

A COMPREHENSIVE STUDY ON MODERATOR OF BIG DATA USAGE IN SHAPING CORPORATE IMAGE THROUGH MARKETING INITIATIVES IN CHINA'S ICT SECTOR

Xinyi LEONG

1 Faculty of Finance and Administrative Science,
Al Madinah International University, Kuala Lumpur, Malaysia

CJ059@lms.mediui.edu.my

Maged Mustafa Mahyoub AL-DUBAI

2 Faculty of Finance and Administrative Science,
Al Madinah International University, Kuala Lumpur, Malaysia

maged.@gmail.com

Abstract.

This study examines big data utilization as a moderating factor in the relationship between marketing initiatives and the development of corporate images. Quantitative methodology employed and 400 data set gathered from professionals that comes from three representative cities in China. This study examines five key marketing initiatives, digital marketing strategies, customer engagement, brand personality, innovation and technological advancements, and corporate social responsibility (CSR), and their impact on shaping corporate image. During data analysis and hypothesis testing, AMOS and SPSS were used to check reliability and validity for all variables. The findings indicate that each marketing initiative variable has direct relationship with development of corporate images. Regarding the indirect effect of big data usage as moderate variable between the variables, the results specified that it does not moderate the relationship between digital marketing strategies and corporate image. However, the models confirmed that big data usage significantly moderates the relationships between other marketing initiatives and corporate image. Nonetheless, all moderation effects were negative, implying that the increased big data usage will diminish the positive impact of these variables on corporate image. Based on the research findings, implications for theory, practitioners and policy were examined. Limitations and recommendations for future research were outlined.

Keywords: big data usage, corporate image, digital marketing strategies, customer engagement, brand personality, innovation and technology advancement, corporate social responsibility (CSR).

1. Introduction

In today's data-driven business environment, organizations increasingly leverage big data analytics to enhance their marketing strategies and strengthen corporate reputation. The information and communication technology (ICT) sector in China, characterized by rapid digitization and a booming digital economy, provides an ideal context to examine how data-driven marketing can shape a firm's corporate image. A strong corporate image, where the public's overall perception of a company, is recognized as a critical strategic asset influencing customer trust, loyalty, and competitive advantage. Marketing initiatives such as digital marketing, customer engagement, brand personality, innovation & technological advancements, and corporate social responsibility (CSR) are widely regarded as key drivers of corporate image formation in the eyes of stakeholders. At the same time, big data usage in marketing offers exceptional opportunities for personalization, insight generation, and performance optimization, and it has been hailed as

a "management revolution" and "the next frontier for innovation". However, the interplay between these marketing initiatives and big data remains underexplored. It is unclear whether and how big data utilization might amplify or alter the effectiveness of traditional marketing initiatives in shaping a positive corporate image, especially in fast-evolving markets like China's ICT industry. This gap is noteworthy, as Chinese companies are at the forefront of digital transformation, with enormous volumes of consumer data available and cutting-edge adoption of technologies like artificial intelligence and analytics. Understanding the role of big data as a potential moderator is crucial for both scholars and practitioners, since it could reveal whether data-driven strategies strengthen corporate image or unintentionally undermine certain marketing efforts.

Despite extensive literature on big data analytics and on individual marketing strategies, limited research has addressed their combined impact on corporate image. Prior studies typically examine

marketing initiatives in isolation with respect to outcomes like brand equity or customer behavior, and many highlights big data's transformational potential for marketing decision-making. Yet scarce attention has been paid to how big data usage influences the effectiveness of multiple concurrent marketing initiatives on building corporate images. In other words, does heavy utilization of big data in marketing enhance the positive effects of marketing initiatives on corporate image? This question is especially significant in China's ICT sector, a diverse and rapidly changing market where digital strategies and consumer behaviors are evolving quickly. Companies in this sector are early adopters of big data and digital marketing, yet they operate in a complex cultural and technological landscape. Without clear empirical evidence, businesses may be unsure how to integrate big data into marketing in ways that genuinely support the development of their corporate image. Therefore, this study addresses the research gap by investigating the direct links between key marketing initiatives and corporate image and also evaluating big data moderating role in these relationships.

2. 1. Literature Review

1.1 Theoretical Background

The classification of the marketing initiatives into digital marketing strategies, customer engagement, brand personality, corporate social responsibility, as well as innovations and technological advancements have been long used in the marketing capability literature. To develop a strong marketing initiative, all five types of variables need to be invested in by the companies to achieve competitive advantage. Resource-based View (RBV) suggests that a company's resources and capabilities drive its competitive advantage. Big data usage can be considered a strategic resource because of its' capability of gathering, handling and analyzing functionality that supports company extract valuable insights (Kissi, 2024; Mazzei & Noble, 2020). Organizational learning highlights the importance of learning and altering in an organization. Fanelli et al (2023) believed that organizations use big data analytics in decision-making and it has been an effective tool that served as a guide for the decision-making process. Subsequently, big data will be tested whether it moderates the marketing initiatives in shaping the corporate image. Brand image and customer engagement are valuable for companies and RBV helps companies to achieve competitive advantage (Gong et al, 2023). As e-commerce and m-commerce adoption are becoming more mature these years, online customer engagement has been spread widely. Digitalization has been adapted fast, and content marketing is becoming significant. Perez-Vega et al (2025) believed that engagement

on social media platforms can increase consumers' request towards the corporate image. However, there are other researchers suggested corporates using social media communicate their engagement seemed to be less impactful (Gong et al, 2023). Consequently, digital marketing strategies, brand personality and customer engagement, and technological advancement are chosen to be one of the marketing initiatives variables. Sustainability purchase intention demonstrates positives impacts on corporate social responsibility in various studies (Huo et al, 2022). Gong et al (2023) found that consumers have been positively response to companies that actively participate in CSR activities. Several examples have been included in the previous chapter as support for statements. Gong et al (2023) also shared that CSR have a direct connection to corporate image in his previous study. Therefore, CSR is selected as one of the marketing initiatives variables in this study.

1.2 Key Hypotheses

The comprehensive synthesis of existing literature explains ten pivotal hypotheses that compose the conceptual foundation of this investigation. First, to posit that digital marketing strategies, customer engagement, brand personality, innovations and technological advancements, as well as corporate social responsibility exerts positive influences on the shaping of corporate image (H1-H5). Second, assume and investigate that big data usage serves as a significant moderator in the relationship between these marketing initiatives and the development of corporate image (H6-H10).

1. Digital Marketing Strategies

Digital marketing allows two-way communication between business and consumers, making it easier for the business to understand its audience and needs (Dimitrios et al, 2022). It enables communication to occur without the constraints of geographical or time factor, and accessible at all hours and anywhere in the world. Effective digital marketing strategies rely on quality data (Usercentrics, 2024). The more accurate data collected and managed, the higher the successful results drive revenues from developing campaigns to attract and retain customers. Every online interaction generates data, and these data needs to be processed then turned into insights that help organization's managers improve their management and decision making. Big data analysis can deliver insights, for instance who your customers are, what they like, where they are and how they are being reached. Also examine and determine how customer loyalty being influences, as well as figure out what keeps customers coming back again. With the insights above, marketers can improve their current marketing strategies across the channels to achieve better growth and stay competitive in the market. Therefore, based on the

gap identified in this study, offer the following hypothesis:

H1: There is a relationship between digital marketing strategies and corporate image.

2. Customer engagement

According to most scholars, customer engagement (CE) is characterized by a multidimensional model comprising cognitive, emotional, and behavioral dimensions companies (Gong et al, 2023). Many organizations view customer engagement as a route for creating and enhancing the value of cocreated in customer-company relationships – thereby improving business performance (Bolton, 2011). Therefore, managers seek to foster customer engagement into the organization's marketing strategies. Verhoef et al, (2000) shared an example of customer engagement, where a leisure firm proactively asks recent customers to provide ideas and feedback. For example, Lays' chips asked customers to develop a new chips flavor in a contest, and the winner will receive 1% of the turnover of the resulting new product. Engagement experience enhances the product experience and facilitates the transformation of the customer into an active contributor to the firm's marketing functions (Harmeling et al, 2016). Customer engagement plays a significant role in promoting a corporate's image and driving sales (Perez-Vega et al, 2025). Vivek et al, (2012) previously studied on customer participation and involvement as antecedents to customer engagement, and tested with value, trust, affective commitment, word of mouth, loyalty and brand community involvement as consequences. To enable practitioners to make full use of the construct and academics to continue exploring the construct, future research should develop a customer engagement scale and test its applicability across contexts (Vivek et al, 2012). Previous study shared the sustainable practices of the firms to improve the brand ranking and engage the customers for the long term (Gong et al, 2023). Brand or corporate image and the engagement of customers are valuable for companies (Gong et al, 2023). In addition, earlier research has found that customers are more engaged with fashion brands when they believe they have a positive image of their organization (Gong et al, 2023). Therefore, this study offers the following hypothesis:

H2: There is a relationship between customer engagement and corporate image.

3. Brand Personality

Garcia-Salirrosas & Gordilo, (2021) suggested that brand is considered one of the most valuable intangible assets that companies have, brand management has become a managerial priority in recent times. It represents perceptions and

emotions of customers regarding goods or services of an organization, as those that are successful in the market established deep connections with their consumers (Garcia-Salirrosas & Gordilo, 2021). A robust brand personality, as perceived by consumers, will be congruent with the representation of the corporate image. Brand equity is strongly related to corporate image, which is defined as the impression created in the mind of the public about a company and is related to its physical and behavioral attributes (Garcia-Salirrosas & Gordilo, 2021). A study by Lee and Kim (2009) showed that brand personality influences consumers' emotions and influences consumers' consumption behavior. Garcia-Salirrosas & Gordilo, (2021) studied that brand is an asset that generates great benefits for any organization and increases the competitiveness of companies. It is understood that brand equity is strongly related to corporate image, where companies must create and maintain a positive image as it somehow would impact on the preference of consumers over their competitors. Prior literature, researchers or scholars has been focused on brand equity with consumer involvement, behavior, loyalty or even trust, while there's no or limited study mentioned the relationship between brand personality and corporate image. That is why the continuous updating and adjustment of the concept becomes an academic need since society lives a constant development that requires an active academy (Garcia-Salirrosas & Gordilo, 2021). Therefore, based on the gap identified in this study, it offers the following hypothesis:

H3: There is a relationship between brand personality and corporate image.

4. Innovation & Technology advancement

Technology innovation refers to the development, use, or implementation of new concepts, methods, devices, or processes aimed at enhancing or changing the way existing work, products, or services function (Suherlan & Okombo, 2023). In recent, Gartner (2024) webinar extracts a poll of more than 2,500 executives, 38% indicated that customer experience and retention is the primary purpose of their generative AI investments. The Artificial intelligence index report (2024) conveyed a survey finding from Ipsos shows that over 2023, the proportion of those who think AI will dramatically affect their lives in the next three to five years has increased from 60% to 66%. According to Tran et al (2015) investigation in exploring the corporate image formation process, research suggested there is a clear indication for scholars to explore and understand the impacts of technology. Tannady et al, (2022) revealed that

product innovation affects brand image, the better product innovation, the higher the brand image. It explains the significance of paying more attention to the innovation when developing a product as it will greatly affect the consumer's impression of the product being offered (Tannady et al, 2022). Elziny & Mohamed (2021) research found that there was an indirect positive significant relationship between the variable of technological innovation and brand image. Findings revealed that technological collaboration and expertise are the key factors in the creation of technological innovations and have significant positive influences on brand image through two mediating variables which customer's satisfaction such as security, ease of use, and perceived quality to improve their loyalty toward the brand. However, there is no study found on testing whether technological innovation has a direct relationship with the corporate image yet. Therefore, based on the gap identified in the prior study, the following hypothesis offers:

H4: There is a relationship between innovative & technological advancements and corporate image.

5. Corporate Social Responsibility (CSR)

According to Tang (2012) development business ethics is one form of applied ethics that examines ethical principles and problems that can arise in a business environment. One of the advantages is committing to CSR can improve corporation's profitability and value. While benefiting society and lessening the negative impacts on the environment, consumers are increasingly looking to buy goods and services from socially responsible companies, which can have a positive impact on organization's bottom line (Ganti, 2023). Some scholars believe CSR is highly valued by organizations seeking to drive their corporate image (Yu & Hu, 2014), increase visibility and thawing negatives publicity (Madina et al, 2014). Fombrun and Shanley (1990) pointed out that CSR activities were an important element to achieve product differentiation and build corporate image. Other scholars suggested that the performance of CSR can improve corporate image and even push up stock value (Porter and Kramer, 2006). Yu and Hu (2014) found that scholars in China have also paid attention on the relationship between CSR and corporate image in recent years, particularly focusing on how CSR behaviors can contribute to gain positive corporate image. Virvilaite & Daubaraite (2011) studied that corporate image will influence the corporate reputation, where CSR gives consumer a chance to feel that he or she is making the right decision by choosing a product. Some theory claims that an organization's interest is to maximize its shareholders value (Mandina et

al, 2014). To elaborate this statement further, it can be explained that CSR can strengthen the company's competitiveness, to gain market share in such a competitive environment. Mandina et al (2014) studied that firms can seek to enhance their public image to gain more customers, better employees, access to money markets, and other benefits. Based on the gap identified, this study offers the following hypothesis:

H5: There is a statistically significant relationship between corporate social responsibility and corporate image.

6. Big Data as Moderator

Big data presents a unique set of opportunities and challenges for companies striving to maintain a competitive edge in highly saturated markets (Ampanthong, 2024). Tran et al (2015) suggested there is a clear indication for scholars to understand the impact of websites, online presence and mobile to the corporate image. Marketing strategies driven by big data analytics allow businesses to not only react to market trends but also to anticipate consumer needs and adjust their strategies accordingly (Ampanthong, 2024). These analytics are instrumental in recognition the patterns and trends to identify the specific needs and desires of different consumer segments. Powerful data-driven processes associated with big data provided an insight of analytics, where these data are transformed into information that provides value by enhancing decision-making capabilities through knowledge generation (Pugna et al, 2019). It should be employed continuously to track and monitor the organization performance as well as flagging potential risk and issues. Boakye et al (2025) shared that previous study has confirmed the significant influence of incorporating new technologies into digital marketing strategies, particularly to improve the spending and enhance operational effectiveness. However, in Boakye et al (2025) study, AI -driven personalization is performed as a mediator variable, where no moderator variable is being tested. Baqleh & Alateeq (2023) highlighted that further studies may consider the moderating effect of big data analysis on performance rather than competitive advantage. Mahmood et al (2022) studied the moderating effect of big data analytics, whereas its direct impact on organizational performance was not part of the previous research, therefore it may be explored further in future research to ensure more generalizability of the research. Ledro et al (2022) also shared that future work can identify possible moderators to build a comprehensive and thorough understanding. Another researcher, Kaperonis (2024) suggested that future research should apply to various industry sectors, as it could unravel sector-specific challenges and benefits that related

to new technologies implementation in digital marketing. In summary, big data usage should be taken as a moderator variable. It is argued that big data usage can strengthen the relationship between marketing initiatives and corporate image. Based on the discussion above, the following hypothesis are proposed:

H6: The big data usage moderates the relationship between digital marketing strategies and corporate image.

H7: The big data usage moderates the relationship between customer engagement and corporate image.

H8: The big data usage moderates the relationship between brand personality and corporate image.

H9: The big data usage moderates the relationship between innovative & technology advancements and corporate image.

H10: The big data usage moderates the relationship between corporate social responsibility and corporate image.

Drawing on the theories of RBV, sustainable purchase intentions, organizational learning and big data phenomena, data driven decision-making as well as data driven performance management, the study proposes and examines the relationship between various marketing initiatives and the perception of corporate image shown in Figure1. The marketing initiatives are conceptualized as a higher order concept, comprising of digital marketing strategies, customer engagement, brand personality, innovations and technological advancements, as well as corporate social responsibility, representing as the independent variables (IVs) while corporate image represents the dependent variable (DV). Big data usage is the moderate variable (MD) in this research. RBV suggests that a company's resources and capabilities drive its competitive advantage. Big data usage can be considered a strategic resource because of its' capability of gathering, handling and analyzing functionality that supports company extract valuable insights (Kissi, 2024; Mazzei & Noble, 2020). Organizational learning highlights the importance of learning and altering in an organization. Fanelli et al (2023) believed that organizations use big data analytics in decision-making and it has been an effective tool that served as a guide for the decision-making process. Subsequently, big data will be tested whether it moderates the marketing initiatives in shaping the corporate image. Brand image and customer engagement are valuable for companies and RBV helps companies to achieve competitive advantage (Gong et al, 2023). As e-commerce and m-commerce adoption are becoming more mature these years, online customer engagement has been spread widely. Digitalization has been adapted fast, and content marketing is becoming significant.

Perez-Vega et al (2025) believed that engagement on social media platforms can increase consumers' request towards the corporate image. However, there are other researchers suggested corporates using social media communicate their engagement seemed to be less impactful (Gong et al, 2023). Consequently, digital marketing strategies, brand personality and customer engagement, and technological advancement are chosen to be one of the marketing initiatives variables. Sustainability purchase intention demonstrates positives impacts on corporate social responsibility in various studies (Huo et al, 2022). Gong et al (2023) found that consumers have been positively response to companies that actively participate in CSR activities. Gong et al (2023) also shared that CSR have a direct connection to corporate image in his previous study. Therefore, CSR is selected as one of the marketing initiatives variables in this study.

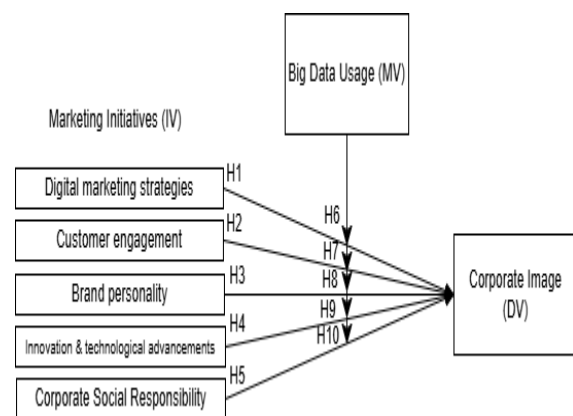


Figure 1 Research Conceptual Model

1. Methodology

This section outlines the research methodology employed to investigate the influences of marketing initiatives on shaping the corporate image, moderated by big data usage, in the ICT sector of China. This study utilized a quantitative, survey-based research design to empirically investigate the relationships among the variables. The methodology is designed to match the research objectives and questions, making sure that data collection and analysis are both strong and reliable.

1.1 Research Design

This research employs rigorous quantitative research design to examine various hypotheses centered around the enhancement of corporate image, the implementation of big data analytics, and the effectiveness of five key marketing strategies. The study will assess the empirical connections between the independent and dependent variables through advanced statistical methods, including structural equation modeling. This research, quantitative methodology and

survey techniques are utilized to gather information regarding the influence of marketing strategies on corporate reputation. The raw data from a survey can pertain not only to the respondent's current behavior but also to his and her state of mind or intentions (Awang, 2014). Questionnaires are given to respondents to elicit information for the study, as they are asked questions based on the information needed by the study (Awang, 2014). Using this approach, the data gathering process is swift, effective, and can be easily governed to a large sample. Surveys allow researchers to assess a wider variety of behaviors and other phenomena than can be studied in a typical naturalistic observation study (Asenahabi, 2019).

8.2 Population and Sampling

The target population encompasses ICT sector professionals within the selected Chinese ICT hub cities to capture insights from organizations at the forefront of big data and marketing innovation. Data was collected via a structured questionnaire distributed to industry professionals in Shenzhen, Beijing, and Shanghai city. These three cities are the major Chinese ICT hub that represents China's top three ICT cities in the industry. To ensure the sample mirrors the population, simple random sampling method is applied to this investigation, making sure potential respondents are equally selected as this research sample. Previous study suggested that there is a need for further investigation in different geographic areas to highlight the potential effects of big data usage on the marketing initiatives and the development of corporate image. Therefore, this research is targeted to the China ICT sector's employees from the cities mentioned above. With the selected areas and industry sector, Raosoft will be used as a guide in this study for establishing the suitable sample size. According to Raosoft, it is recommended that 385 samples is required. Therefore, a total of 500 survey questionnaires were distributed, of which 400 valid responses were obtained and used for analysis. The respondent profile covered a range of demographics and included various roles and departments within ICT companies, enhancing the representativeness of the data.

8.3 Data Collection

The survey instrument was carefully developed through an instrument development process, including pre-testing, to ensure content validity. Wherever possible, measurement items for each construct (corporate image, the five marketing initiatives, and big data usage) were adapted from established scales in prior research and refined to fit the ICT sector context. The questionnaire data was gathered on respondents' perceptions of their company's performance on the five marketing initiatives and the overall corporate image of their firm, as well as the extent of big data usage in

marketing operations. The demographic section collected participants' details such as age, gender, professional role, and years of experience, facilitating further analysis of possible moderating variables and evaluating the representativeness of the sample. The variables were operationalized through a comprehensive five-point Likert scale (ranging from 1=Strongly Disagree to 5=Strongly Agree). The independent and moderator variable was measured based on four items adopted from previous studies. The operationalization of the corporate image (CI) shaping is based on eight items adopted from past investigations. Responses were captured and the survey also collected relevant demographic and organizational information about the participants.

3. 4. Results

Collected data were analysed using a combination of descriptive statistics, factor analyses, and multivariate hypothesis-testing methods. First, data screening procedures confirmed acceptable data quality and completeness, ensuring minimal missing data and no significant issues of inconsistency. The measurement model was validated through confirmatory factor analysis (CFA), where each construct's indicators showed strong factor loadings well above the 0.6 threshold, indicating good convergent validity and reliable measurement of the intended theoretical constructs. The overall KMO value of the questionnaire is 0.948, which is greater than the threshold of 0.6, suggesting the sampling is adequacy and the data is highly suitable for factor analysis. The p-value is 0.000, which is less than 0.01, confirming that the variables are sufficiently correlated and appropriate. The overall questionnaire and the various dimensions in this research demonstrated Cronbach's Alpha ranging from 0.795 to 0.943, exceeding 0.7, meeting the level of acceptance. This indicates strong internal consistency of the variables, confirming exceptionally high reliability of the survey results.

Table 1 Reliability analysis for all variables

Dimension Variable	Cronbach's Alpha	Number of items
Corporate image	0.888	8
Digital marketing strategies	0.811	4
Customer engagement	0.809	4
Brand personality	0.795	4
Innovation & technological advancements	0.813	4

Corporate social responsibility	0.805	4
Big data usage	0.805	4
Overall Questionnaire	0.943	32

Table 2 KMO and Barlett's test for all variables		
KMO Measure of Sampling Adequacy		0.948
Bartlett's Test of Sphericity	Approx. Chi-Square	5770.722
Degrees of Freedom (df)		496
Significance (Sig.)		0.000

The table below presented convincing evidence of measurement quality across all the constructs in this study, with most of them demonstrating excellent validity and reliability standards. All the construct had exceeded the recommended threshold of 0.7 for constructs reliability (CR). The highest CR was 0.888 ranging from 0.796 to 0.888. All the constructs achieved more than 0.8 except for the brand personality which was 0.796 but it was still acceptable. For the average variance extracted (AVE), five constructs meet 0.5 threshold, indicating excellent validity. Corporate image and brand personality were illustrated 0.499 and 0.493, which is slightly below but very close to the threshold and could be considered as acceptable. The highest AVE was 0.522, demonstrated by innovation & technological advancements. As a result, the outcomes support the use of these constructs for hypothesis testing in the research study.

Table 3 All construct's AVE and composite reliability CR in AMOS

Construct	Items	$\Sigma(\lambda^2)$	AVE	CR	Validity Conclusion
Corporate image	Q8-Q15	3.994	0.499	0.888	Good
Digital marketing strategies	Q16-Q19	2.076	0.519	0.812	Excellent
Customer engagement	Q20-Q23	2.073	0.518	0.811	Excellent
Brand personality	Q24-Q27	1.974	0.493	0.796	Acceptable
Innovation & technological advancements	Q28-Q31	2.087	0.522	0.813	Excellent

Corporate social responsibility	Q32 - Q35	2.043	0.511	0.806	Excellent
Big data usage	Q36 - Q39	2.034	0.509	0.805	Excellent

For hypothesis testing, the study employed Structural Equation Modeling (SEM) using AMOS software to examine the direct effects of the five marketing initiatives on corporate image within an integrated model. This allowed for simultaneous estimation of relationships and provided model fit indices to ensure the conceptual framework's robustness.

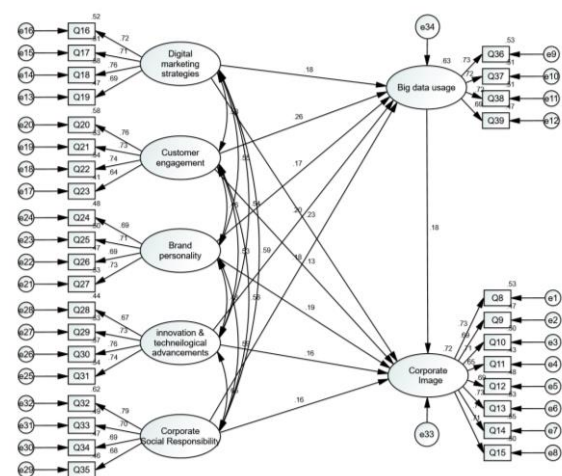


Figure 2 SEM diagram of the overall measurement model

The results of the structural equation model fit analysis above indicate a good model fit, with all indices meeting acceptable standards: The Chi²/df value is 1.139, which is below 5; the RMSEA value is 0.019, below 0.08. The GFI and AGFI values are 0.930 and 0.916, respectively, both above 0.9, indicating the model was well fits the data. The IFI and CFI values are both 0.989, above 0.9 and the PGFI value is 0.780, above 0.50. This indicates that the model matches the data well and effectively reflects the relationships among the latent variables.

Table 4 GOF indices of SEM model for all variables

Name of category	Name on index	Index value	Level of acceptance	Comments
Absolute fit	RMSEA	0.019	RMSEA < 0.08	Excellent fit
Absolute fit	GFI	0.930	GFI > 0.90	Excellent fit

Incremental fit	AGFI	0.916	AGFI > 0.90	Excellent fit
Incremental fit	IFI	0.989	IFI > 0.90	Excellent fit
Incremental fit	CFI	0.989	CFI > 0.90	Excellent fit
Parsimonious fit	Chisq/df	1.139	Chisq/df < 5.0	Excellent fit
Parsimonious fit	PGFI	0.780	PGFI > 0.5	Excellent fit

The empirical results provide dedicated support for the direct influence of marketing initiatives on corporate image, as well as revealing a complex moderating role of big data usage. All five marketing initiatives were found to have significant positive effects on corporate image ($p < 0.05$ for each direct path). This indicates that, in China's ICT sector, strategic efforts in digital marketing, fostering customer engagement, building a distinct brand personality, pursuing innovation and technological advancement, and committing to corporate social responsibility each contribute meaningfully to enhancing how stakeholders perceive the company. In practical terms, these results underscore that a multifaceted marketing strategy is beneficial for firms aiming to cultivate a strong corporate image.

Table 5 The Significance Analysis of the Direct Effects

Path	Estimate	S.E.
DMS→CI	.375	.042
CE→CI	.302	.043
BP→CI	.327	.041
ITA→CI	.337	.042
CSR→CI	.346	.044

Note. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Nevertheless, the moderation analysis provided detailed and multifaceted findings. The role of big data usage as a moderator was partially supported. Result indicates that big data utilization did not significantly moderate the relationship between digital marketing strategies and corporate image, suggesting that the positive impact of digital marketing on corporate image remains consistently regardless of the level of big data analytics employed. By contrast, for the other four marketing initiatives (customer engagement, brand personality, innovation & technological advancements, and CSR), big data usage emerged as a significant moderator of their effects on corporate image.

Table 6 The Significance Analysis of the Indirect Effects

Path	coeff	S.E.	t
DMS→BD→CI	-.040	.037	-1.077
CE→BD→CI	-.1306	.0396	-3.2979
BP→BD→CI	-.1054	.0392	-2.6894
ITA→BD→CI	-.0884	.0381	-2.3228
CSR→BD→CI	-.1074	.0421	-2.5491

4. 5. Discussions

Intriguingly, all these moderation effects were negative. In other words, although higher levels of big data usage strengthen a firm's capabilities, they were found to diminish the positive impact that customer engagement, brand personality, innovation efforts, and CSR have on corporate image. This counterintuitive result implies that when organizations in the ICT sector heavily leverage big data in their marketing operations, the marginal benefit of certain human-centric or innovation-driven initiatives on shaping a favorable corporate image is reduced.

These findings summarized in Table 8 below, highlight that big data's role is more complex than a straightforward "more data = better image" equation. Combining big data with traditional marketing can boost efficiency but may reduce the personal or creative elements essential for public image.

Path	Estimate	S.E.	t	p	Hypothesis	Result
DMS→CI	.375	.042	8.953	***	Supported	Supported
CE→CI	.302	.043	6.962	***	Supported	Supported
BP→CI	.327	.041	7.927	***	Supported	Supported
ITA→CI	.337	.042	7.944	***	Supported	Supported
CSR→CI	.346	.044	7.835	***	Supported	Supported

Table 7 Key Findings, Theoretical and Practical Implications		
Key Finding	Theoretical Implications	Practical Implications
Each of the five marketing initiatives (digital marketing, customer engagement, brand personality, innovation & technological advancements, and CSR) has a significant positive effect on corporate image.	Extends marketing theory by confirming that multiple distinct initiatives all contribute to corporate image formation. This integrated evidence bridges gaps in prior research, which often examined these factors in isolation. It supports stakeholder and branding theories by	Companies in the ICT sector should invest comprehensively in diverse marketing strategies from robust digital marketing and innovation to active CSR, customer engagement, and brand personality development, as each strategy demonstrably enhances corporate image. An integrated approach to

	showing that various strategic marketing activities strengthen stakeholders' positive perceptions of the firm.	marketing is likely to yield cumulative benefits for brand reputation.
Big data usage does not significantly moderate the relationship between digital marketing strategies and corporate image.	Suggests that the effectiveness of digital marketing on shaping corporate image is stable even with varying levels of data analytics. This finding aligns with digital marketing theory, implying that core benefits of digital marketing (such as personalization) persist regardless of big data intensity. The result narrows the theoretical scope of big data's influence, indicating it may not universally alter all marketing outcome relationships.	Managers can be confident that data-driven tools will not undermine the positive impact of digital marketing on corporate image. Firms should continue to leverage digital marketing campaigns to bolster corporate image without concern that heavy analytics use will erode those campaigns' effectiveness. In practice, digital marketing and big data can comfortably co-exist, as data analytics neither enhances nor detracts from digital marketing's image-building power.
Big data usage significantly and negatively moderates the effects of customer engagement, brand personality, innovation & technological advancements, and CSR on corporate image (higher data utilization weakens the positive influence of these initiatives).	This unexpected finding challenges assumptions in marketing and IT integration theory that more data automatically augments marketing effectiveness. It indicates possible diminishing returns or interference effects such as extensive data analytics might	Practitioners should recognize that bigger data is not always better for every aspect of marketing. Especially when cultivating customer relationships, brand identity, innovation perception, or CSR reputation, an overemphasis on data analytics may inadvertently make a company appear

	reduce the human, creative, or relational facets by which certain initiatives (e.g. personal engagement, brand storytelling, innovation culture, or social initiatives) shape corporate image. Theoretically, it calls for refinement in models of technology-enabled marketing, suggesting that scholars should account for context and balance between data-driven decision-making and experiential marketing. It supports a more nuanced, contingency-based view of big data's role which can moderate marketing's impact on intangible outcomes like brand image.	impersonal, risk-averse, or inauthentic to stakeholders. Business leaders in data-intensive industries must strive for balance. Practitioners can use big data insights to inform and personalize marketing initiatives without overshadowing the creativity, human touch, and authenticity that drive corporate image. For example, firms should ensure data analytics enhances rather than replaces genuine customer engagement efforts, storytelling around brand values, innovative culture, and meaningful CSR communication.
--	---	--

At the same time, leaders must approach big data initiatives with strategic caution. The finding that indiscriminate or extensive big data use can weaken the effectiveness of certain marketing efforts is a reminder that human elements remain essential in marketing. For example, while big data analytics can encourage companies to use automated customer interactions or rely on algorithms for decision-making, this reliance may unintentionally diminish the personal connection and authenticity that customers expect from the brand. As a result, it could reduce the positive impact that genuine customer engagement and a distinct brand personality have on a company's image. Managers should therefore strive to strike a balance by use data analytics to inform decision-making and personalize offerings but avoid

allowing data algorithms to completely replace creative branding judgment or actual human connection.

For companies in the Chinese ICT sector, the results recommend a standardized approach to technology adoption in marketing. Embracing big data can help marketers target digital marketing efforts more precisely and collect valuable feedback to refine their products. It should be viewed as a tool that enhances traditional marketing expertise rather than replacing them. According to our findings, excessive dependence on data without thoughtful integration may poorly impact public perception and yield diminishing returns. Business leaders and marketing executives can use these insights to better allocate resources. For instance, organizations may continue investing in data analytics while simultaneously equipping marketers with the skills to leverage data for improving customer-centric creativity and engagement. Furthermore, the observation that data does not moderate the impact of digital marketing on image suggests that developing digital marketing capabilities and advancing data analytics can occur concurrently without risk of interference.

5. 6. Conclusion

This extended abstract has synthesized the crucial elements of study on how big data usage moderates the relationship between marketing initiatives and corporate image in China's ICT sector. The study confirms that classic marketing initiatives remain fundamental to building a strong corporate image, while also revealing that the surging use of big data analytics can be complex on these relationships. Theoretical contributions include expanding marketing and information systems theory to incorporate the nuanced role of big data as a moderator, especially highlighting that more data is not universally beneficial in marketing contexts. Business practitioners should take a balanced approach, using big data wisely to enhance customer engagement, branding, innovation, and CSR efforts without reducing their impact. Policymakers and industry associations should consider frameworks for the ethical use of big data in marketing, as these could help firms prevent privacy issues and protect their corporate reputation. In summary, this research offers practical guidance for companies in China to align big data strategies with marketing goals, helping turn technology into stronger branding and lasting competitive advantage.

7.Limitations and Future Research

This research has certain limitations that open avenues for future inquiry. First, data were

collected through a cross-sectional survey of ICT companies in China. Although this focused high-tech context enabled effective model testing, it may restrict the generalizability of the findings. Future research could replicate and extend this study in other industries such as manufacturing, services or cultural contexts within and outside of China to see if the observed patterns hold or vary. Comparative studies across industries or countries would help determine whether the negative moderation by big data is a general phenomenon or specific to specific environments. Second, the measurement of corporate image and other constructs relied on perceptual, self-reported survey data from company insiders. Subsequent studies might incorporate external assessments of corporate image, for instance, customer or public perceptions, to validate whether internal perceptions align with external reputation outcomes. Mixed-method approaches, including qualitative research such as interviews or case studies, could also be valuable to explore the underlying reasons why big data usage might dampen the impact of certain marketing initiatives. Such insights could reveal whether the negative moderation stems from organizational challenges. Third, future research may examine additional moderating or mediating variables. For example, investigating the role of organizational factors such as data-driven culture, agility, or leadership support, which might clarify how companies can turn big data into a true asset for marketing without adverse side effects. Additionally, studying the best ways to use big data by pinpointing points where its advantages level off or even decline could offer helpful advice for achieving analytics benefits without sacrificing effective marketing.

6. References

- Ampanthong P. (2024). From insights to action: Transforming big data into competitive advantages for marketing in the digital era. Retrieved from https://www.academia.edu/122202397/From_Insights_to_Action_Transforming_Big_Data_into_Competitive_Advantages_for_Marketing_in_the_Digital_Era?nav_from=7ed1c237-7379-49d7-a333-8ecc9994f9be
- Artificial intelligence index report. (2024). Stanford university human-centered artificial intelligence. Retrieved from https://aiindex.stanford.edu/wp-content/uploads/2024/05/HAI_AI-Index-Report-2024.pdf
- Asenahabi, B. M. (2019). Basics of research design: A guide to selecting appropriate research design. International journal of contemporary applied researches, 6(5), 76-89. Retrieved from <https://ijcar.net/assets/pdf/Vol6-No5-May2019/07.-Basics-of-Research-Design-A-Guide-to-selecting-appropriate-research-design.pdf>
- Awang, Z. (2014). Research methodology and data analysis, 2nd ed. University teknologi mara, UiTM press.

- Baqleh, L. A., & Alateeq, M. M. (2023). The impact of supply chain management practices on competitive advantage: The moderating role of big data analytics. *International journal of professional business review*, 8(3), 1-22. [Doi: 10.26668/businessreview/2023.v8i3.679](https://doi.org/10.26668/businessreview/2023.v8i3.679)
- Boakye, C., Sarfo, B., K., O., Gyimah, W., A., Boakye, S., Owusu-Mensah, D. (2025). Optimizing digital marketing strategies through Ai-driven personalization: Analyzing consumer behavior and engagement across multichannel platforms. *Journal of emerging technologies and innovative research (JETIR)*, 12(3), 496-498. <https://doi.org/10.1007/S11002-020-09537-5>
- Bolton, R. N. (2011). Customer engagement: Opportunities and challenges for organizations. *Journal of service research*, 14(3), 272-274. [Doi: 10.1177/1094670511414582](https://doi.org/10.1177/1094670511414582)
- Dimitrios, B., Ioannis, R., Angelos, N., Nikolaos, T. (2022). Digital marketing: The case of digital marketing strategies on luxurious hotels. *Procedia computer science*, 219, 688-696.
- Elziny, M. N. & Mohamed, H. E. (2021). The role of technological innovation in improving the Egyptian hotel brand image. *International journal of heritage, tourism and hospitality*, 15(2), 20-39. [Doi: 10.21608/IJHTH.2022.245625](https://doi.org/10.21608/IJHTH.2022.245625)
- Fanelli, S., Pratici, L., Salvatore, F. P., Donelli, C. C., Zangrandi, A. (2023). Big data analysis for decision-making processes: Challenges and opportunities for the management of health-care organizations. *Management research review*, 46(3), 369-389.
- Fombrun, C. & Shanley, M. (1990). What's in a name? Reputation building and corporate strategy. *Academy of Management Journal*, 33, 233-258.
- Ganti A. (2023). Social Responsibility in Business: Meaning, Types, Examples, and Criticism. Retrieved from <https://www.investopedia.com/terms/s/socialresponsibility.asp#:~:text=Social%20responsibility%20means%20that%20besides,lessening%20negative%20impacts%20on%20them>
- Garcia-Salirrosas, E. E. & Gordilo, J. M. (2021). Brand personality as a consistency factor in the pillars of CSR management in the New Normal. *Journal of open innovation: Technology, market and complexity*, 7, 134. [Doi: 10.3390/joitmc7020134](https://doi.org/10.3390/joitmc7020134)
- Gartner. (2024). Gartner experts answer the top generative AI questions for your enterprise. Retrieved from <https://www.gartner.com/en/topics/generative-ai>
- Gong, Y., Xiao, J., Tang, X., Li, J. (2023). How sustainable marketing influences the customer engagement and sustainable purchase intention? The moderating role of corporate social responsibility. *Frontiers in Psychology*, 14. <https://doi.org/10.3389/fpsyg.2023.1128686>.
- Harmeling, C. M., Moffett, J. W., Arnold, M. J., Carlson, B. D. (2016). Toward a theory of customer engagement marketing. *Journal of the academy of marketing science*, 45, 312-335.
- Huo, C., Hameed, J., Zhang, M., Mohd, A., A., F., Hashim, N., A., A., N. (2022). Modeling the impact of corporate social responsibility on sustainable purchase intentions: insights into brand trust and brand loyalty. *Economic research-ekonomika istrazivanja*, 35(1), 4710-4739. <https://doi.org/10.1080/1331677X.2021.2016465>
- Kaperonis, S. (2024). How artificial intelligence (AI) is transforming the user experience in digital marketing. The use of artificial intelligence in digital marketing: competitive strategies and tactics, 25. <https://doi.org/10.4018/978-1-6684-9324-3.CH005>
- Kissi, P. S., (2024). Big data analytic capability and collaborative business culture on business innovation: the role of mediation and moderation effects. *Discover analytics*, 2(2). [Doi: 10.1007/s44257-024-00010-5](https://doi.org/10.1007/s44257-024-00010-5)
- Ledro, C., Nosella, A., Vinelli, A. (2022). Artificial intelligence in customer relationship management: literature review and future research directions. *Journal of business & industrial marketing*, 37(13), 48-63. [Doi: 10.1108/jbim-07-2021-0332](https://doi.org/10.1108/jbim-07-2021-0332).
- Lee, Y. & Kim, J. (2009). Family restaurant brand personality and its impact on customer's emotion, satisfaction, and brand loyalty. *Journal of hospitality & tourism research*, 33(3). [Doi: 10.1177/1096348009338511](https://doi.org/10.1177/1096348009338511)
- Mahmood, Q., Ahmed, R., Philbin, S., P., (2022). The moderating effect of big data analytics on green human resource management and organizational performance. *International journal of management science and engineering management*, 18(3), 177-189. [Doi: 10.1080/17509653.2022.2043197](https://doi.org/10.1080/17509653.2022.2043197)
- Mandina, S. P., Maravire, C. V., Masere, V. S. (2014). Effectiveness of corporate social responsibility in enhancing company image. *Journal of applied business and economic*, 16(3), 152-170. Retrieved from https://na-businesspress.homestead.com/JABE/MandinaSP_We_b16_3.pdf
- Mazzei, M. J. & Noble, D. (2020). Big data strategy: Theoretical foundations and new opportunities. *IntechOpen*. [Doi: 10.5772/intechopen.84819](https://doi.org/10.5772/intechopen.84819).
- Perez-Vega, R., Garnelo-Gomez, I., Baxter, K., Histon, W., Mazzoli, I., Sanchez-Razo, M., (2025). Setting the sustainability agenda: The impact of luxury brands' SDG-related tweets on consumer engagement. *International journal of consumer studies*. <https://doi.org/10.1111/ijcs.70098>
- Porter, M. E., & Kramer, M. R. (2006). Strategy and society: The link between competitive advantage and corporate social responsibility. *Harvard Business Review*, 84, 78-92.
- Pugna, I. B., Dutescu, A., Stanila O. G. (2019). Corporate attitudes towards big data and its impact on performance management: A qualitative study. *Sustainability*, 11, 684. [Doi: 10.3390/su11030684](https://doi.org/10.3390/su11030684)
- Suherlan, S. & Okombo, M. O. (2023). Technological innovation in marketing and its effect on consumer behaviour. *Technology and society perspectives (TACIT)*, 1(2), 94-103. [Doi: 10.61100/tacit.v1i2.57](https://doi.org/10.61100/tacit.v1i2.57)
- Tang B. (2012). Contemporary Corporate Social Responsibility (CSR) in China: A Case Study of a Chinese Compliant. *Moral Cents*, 1(2). Retrieved from <https://sevenpillarsinstitute.org/wp-content/uploads/2017/11/Corporate-Social-Responsibility-in-China-EDITED-1.pdf>
- Tannady, H., Sjahrudin, H., Saleh, I., Renwarin, J. M. J., Nuryana, A. (2022). Role of product innovation and brand image toward customer interest and its implication on electronic products purchase decision. *Widyakala Journal*, 9(2), 93-98. [Doi: 10.36262/widyakala.v9i2.602](https://doi.org/10.36262/widyakala.v9i2.602)
- Tran, M. A., Nguyen, B., Melewar, T. C., Bodoh, J. (2015). Exploring the corporate image formation

- process. Qualitative market research, 18(1), 86-114. [Doi: 10.1108/QMR-05-2014-0046](https://doi.org/10.1108/QMR-05-2014-0046)
- Usercentrics. (2024). Future of Data in Marketing. Retrieved from <https://usercentrics.com/guides/future-of-data-in-marketing/big-data-marketing/>
- Verhoef, P. C., Reinartz, W. J., Krafft, M. (2000). Customer engagement as a new perspective in customer management. Journal of service research, 13(3), 247-252. [Doi: 10.1177/1094670510375461](https://doi.org/10.1177/1094670510375461)
- Virvilaite, R. & Daubaraite, U. (2011). Corporate social responsibility in forming corporate image. Inzinerine Ekonomika-Engineering Economics, 22(5), 534-543. [Doi: 10.5755/j01.ee.22.5.972](https://doi.org/10.5755/j01.ee.22.5.972)
- Vivek, S. D., Beatty, S. E., Morgan, R. M. (2012). Customer engagement: Exploring customer relationships beyond purchase. Journal of marketing theory and practice, 20(2), 127-145. [Doi: 10.2753/MTP1069-6679200201](https://doi.org/10.2753/MTP1069-6679200201)
- Yu, W. & Hu, H. (2014). Corporate Social Responsibility in Asia. CSR, Sustainability, Ethics & Governance. Springer, Cham, 3-18. [Doi: 10.1007/978-3-319-01532-3_1](https://doi.org/10.1007/978-3-319-01532-3_1)
- [1] Through Blockchain Exploratory Study.
- [2]