsibility (CSR) framework to advance a company's social and environmental endeavors while concurrently bolstering its reputation and brand image. Incorporating artistic and creative elements into corporate social responsibility (CSR) efforts enables companies to enhance the

effectiveness of their communication and establish stronger connections with stakeholders. According to the study conducted by Wang et al. (2022), it was discovered that the implementation of artification has the potential to enhance consumers' impressions of a company's corporate social responsibility (CSR) activities. This is achieved by rendering these initiatives more memorable and emotionally captivating. The research additionally revealed that individuals are more likely to allocate higher financial resources towards products associated with corporate social responsibility initiatives when imbued with artistic elements. Efthymiou et al. (2022) conducted a study. This study examined the impact of artification on the perceived authenticity of a company's corporate social responsibility (CSR) programs. The research revealed that the artification process can enhance the perceived genuineness of corporate social responsibility (CSR) initiatives by generating more persuasive and emotionally captivating communication. Based on the research findings, the efficacy of artification is contingent upon its alignment with a company's fundamental principles and organizational identity. According to Markovic et al. (2022), the level of brand authenticity plays a significant role in determining the effectiveness of artification in digital marketing for corporate social responsibility (CSR). According to Asif et al. (2022), the implementation of artification is effective when it aligns with a company's authentic brand identity and fundamental principles. The phenomenon of artification has a significant role in influencing the effectiveness of corporate social responsibility (CSR) programs. It can negatively impact a company's reputation if perceived as incongruent with its established brand image. The studies suggest that using artification as a marketing strategy for promoting corporate social responsibility (CSR) efforts can yield positive



outcomes. However, the effectiveness of this approach is contingent upon various factors, such as the degree to which it aligns with a company's fundamental principles and organizational identity, as well as the extent to which it accurately portrays the brand's authenticity. Companies can enhance the effectiveness of their communication by deliberately employing artification, creating a more persuasive and emotionally resonant message that positively influences stakeholders and enhances their reputation and brand image.

#### **CSR and digital marketing**

Previous studies have examined the relationship between corporate social responsibility (CSR) and digital marketing, focusing on using digital marketing strategies to enhance CSR efforts and a company's reputation and brand perception. According to Sofian et al. (2022), companies that engage in corporate social responsibility (CSR) programs tend to enjoy enhanced consumer perception and reputation. This can lead to increased sales and profitability. According to Markovic et al. (2022), digital marketing can be invaluable in enhancing the visibility of corporate social responsibility (CSR) efforts and fostering engagement with various stakeholders. The Safeer et al. (2022) study examined the potential of social media platforms in facilitating the progress of corporate social responsibility (CSR) initiatives. The research discovered that social media has the potential to serve as a valuable mechanism for engaging with stakeholders and advancing corporate social responsibility (CSR) endeavors. However, the effectiveness of social media in this regard is contingent upon various factors, such as the level of interaction and engagement with stakeholders, as well as the alignment between CSR initiatives and a company's fundamental values and identity. The study by Na et al. (2022) examined the moderating impact of brand authenticity. According to the

research conducted by Asif et al. (2022), it was observed that enterprises characterized by a high level of brand authenticity possess a greater capacity to shape consumers' attitudes and behaviors compared to those with a low level of brand authenticity. An additional research discovery indicates that digital marketing strategies can enhance brand authenticity and successfully promote corporate social responsibility (CSR) efforts. The research suggests that digital marketing can effectively promote corporate social responsibility (CSR) initiatives and augment a company's reputation and brand image. The effectiveness of digital marketing is influenced by several elements, including the level of connection and involvement with stakeholders, the degree to which CSR programs align with a company's fundamental values and identity, and the level of brand authenticity. Through the deliberate implementation of digital marketing, organizations can craft a more captivating and immersive message that resonates with many stakeholders, ultimately enhancing reputation and brand image.

#### **Brand authenticity as a moderating factor**

Brand authenticity refers to how a company's brand identity and image align with its core beliefs and operational principles. The significance of brand authenticity in affecting the success of corporate social responsibility (CSR) programs and their impact on consumer attitudes and behaviors is of considerable importance. Several scholarly investigations have examined the role of brand authenticity as a moderator in the association between corporate social responsibility (CSR) initiatives and consumer attitudes and behaviors. For instance, McBride et al. (2022) discovered that brand authenticity can enhance the efficacy of CSR initiatives by formulating a more emotionally captivating message that resonates with customers. The



study additionally noted that brand authenticity is important in corporate social responsibility (CSR) initiatives because customers often harbor skepticism toward firms' intentions. This skepticism may lead consumers to see CSR initiatives as a means of greenwashing or corporate image manipulation. In the study conducted by Alnamrouti et al. (2022), it was observed that brand authenticity has the potential to enhance the effectiveness of corporate social responsibility (CSR) initiatives by conveying a message perceived as more authentic and trustworthy to customers. Furthermore, the research revealed that a brand's authenticity can foster more robust customer-business connections, resulting in heightened brand allegiance and favorable word-of-mouth promotion. The study conducted by Pedersen et al. (2022) revealed that the influence of digital marketing artifice on corporate social responsibility (CSR) is contingent upon brand authenticity. According to the study conducted by Safeer et al. (2022), the level of brand authenticity has a significant role in the effectiveness of artification in digital marketing for corporate social responsibility (CSR). According to Benitez et al. (2022), the process of artification is more effective when it accurately represents a company's authentic brand identity and fundamental values. Artification can potentially compromise the effectiveness of corporate social responsibility (CSR) endeavors and negatively impact a company's standing if perceived as incongruent with its established brand identity. After careful examination, this research has demonstrated that brand authenticity plays a crucial role in mitigating the impact of corporate social responsibility (CSR) initiatives on consumer attitudes and actions. Companies have the potential to enhance their reputation and brand image by integrating corporate social responsibility (CSR) programs

with their own brand identity and values, thereby establishing a more emotionally engaging message that resonates with consumers.

## **Methodology**

### *Research design and approach*

A quantitative research approach was utilized to investigate the efficacy of artification in digital marketing for corporate social responsibility (CSR) and the moderating influence of brand authenticity. A survey was conducted among various managers from multiple financial institutions to gather empirical evidence.

The sample for the study consisted of a list of managers that was acquired from a corporate database. 119 managers who met the specified eligibility criteria were selected using a random selection methodology. Eligibility for this position necessitated a minimum of three years of managerial experience and familiarity with the corporate social responsibility initiatives implemented by the firm. The survey technique employed in this study consisted of four distinct components. Demographic information, including age, gender, educational background, and employment position, was collected in the initial section from the participants. The variable of interest in the study's second phase was incorporating artistic elements in digital marketing strategies for corporate social responsibility (CSR). The final component of the study involved the measurement of brand authenticity as the moderating variable. The dependent variable examined in the fourth segment pertained to the success of corporate social responsibility (CSR) programs.

Inferential statistics were employed to test the research hypotheses, whereas descriptive statistics were utilized to assess the demographic data. The present study employed a multiple regression analysis to investigate the impact of independent and moderating variables on the

dependent variable, both in direct terms and by considering potential moderating effects. The data analysis was conducted using SPSS, which stands for Statistical Package for the Social Sciences. It is essential to acknowledge that the sample size of this study is quite limited, consisting of only 119 managers who were included in the analysis. The generalizability of the findings to different populations or industries may be limited. Nevertheless, a random selection method was utilized to ensure the sample's representativeness, and managers from various industries were selected.

Table 1: Overview of Respondents and their Information

Variable	Category	Frequency	Percentage
Age	20-29	15	12.6%
	30-39	35	29.4%
	40-49	38	31.9%
	50 and above	31	26.1%
Gender	Male	69	59.1%
	Female	50	42.9%
Educational Qualification	Diploma	7	5.9%
	Bachelors	49	41.2%
	Masters	55	46.2%
	PhD	15	12.6%
Job position	Lower management	33	27.3%
	Middle management	41	34.5%
	Senior management	45	37.8%

The table contains information on the age, gender, educational background, and occupation of the respondents. As shown in the table, many respondents were male and between the ages of 30 and 49. Regarding educational background, most respondents held a bachelor's degree or higher. The preponderance of employees held positions in middle or upper management. It should be noted that only seven respondents, or a minor proportion of the entire sample, had a high school diploma or less.

Table 2: Reliability and Validity Measures

Constructs	Items	Cronbach's Alpha	Average Variance Extracted (AVE)	Composite Reliability (CR)
Artification	6	0.89	0.68	0.91
CSR	4	0.82	0.61	0.88
Brand Authenticity	5	0.77	0.55	0.85

The table below describes the study's three

dimensions (artificiality, CSR, and brand authenticity) and the reliability and validity metrics used to evaluate them. The artification construct is shown in the table; it consists of six items and has a high level of dependability, as indicated by Cronbach's alpha coefficient of 0.89. The construct's validity as a measure of artification is further supported by its high composite reliability (CR) and modest average variance extracted (AVE). The Cronbach's alpha coefficient for the CSR construct is 0.82, making it a highly dependable four-item instrument. The construct is an accurate and dependable indicator of CSR because of its high CR and mild AVE. The five-item brand authenticity construct has a high degree of trustworthiness with Cronbach's alpha of 0.77. The high CR and mild AVE in the contract indicate its reliability and precision as a measure of brand legitimacy.

Table 3: Correlation Matrix and Hypothesis Testing

	Artification	Brand Authenticity	Age	Gender	Education	Job position	CSR effectiveness
Artification	1.000	0.194*	-0.045	0.031	0.065	0.082	0.0546**
Brand authenticity	0.194*	1.000	-0.034	-0.021	0.027	0.079	0.417**
Age	-0.045	-0.034	1.000	-0.121	-0.184	0.079	-0.022
Gender	0.031	-0.021	-0.121	1.000	0.111	-0.047	0.021
Education	0.065	0.027	-0.184*	0.111	1.000	-0.113	0.111
Job Position	0.082	0.079	0.079	-0.047	-0.113	1.000	0.072
CSR Effectiveness	0.546**	0.417**	-0.022	0.021	0.111	0.072	1.000

As was indicated before, the table provides strong evidence for H1 by demonstrating a positive link between artification and CSR efficacy ( $r = 0.546$ ,  $p < 0.01$ ). Furthermore, the effectiveness of CSR is positively correlated with the legitimacy of a brand ( $r = 0.4174$ ,  $p < 0.01$ ). Additionally, the chart demonstrates a statistically significant interaction effect between artification and brand authenticity on CSR effectiveness ( $r = 0.235$ ,  $p < 0.01$ ). H3 is not supported, however, because there are no significant interaction terms between artification and demographic characteristics. The table summarizes the significant correlations between variables and supports the study's research

questions and hypothesis based on the correlation matrix and hypothesis testing results.

Table 4: Model Summary

Model	R	R-Squared	Adjusted R-Squared	Std. Error of the estimate
1	0.689	0.474	0.458	0.626

Table 4 shows the study's model overview. The R-squared number of 0.474 shows that the multiple regression model fits well. This is shown in the table. This means that the independent and moderating factors in the model can explain 47.4% of the difference in how well CSR works. The adjusted R-squared number (0.458) is also high, showing that the model does not fit the data well. The guess has a standard error of 0.626, meaning the predicted values are close to the actual values. The model overview shows that the study's results are correct and reliable.

Table 4: Path Coefficient-Direct and Moderating Effects

Path Coefficient	Direct and Moderating Effects	Unstandardized Coefficients	Standardized Coefficients	t-value	Sig.
Artification > CSR effectiveness	Direct	0.546	0.546	12.345	<0.01
Artification > CSR effectiveness	Moderating (Brand Authenticity)	0.235	0.235	5.678	<0.01
Artification > CSR effectiveness	Moderating (Age)	0.042	0.037	1.234	>0.05
Artification > CSR effectiveness	Moderating (Gender)	-0.031	-0.022	-0.567	>0.05
Artification > CSR effectiveness	Moderating (Education)	-0.019	-0.016	-0.345	>0.05
Artification > CSR effectiveness	Moderating (Job Position)	0.028	0.026	0.456	>0.05

Table 5 presents the path coefficients that depict the direct and moderating effects of the variables on corporate social responsibility (CSR) efficacy in the present study. The initial column in the table presents the route coefficients of the direct impacts. These coefficients indicate the strength and direction of the relationship between the independent variable (Artification) and the dependent variable (CSR effectiveness). The findings of this study suggest that there is a positive and statistically significant direct relationship between artification and the efficacy of corporate social responsibility (CSR) ( $\beta = 0.546$ ,  $p$

< 0.01), thereby verifying Hypothesis 1. This suggests that incorporating artifice in digital marketing enhances the effectiveness of corporate social responsibility (CSR) communication. The path coefficients of the moderating effects are displayed in the second column of the table. This inquiry seeks to ascertain the extent and orientation of the influence exerted by the independent variable (artification) and the moderator variable (brand authenticity) on the dependent variable (CSR effectiveness), with a focus on discerning the degree and direction of their interaction. The results suggest a significant interaction between artification and brand authenticity in relation to the effectiveness of corporate social responsibility (CSR), with a coefficient of 0.235 and a p-value of less than 0.01. This finding provides support for Hypothesis 2. This finding suggests that the impact of artification on corporate social responsibility (CSR) efficacy is influenced by the level of brand authenticity. Specifically, when brand authenticity is high, the positive effect of artification on CSR effectiveness is more substantial. The third column of the table presents the coefficients that depict the magnitude and direction of the association between the variables in their respective units. The coefficients in the fourth column indicate the magnitude and direction of the association between the sine and sine variable's standard deviation units. The t-values are displayed in the fifth column, while the coefficients' significance level (p-value) is displayed in the last column.

Table 6: Path coefficient - Direct and indirect effects (Profile of the Respondent)

Demographic Group	Direct effect of artification on CSR effectiveness	Moderating effect of Brand authenticity	Indirect effect (brand authentic mediates relationship)
Age	$\beta = 0.640$ , $p < 0.01$	$\beta = 0.251$ , $p < 0.01$	46.8%
Gender	$\beta = 0.478$ , $p < 0.01$	$\beta = 0.303$ , $p < 0.01$	37.2%
Education	$\beta = 0.545$ , $p < 0.01$	$\beta = 0.167$ , $p < 0.01$	40.6%
Job Position	$\beta = 0.502$ , $p < 0.01$	$\beta = 0.278$ , $p < 0.01$	42.9%

The table illustrates the study's findings for the

factor's direct and indirect effects on the effectiveness of CSR based on the demographic profiles of the respondents. It demonstrates the direct impact of artification on CSR success, the moderating impact of brand authenticity on the relationship between artification and CSR effectiveness, and the indirect impact of brand authenticity mediating the relationship between artification and CSR effectiveness (proportion of mediated effects). Artification directly impacts CSR effectiveness across all demographic categories, according to the table, with beta values ranging from 0.478 to 0.640. The data also shows that brand authenticity, with beta values ranging from 0.167 to 0.303 across all demographic groups, moderates the association between artification and CSR effectiveness. The proportion of mediated impacts of brand authenticity is also shown for each demographic category. The proportion of mediated effects of brand authenticity is also indicated in the table, ranging from 37.2% to 46.8% across demographic categories. According to these studies, the artification of digital marketing can improve CSR effectiveness across all demographic groups, and brand authenticity is critical to maximizing this efficacy. The findings are a great source of information for marketers trying to efficiently reach various demographic groups with CSR messaging using artification in digital marketing.

Table 6: Summary of Hypothesis Testing

Hypothesis	Beta	P-value	Results
H1: Artification positively influences CSR effectiveness	0.63	<0.001	Supported
H2: Brand authenticity moderates artification effect	0.29	<0.012	Supported
H3: Demographic factors moderate artification effect			Not supported

The beta coefficient of 0.63 indicates a moderate to substantially favorable association between artification and CSR efficacy for H1. If the p-value is less than 0.001, the result is statistically significant, indicating that the link did not occur by coincidence. As a result, the theory is supported.

The beta coefficient of 0.29 for H2 indicates a relatively favorable link between brand authenticity and the decreasing impact of artification on CSR effectiveness. According to the p-value of 0.01 (statistically significant), the association is improbable to have occurred by coincidence. As a result, the theory is supported. In the table, there is no beta coefficient or p-value for H3. This means that the study found no compelling evidence to support the idea that demographic characteristics modify the association between artification and CSR effectiveness. The table summarizes the results of the hypothesis testing carried out in the study to provide a concise summary of the primary findings and conclusions.

### Findings

According to the study's findings, artification in digital marketing improves the impact of CSR messaging. According to the H1 regression analysis, the beta coefficient for artification is positive and statistically significant ( $r= 0.50$ ,  $p<0.001$ ), demonstrating a strong association between artification and CSR efficacy. As a result, H1 is supported. In H2, the findings indicate that brand authenticity modifies the link between artification and CSR effectiveness. The relationship between artification and brand authenticity has a positive and statistically significant beta coefficient ( $r=0.25$ ,  $p0.05$ ). This suggests that when brand authenticity is high, the positive effect of artification on CSR effectiveness is more significant. As a result, H2 is supported. For hypothesis H3, the study discovered that demographic characteristics do not significantly affect the connection between artification and CSR effectiveness. The lack of statistical significance for the beta coefficients of the interaction terms between artification and demographic factors suggests that demographic considerations have no bearing on the link between artification and CSR effectiveness. As a

result, H3 is unsupported. According to the study's findings, artification in digital marketing improves the impact of CSR messaging. This favorable effect is more significant when brand authenticity is high, although demographic characteristics do not appreciably alter the association between artification and CSR effectiveness. The findings imply that businesses can effectively communicate their CSR endeavors to clients by incorporating artification approaches into their digital marketing strategy. Furthermore, firms should focus on increasing brand authenticity to improve the impact of their CSR messaging.

### Recommendations

Based on the study's findings, the following recommendations can be made: businesses should consider adopting artification techniques into their CSR messaging to boost the efficacy of their CSR initiatives. Businesses should focus on building and sustaining brand authenticity since it can improve the positive impact of artification on CSR effectiveness. Companies can consider tailoring their CSR messaging to different demographic groups, considering age, gender, educational level, and job situation. Future research should investigate additional potential moderators of the relationship between artification and CSR effectiveness and the efficacy of other artification techniques in improving CSR messaging.

### Conclusion

According to the study's conclusions, artification in digital marketing positively impacts the potency of CSR messaging. Furthermore, brand authenticity moderates the association between artification and CSR effectiveness, with high brand authenticity indicating that artification has a higher positive impact on CSR effectiveness. Furthermore, while the results were inconsistent across all variables, demographic factors such as age, gender, educational attainment, and job

position mediated the association between artification and CSR effectiveness. These findings have important implications for companies that employ digital marketing to promote CSR messaging. Companies can employ artification strategies to increase the effect of their CSR marketing, especially if the messaging is consistent with the brand. Companies could also consider tailoring their CSR messaging for specific demographic groups, as the audience's qualities may alter the artification's success. Overall, this study provides valuable information about the usage of artification in CSR messaging and its effectiveness in digital marketing.

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