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The role of blockchain technology in enhancing digital marketing practices: An analytical study of the opinions of some virtual store customers in the qi services application

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Abstract
With the digitization of marketing, most influencer marketing activities are now conducted on social media platforms such as Facebook, Instagram, and Twitter. However, despite the increasing use of these platforms, studies on this subject remain scarce. Digital marketing relies on data, trust, and efficiency, yet it faces persistent challenges such as ad fraud, data breaches, and a lack of transparency. Blockchain technology offers a solution to these issues by establishing a secure, transparent, and efficient digital ecosystem. This study proposed a theoretical framework by leveraging relevant literature to achieve its research objectives. Using a descriptive-analytical approach, the opinions of 278 customers shopping from Qi application stores were analyzed. Data were collected through an online survey questionnaire designed via Google Forms. Various statistical methods were applied using Smart PLS 4 software to assess the data and examine the hypotheses. The findings indicated two significant impacts of blockchain technology and its dimensions on digital marketing. Consequently, a series of recommendations were proposed, including enhancing the design of store interfaces, increasing privacy and security through end-to-end encryption, and implementing instant alerts for any suspicious activity.

Keywords: Blockchain technology, digital marketing, influencer marketing, social media, data security, transparency, smart PLS 4

Introduction

The concept of blockchain technology first emerged in 1991 when researchers Haber and Scott introduced computational solutions to timestamp digital documents, preventing unauthorized access or modifications. The implementation of the Merkle tree design during 1992 allowed for spreading all documents under one block which boosted operational speed. The technology became obsolete while the patent for its design expired in 2003 which was four years before Bitcoin gained popularity.

The evolution of digital marketing faces ongoing challenges including data privacy risks and performance measurement doubts and poor targeting accuracy and insufficient personalization. The decentralized secure and transparent characterizations of blockchain technology have emerged to solve these problems. The research by Li and Patel (2022) [24] examined how blockchain improves digital marketing transparency as well as trust levels. The decentralized operations of blockchain combined with smart contracts enable transparent interactions between businesses and customers which leads to trust development and long-term customer loyalty according to their research.

Many scholarly works investigate both strengths and obstacles that occur when implementing blockchain within consumer-oriented marketing frameworks. The developers Jones and Patel (2023) [18] examined blockchain adoption regulations in digital marketing along with related legal aspects before presenting a framework to address these challenges. The research by Lee *et al.* (2022) [24] examined scalability issues and provided two solutions including sharding protocols in combination with off-chain mechanisms to solve the problem.

The growth of digitalization throughout different industries led marketing to shift from traditional methods to digital platforms which requires detailed evaluation of blockchain integration in marketing.

The integration seeks to address security challenges that face digital marketing during the future.

Literature review and Research Hypotheses

Literature review: The research by Nusir (2024) [31] investigated blockchain applications for digital advertising through its fundamental elements of decentralization, immutability and transparency. The key features of blockchain technology enhance digital advertising operations while rebuilding confidence between all parties involved.

The blockchain platform AdChain performs authentication of advertisement views while removing deceptive traffic as described by Johnson and Smith (2021) [40]. The solutions offer dual protection for budgeted marketing funds while building better brand-consumer trust relationships. Business entities can establish a unified framework for fraud detection through blockchain by working together with advertiser's publishers and verification providers. A decentralized operational structure enhances digital marketing integrity through its implementation.

The built-in security attributes of blockchain technology protect data from breaches and provide complete data handling accountability according to Martínez-López *et al.* (2020) [29]. Companies that merge blockchain operations can act proactively to protect data privacy which builds better trust with their customers.

According to Gupta and Ramlakan (2025) [34], researchers studied consumer behaviors and attitudes while focusing on the substantial impact of ongoing online community involvement on shopping decisions. Secure marketing practices along with positive language create trust which leads to positive online attitudes among customers.

Nusir (2024) [31] demonstrates how blockchain enhances the transparency levels and builds trust between entities involved in programmatic advertising. Through blockchain adoption NYIAX has established a system which improves transparency and reaches an improved transparency and trust measure by lowering ad fraud by 35% and boosting ad viewability by 25%. The combined structure helps advertisers maximize their budgets to protect advertising quality at all times. The decentralized approach of blockchain lets marketers provide customized material to users while preserving their privacy through distributed data storage systems.

Studying by Arab (2023) confirms that blockchain technology effectively combines individual-style services with confidentiality protections. Through Civic users gain control over their data while they can choose to share parts of it with marketers who offer rewards as compensation. Organizations following this approach meet GDPR requirements which boosts both trust from users and engagement levels by 32%.

In their research Kindiy and Oklander (2023) [22] studied how blockchain technology enhances marketing approaches by implementing clear procedures. The blockchain technology proves sustainability claims in marketing initiatives so consumers can validate brand messaging. Through this trust-building mechanism brands can stand out in competitive markets thus improving customer loyalty.

Jaoude and Saade (2017) [16] investigated different elements that determine business application consumer acceptance of blockchain technology. The research analyzed fundamental components which exist in technology acceptance models particularly perceived usefulness combined with reputation and perceived transactions and technological risks. The research established that reputation and risks as well as benefits and transactions act as determinants of blockchain adoption. The study proposed three recommendations for improving consumer trust in blockchain technology which include future research development of quantitative assessment models and identification of user perceptions toward specific adoption factors.

Tan *et al.* (2023) [52] prove that loyalty programs based on blockchain technology enhance consumer experiences through both flexible solutions and transparent operations. The new innovation simplifies operational challenges in business operations which leads to more affordable loyalty programs.

Data collection and verification functions of blockchain enable improved targeting accuracy at a 40% enhancement according to Mahmoud *et al.* (2023) [28]. Users through Datawallet systems secure the sale of their personal information to marketers while reducing the number of intermediaries through more precise reporting. Through its operation blockchain technology minimizes operational expenses together with improved marketing campaign performance which leads to superior return on investment (ROI).

The research by Chotisarn and Phuthong (2025) [8] studied how blockchain technology affects marketing analytics data which led to enhanced data accuracy by 28%. Business professionals obtain performance-enhancing insights from Blockgraph to maximize their marketing return on investment.

Research Framework and Hypotheses

Based on the reviewed literature, the identified research problem, and the study's key questions, the research hypotheses can be formulated as follows:

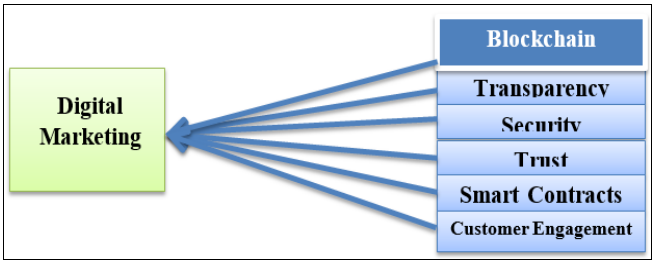


Fig 1: The Hypothetical Framework of the Study

The following sub-hypotheses demonstrate that Blockchain technology produces a statistically significant impact on digital marketing according to H1:

H1: There is a statistically significant impact of Transparency on digital marketing.

$H1_1$: There is a statistically significant impact of Security on digital marketing.

$H1_2$: There is a statistically significant impact of Trust on digital marketing.

$H1_3$: There is a statistically significant impact of Smart Contracts on digital marketing.

$H1_4$: There is a statistically significant impact of Customer Engagement on digital marketing.

$H1_5$: There is a statistically significant impact of the combined Blockchain dimensions on digital marketing.

Methodology

Research Problem

In the current context of globalization and digitalization, the role of marketing is no longer limited to merely delivering goods from producers to consumers. It has expanded to encompass all activities related to virtual markets and electronic marketing practices. To maintain its pioneering role, marketing must adapt, requiring companies to commit to the goal of sustainability and strive to create a loyal customer base.

In the midst of the digital revolution within the local environment (with Iraq as a model) and the introduction of electronic payment and shopping mechanisms through MasterCard, QiCard, and similar services, along with the emergence of applications for these cards and the proliferation of marketing stores, the researcher has observed various reactions on social media platforms such as TikTok, Instagram, and Facebook. These reactions often reflect negative impressions, which can be summarized as follows:

1. Some stores charge customers a commission for purchasing top-up cards for Asiacell and Zain Iraq lines.
2. The hotline or customer service line designated for complaints responds slowly.
3. Financial security concerns, as payment notifications are delayed, causing anxiety for customers.
4. Privacy and confidentiality issues, as some stores request personal information from customers.
5. Certain stores activated within the QiCard application lack a diverse shopping cart and present difficulties in virtual navigation through different sections of the store.

All these factors prompted the researcher to select the current study title, focusing on the utilization of Blockchain technology to enhance digital marketing practices in Qi application stores.

Based on this context, the primary research question can be formulated as follows

What is the impact of Blockchain technology on enhancing digital marketing practices?

Study Objectives

1. To determine the extent of Blockchain technology's impact on digital marketing.
2. Provide suggestions to improve the digital marketing experience in the researched stores.

Description of the researched sample

The questionnaire forms were distributed to a sample of 300 customers who shop from virtual stores through (Qi-Card Services Application). The questionnaire was distributed in the form of an electronic link through (Google Form). The response rate was 93%, meaning that the number of respondents to the questionnaire reached 278 customers.

Concept of Blockchain Technology

The term Blockchain first appeared in a research paper published by Satoshi Nakamoto, which introduced a shared database design involving millions of interconnected computers via the World Wide Web. This decentralized system is not controlled by any single entity, individual, or company, making it (theoretically) immune to domination or manipulation of transactions (UNCTAD, 2021, p. 2) [49].

The origins of this technology can be traced back to a few fundamental elements: blocks, transaction data, timestamps, and the hash value of the previous block. These components form the foundation of software systems initially developed for the cryptocurrency Bitcoin (Fahmideh, 2022, p. 3) [12].

The technology derives its name from its structure a chain of interconnected blocks (Salman, 2022, p. 1365) [37]. The name is said to be inspired by natural architectural engineering, where blocks are sequentially recorded and linked as groups, forming a cryptographically protected chain (Alkhateeb, 2021, p. 216; Jumaa, 2023, p. 206) [4, 53].

Satoshi Nakamoto defined Blockchain technology as an electronic cash equivalent that enables direct online payments between parties without the need for a financial institution (UNCTAD, 2021, p. 2) [49].

On the other hand, Kamal and Ghani (2022, p. 129) [14] described it as an electronic recording system for processing and documenting transactions, allowing all parties to track information through a secure network.

Blockchain technology can be viewed as a decentralized, encrypted, and distributed database where every completed transaction is recorded and made accessible to all network members (Ali, 2022, p. 23) [3]. It consists of a series of blocks containing a comprehensive list of transaction records (Zheng *et al.*, 2018, p. 355) [51].

Blockchain plays a crucial role in various commercial and social interactions due to its transparency, security, and performance enhancement (Frizzo, 2020, p. 3) [13]. In a blockchain system, each data block is identified by a cryptographic hash function and interacts with other blocks, forming a data chain (Bahga, 2016, p. 550) [5].

According to Ali (2022, p. 28) [3], blockchain data is divided into two categories

- Public: Anyone can read all ongoing transactions and participate in the network, contributing to maintaining the ledger.
- Private: Information and network protection are restricted to a predefined group of known participants, often used in institutions requiring immutable transactions that can only be verified by a limited number of node subscribers.

Accordingly, Blockchain technology reduces the role of intermediaries, who may cause disruptions, breaches, and fraud. When Blockchain is utilized, trust in the network and its operations increases (Wang, 2019, p. 213) [50].

This technology enables the creation and transfer of digital assets with high confidence. Another notable feature is the smart contract unit, which stores negotiation terms and verifies outcomes based on agreed conditions. This reduces the role of intermediaries and enhances transaction and interaction transparency (Saberi, 2019, p. 239) [36].

Dimensions of Blockchain Technology

According to Ikarni and Prasanna (2023, p. 663), the key dimensions of Blockchain technology are as follows:

1. Transparency: Stakeholder understanding of product information extends to complete access which remains free from all forms of impairment during the information-sharing process (Sunny, 2020, p. 1) [42]. Through blockchain technology companies obtain transparent data storage solutions which allow them to

monitor all transactions and data efficiently. The high degree of transparency enables businesses to create trustworthy customer relationships because they can handle information with transparency and reliability (Ikarni & Prasanna, 2023, p. 663).

2. Security: The security infrastructure in Blockchain technology protects network systems through protective measures that prevent unauthorized alterations and breaches. The technology implements encryption together with digital signatures and participant consensus to work. The approval system for ledger changes by a majority of participants operates in this technology to reduce manipulation risks while ensuring data reliability (Jiang *et al.*, 2020, p. 2) [25]. Data protection through cryptographic algorithms safeguards Blockchain because of its decentralized structure. Creative security measures because of Blockchain technology enable communication companies to build stronger customer trust while simultaneously minimizing fraud vulnerabilities (Ikarni & Prasanna, 2023, p. 664).

Trust: The ability to depend on Blockchain technology for protected and clear data exchange represents Trust in Blockchain while encryption together with decentralization and ongoing verification enable this capability. The technology implements features that decrease intermediary dependence and maintain both enhanced transparency as well as security (Nakamoto, 2008, p. 1) [30]. Trust exists because public shared ledgers that cannot be easily modified operate with decentralization to enable collective data verification. As a result, a reliable environment for digital transactions is created. The data stored in Blockchain is immutable, which is why Blockchain earns trust. Thanks to its decentralized nature, Blockchain removes the need for intermediaries, fostering direct interaction between communication companies and their customers, which leads to building trust and improving business relationships (Nakamoto, 2008, p. 5) [30].

Smart Contracts: The term "smart contract" was coined by Nick Szabo in the mid-1990s, proposing the translation of contract terms into code and integrating them into software or hardware to make them self-executing. This approach was intended to reduce the cost of contracting between parties and avoid incidental exceptions or malicious actions during the contract's execution (Szabo, 1997, p. 176) [44].

Accordingly, a smart contract is an agreement that can be automated and executed, with some parts possibly requiring human input and control. It can be executed either through the legal enforcement of rights and obligations or through the execution of tamper-proof computer code (Clack, 2016, p. 8) [9]. Smart contracts in Blockchain allow agreements to be automatically and securely executed, facilitating marketing operations and ensuring that services are delivered according to the specified, accurate, and transparent terms (Ikarni & Prasanna, 2023, p. 663).

Seijas (2016, p. 8) [38] referred to the "smart contract" as a legal contract (or at least elements of it) that can be represented through software.

Customer Engagement: Customer engagement is based on enabling customers to directly interact with brands through secure and transparent platforms, thanks to the decentralized nature of the technology (Boukis, 2020, p. 2) [6]. Blockchain technology facilitates the secure sharing of data between communication companies and their customers, enhancing the customer experience and attracting them more effectively by offering innovative, trust-based solutions (Ikarni & Prasanna, 2023, p. 663).

Concept of Digital Marketing

Digital marketing is currently one of the most preferred forms of marketing by the general public, particularly among younger generations, due to its widespread attention and popularity. Marketers today use digital marketing as a foundation for promoting their products (Philip, 2021, p. 17) [32]. The term digital marketing refers to the integration of all interactive digital tools to assist marketers in promoting products, aiming to develop more direct and personal relationships with customers. It also allows for complete payment and withdrawal processes, and the concept of feedback is also fundamental in measuring the effectiveness of marketing, as it introduces the concept of response to stimulate marketing (Flores, 2014, p. 3) [54].

Dagga (2015, p. 738) [11] described digital marketing as an interactive marketing of goods and services using digital technologies to reach and retain customers.

Digital marketing can be seen as the use of digital technology, information, and communication to activate marketing tools in organizing marketing functions and activities in order to identify market needs and deliver services to the public (Al-Hamid, 2018, p. 83) [1]. It enhances products, services, and brands across electronic mediums such as the internet, social media, search engines, mobile devices, or other digital channels (Rob, 2013, p. 18). Digital marketing strategies can include a wide range of tactics such as search engine optimization (SEO), pay-per-click advertising (PPC), social media marketing, email marketing, content marketing, affiliate marketing, and others. The goal of digital marketing is to reach a target audience, engage with them, and guide them towards taking a specific action, such as making a purchase (Swami, 2023, p. 1) [43].

Based on the above, it is clear that digital marketing holds significant importance for organizations from several aspects. One key aspect is the future outlook due to the widespread reach of the global network, which increases the opportunities for replacing traditional marketing tools with digital ones. Additionally, customers' adaptation to and acceptance of these digital cultures is evident, along with organizations' expectations of digital work dominating markets in the coming years. Moreover, digital marketing allows customers to negotiate product specifications and prices, in addition to promoting and delivering those products to customers at the specified time and place. Digital marketing is characterized by lower promotional costs compared to traditional marketing. The more an organization can communicate effectively with customers, the greater its chances of attracting and retaining them (Kannan & Hongshuang, 2016, p. 17) [20].

Dimensions of Digital Marketing

Attraction: This dimension refers to how organizations attract customers using digital marketing methods and retain them (Diamond, 2019, p. 29) [10]. It highlights the positive relationship between customer attraction strategies and brand loyalty (Teo & Tan, 2002, p. 260) [47]. The process of customer attraction using social media platforms has become a vital aspect of commercial marketing to draw customers (John, 2017, p. 1) [55]. Therefore, marketers must face challenges and work effectively and economically on promotional activities and their effectiveness (Simmons,

2007, p. 547) [39].

Engagement: Engagement is the second phase of applying digital marketing, aiming to make customers actively participate and provide feedback on the services offered by the organization (Ghiselli & Ma, 2015, p. 256) [15]. To implement digital marketing, marketers must immerse customers in engagement and attention to achieve interaction with the services provided. Digital marketing applications should be inspiring and engaging in content to place the customer in a state of attention and interaction with these influences. This means mastering the creative programming of media and providing content of value to customers, which succeeds in engaging them and allowing them to interact with others who are similar to them, creating a useful and beneficial virtual community (Lui *et al.*, 2010, p. 314) [26].

Communication: Communication is one of the most important opportunities for creating value in digital marketing because it represents an opportunity to personalize the interaction between the service provided and the marketing time or effort for multiple customers at once. Social media allows marketers to learn more about a single customer through continuous interaction, offering any individual service, and reporting on any available individual service or new offers (Ghiselli & Ma, 2015, p. 254) [15]. This is done by communicating with them personally through one of the digital marketing methods, such as email, mobile phones, and other available social media platforms (Lunenburg, 2010, p. 2) [27].

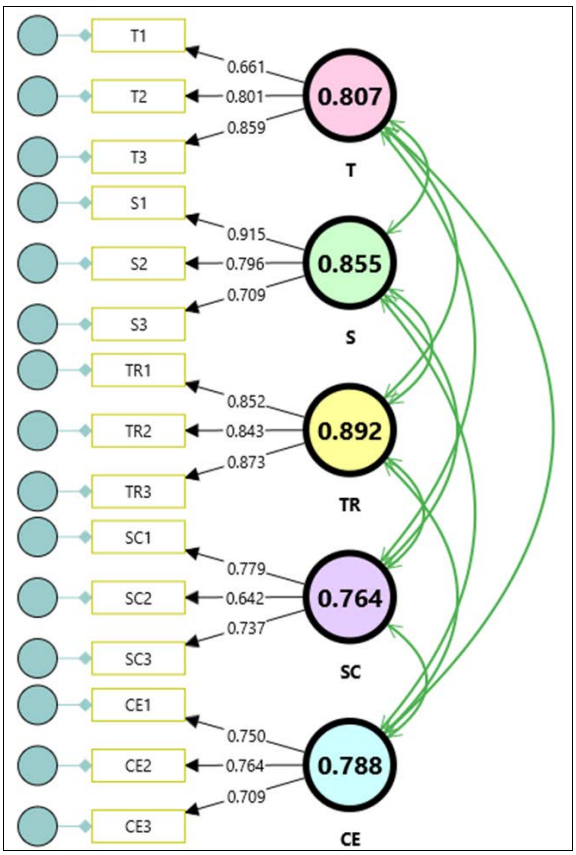
Empirical Results

The following table presents a coding for the variables and dimensions of the study

Table 1: Terminology for Variables and Dimensions of the Study

Study Variables	Code	Number of Survey Items
Transparency	T	3
Security	S	3
Trust	TR	3
Smart Contracts	SC	3
Customer Engagement	CE	3
Blockchain Technology	BCT	15
Acquisition	A	3
Immersion	I	3
Communication	C	3
Digital Marketing	DM	9

Evaluation of Measurement Quality: Blockchain Technology Model: Figure (2) illustrates the questions and dimensions of the Blockchain Technology model, which is composed of five key dimensions, with three questions per dimension. As shown in Table (2), the Composite Reliability (CR) values for the Blockchain Technology variable range between (0.892-0.762), which are within the acceptable limits, indicating good reliability and suggesting a high level of consistency in the measurement scale. Additionally, the Cronbach's Alpha values range between (0.892-0.764), all exceeding (0.70), which signifies high reliability. The results also show that the Average Variance Extracted (AVE) values for the Blockchain Technology variable are all acceptable, ranging between (0.733-0.521), which are greater than the threshold value of (0.50). This indicates that the sub-dimensions contribute significantly to explaining the total variance of the Blockchain Technology variable. Therefore, the model is considered more reliable in explaining the relationships between the variable's dimensions.



Source: Smart PLS 4 Program

Fig 2: Blockchain Technology Model

Table (2) shows the estimation values, which range between (0.915-0.642). It is evident that all survey items are significant. Additionally, the values of (t) range between (11.755- 7.183), which are also greater than the critical value of (t), which is (1.984). This is a sufficient indicator to rely on the final version of the model in subsequent analyses.

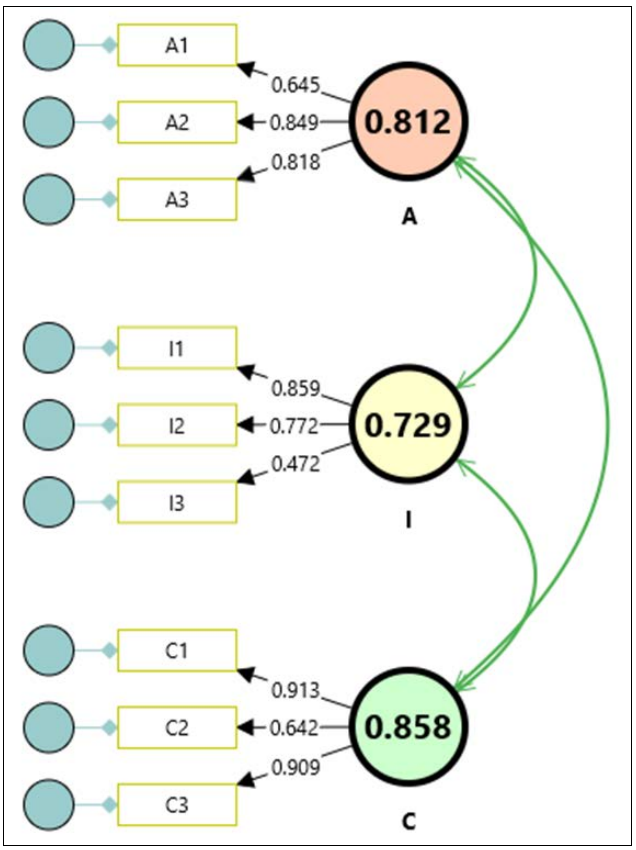
Table 2: Estimates for the Dimensions of the Blockchain Technology Variable

Survey Items	Estimate	T values	P values	Cronbach's alpha)	Composite reliability	(AVE)
CE1 <- CE	0.750	n/a	n/a	0.788	0.786	0.550
CE2 <- CE	0.764	7.621	0.000			
CE3 <- CE	0.709	7.375	0.000			
S1 <- S	0.915	n/a	n/a	0.855	0.849	0.658
S2 <- S	0.796	11.393	0.000			
S3 <- S	0.709	9.110	0.000			
SC1 <- SC	0.779	n/a	n/a	0.764	0.762	0.521
SC2 <- SC	0.642	7.183	0.000			
SC3 <- SC	0.737	8.025	0.000			
T1 <- T	0.661	n/a	n/a	0.807	0.814	0.605
T2 <- T	0.801	7.511	0.000			
T3 <- T	0.859	7.959	0.000			
TR1 <- TR	0.852	n/a	n/a	0.892	0.892	0.733
TR2 <- TR	0.843	11.344	0.000			
TR3 <- TR	0.873	11.755	0.000			

Source: Smart PLS.4 Program

Digital Marketing Model

It is evident from Figure (3), which represents the questions and dimensions of the digital marketing model that it consists of three main dimensions, with three questions for each dimension. According to Table (X), the CR values for the digital marketing variable are all within the acceptable limits, ranging between (0.873-0.749), which is a good indicator and suggests scale reliability. The results show high reliability for the dimensions of the digital marketing variable scale. Additionally, the Cronbach's alpha coefficient values range from (0.858-0.729), which is greater than (0.70), indicating high reliability as well. The results show that the Average Variance Extracted (AVE) values for the digital marketing variable are all acceptable, ranging between (0.691-0.519), which is greater than (0.50), indicating that the sub-dimensions contribute significantly to explaining the overall variance of the digital marketing variable. Therefore, the model is considered more reliable in explaining the relationships between the dimensions of the variable.



Source: Smart PLS.4 Program

Fig 3: Digital Marketing Model

Table (3) shows the estimation values, which range between (0.913-0.472). It is evident that all survey items are significant. Also, the t-values range between (11.737-4.721), which are also greater than the critical value of t, which is (1.984). This is a sufficient indicator to adopt the model in its final form for subsequent analyses.

Table 3: Estimations for the Dimensions of the Digital Marketing Variable

Survey Items	Estimate	T values	P values	Cronbach's alpha)	Composite reliability	(AVE)
A1 <- A	0.645	n/a	n/a	0.812	0.813	0.601
A2 <- A	0.849	7.404	0.000			
A3 <- A	0.818	6.987	0.000			
C1 <- C	0.913	n/a	n/a	0.858	0.873	0.691
C2 <- C	0.642	7.542	0.000			
C3 <- C	0.909	11.737	0.000			
I1 <- I	0.859	n/a	n/a	0.729	0.749	0.519
I2 <- I	0.772	9.421	0.000			
I3 <- I	0.472	4.721	0.000			

Source: Smart PLS.4 Program

Descriptive Analysis of the Research Variables

Blockchain Technology: It is observed from Table (4) that the highest general arithmetic mean was at the "Transparency" dimension, with a mean of (3.377), indicating a moderate level, and a standard deviation of (0.982), with a coefficient of variation (29.08). This dimension ranked third in terms of relative importance. On the other hand, the lowest general arithmetic mean was at the "Security" dimension, with a mean of (3.263), indicating a moderate level, and a standard deviation of (1.044), with a coefficient of variation (32.00). This dimension ranked fifth in terms of relative importance. Overall, the Blockchain Technology variable achieved a general arithmetic mean of (3.340), indicating a moderate level, with a standard deviation of (0.858) and a coefficient of variation (25.70), ranking second in terms of relative importance.

Digital Marketing

It is observed from Table (4) that the highest general arithmetic mean was at the "Communication" dimension, with a mean of (3.357), indicating a moderate level, and a standard deviation of (1.027), with a coefficient of variation (30.61). This dimension ranked third in terms of relative importance. On the other hand, the lowest general arithmetic mean was at the "Engagement" dimension, with a mean of (3.339), indicating a moderate level, and a standard deviation of (0.968), with a coefficient of variation (28.97). This dimension ranked second in terms of relative importance. Overall, the Digital Marketing variable achieved a general arithmetic mean of (3.350), indicating a moderate level, with a standard deviation of (0.817) and a coefficient of variation (24.38), and ranking first in terms of relative importance.

Table 4: Descriptive Statistics of the Research Variables and Dimensions.

Research Variables Dimensions	M	S	CV	Relative Importance
Transparency	3.377	0.982	29.08	3
Security	3.263	1.044	32.00	5
Trust	3.330	1.008	30.26	4
Smart Contracts	3.351	0.917	27.37	1
Customer Participation	3.377	0.936	27.72	2
Blockchain Technology	3.340	0.858	25.70	Second
Attraction	3.354	0.958	28.55	1
Engagement	3.339	0.968	28.97	2
Communication	3.357	1.027	30.61	3
Digital Marketing	3.350	0.817	24.38	First

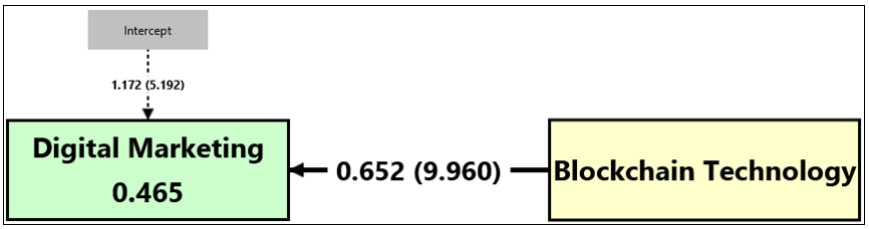
Source: SPSS V.28

Testing the Research Hypotheses: Testing Hypothesis H1: Which states that: (There is a significant effect of Blockchain technology on digital marketing)

It can be seen from Table (5) and Figure (4) that the extracted F value between Blockchain technology and digital marketing is (99.206), which is greater than the tabular F value of (3.94) at a significance level of (0.05). This result provides sufficient support for accepting the alternative hypothesis, which states that (there is a significant effect of Blockchain technology on digital marketing). This indicates that Blockchain technology has a significant effect on digital marketing, as Blockchain was able to explain (46%) of the variations in digital marketing. Additionally, the extracted t-value for Blockchain technology was (9.960), which is greater than the tabular t-value of (1.984) at a significance level of (0.05). This suggests the significance of (β) for Blockchain technology. The value of (β) indicates that an increase of one unit in Blockchain technology will lead to a (65%) increase in digital marketing.

Table 5: Analysis of the Effect of Blockchain Technology on Digital Marketing

Independent Variable			R	(R^2)	Adj(R^2)	(F)	(t)	Sig	Dependent Variable
Blockchain Technology	(α)	1.172	.6850	0.470	0.465	99.206	9.960	0.000	Digital Marketing
	(β)	0.652							



Source: Smart PLS.4 Software

Fig 4: Analysis of the Impact of Blockchain Technology on Digital Marketing

Testing Sub-Hypotheses ($H1_1$, $H1_2$, $H1_3$, $H1_4$, $H1_5$) the following can be observed from Table (6)

The extracted F-values between the dimensions of Blockchain Technology in digital marketing were (87.851, 57.722, 73.841, 63.516, 43. 308) respectively, all of which are greater than the tabulated F-value of (3.94) at the significance level of (0.05). Therefore, the decision is as shown in Table (6).

The correlation coefficient (R) recorded values of (0.663, 0.583, 0.630, 0.602, 0.528), indicating variation in the correlation values between the dimensions of Blockchain Technology and the digital marketing variable. The highest correlation value was found for the "Transparency" dimension at (66%), while the lowest correlation value was found for the "Customer Engagement" dimension at (52%).

Table 6: Sub-Hypotheses for the Impact of Blockchain Technology Dimensions on Digital Marketing

Hypothesis Code	Hypothesis	Decision
$H1_1$	There is a statistically significant effect of the transparency dimension on digital marketing.	The hypothesis is confirmed.
$H1_2$	There is a statistically significant effect of the security dimension on digital marketing.	The hypothesis is confirmed.
$H1_3$	There is a statistically significant effect of the trust dimension on digital marketing.	The hypothesis is confirmed.
$H1_4$	There is a statistically significant effect of the smart contracts dimension on digital marketing.	The hypothesis is confirmed.
$H1_5$	There is a statistically significant effect of the customer participation dimension on digital marketing.	The hypothesis is confirmed.
Number of accepted null hypotheses.		0
Number of accepted alternative hypotheses		5

The value of Adj (R2) achieved was (0.435, 0.334, 0.392, 0.356, 0.272), which indicates a variance in the interpretation of the Blockchain dimensions for the digital marketing variable. It is clear that the highest explanatory value was for the dimension of transparency, which explained 43% of the changes in the digital marketing variable. The lowest explanatory value was for the dimension of customer engagement, which explained 27% of the changes in the digital marketing variable.

The extracted value of (t) for the slope coefficient between the Blockchain dimensions in digital marketing was (9.373, 7.597, 8.593, 7.970, 6.581) respectively. These values are greater than the tabular value of (t) at (1.984) at a significance level of (0.05), indicating the statistical significance of the slope coefficients for the Blockchain dimensions.

The values of (β) for all dimensions were (0.551, 0.456, 0.511, 0.536, 0.461), respectively. This indicates a variance in the impact strength of the Blockchain dimensions on the digital marketing variable. The highest impact strength was for the dimension of transparency, where an increase in this dimension by one unit will lead to a 55% increase in the digital marketing variable. The lowest impact strength was for the dimension of security, where an increase in this dimension by one unit will lead to a 45% increase in the digital marketing variable.

Table 7: Analysis of the impact of Blockchain dimensions on digital marketing

	Dimensions of Blockchain Technology	A	B	R	R^2	Adj (R^2)	F	t	sig
Digital Marketing	Transparency	1.488	0.551	0.663	0.440	0.435	87.851	9.373	0.000
	Security	1.861	0.456	0.583	0.340	0.334	57.722	7.597	0.000
	Trust	1.649	0.511	0.630	0.397	0.392	73.841	8.593	0.000
	Smart Contracts	1.555	0.536	0.602	0.362	0.356	63.516	7.970	0.000
	Customer Engagement	1.794	0.461	0.528	0.279	0.272	43.308	6.581	0.000

Source: SPSS V.28 Program

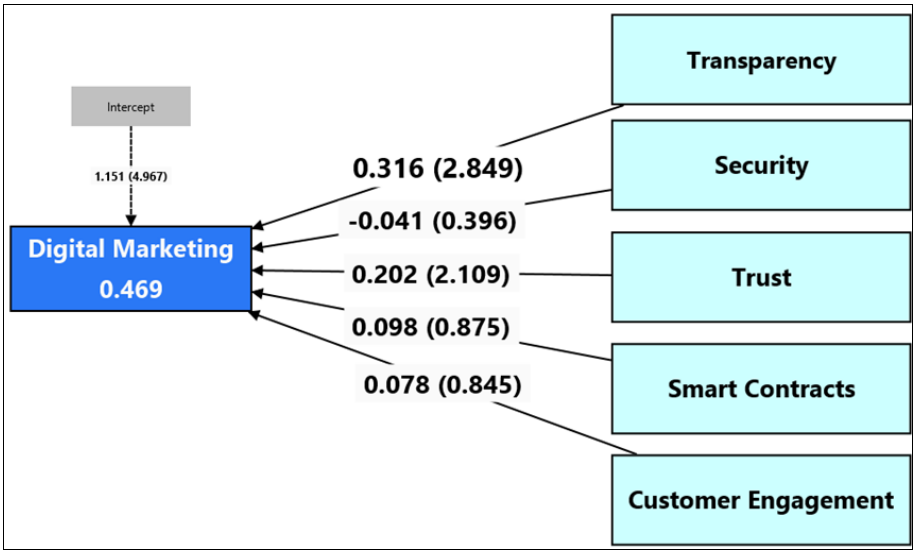
Multiple Impact Hypotheses Test

Table (8) and Figure (7) present the results of the impact analysis between the dimensions of Blockchain collectively in digital marketing. The extracted value of (F) was (20.932), indicating a significant effect between the dimensions of Blockchain together in digital marketing. It is evident from the value of (Adj R^2) that the combined dimensions of Blockchain were able to explain (46%) of the variations occurring in digital marketing. Moreover, the extracted (t) values of (2.849, 2.109) respectively are greater than the tabulated (t) value of (1.984), indicating that the effect of the parameters (β) for the dimensions of (transparency, trust) is significant. An increase in the effect by one unit will lead to an increase in digital marketing by (31%, 20%) respectively. However, the effects of the dimensions (security, smart contracts, customer engagement) showed no significant effect on digital marketing.

Table 8: Impact Analysis of the Combined Blockchain Dimensions in Digital Marketing

Dimensions of Blockchain Technology	(α)	(β)	(t)	Sig.	Multiple (R)	(R^2)	(R^2) Adj	(F)	Sig.
Transparency	1.151	0.316	2.849	0.005	.7020	.4920	.4690	20.932	0.000
Security		0.041-	0.396-	0.693					
Trust		0.202	2.109	0.037					
Smart Contracts		0.098	0.875	0.383					
Customer Engagement		.0780	.8450	.4000					
Tabular (F)					2.70				
Tabular (t)					1.984				
Number of accepted (influential) dimensions = 2									
Number of rejected (non-influential) dimensions = 3									

Source: SPSS V.28 software outputs



Source: Outputs from Smart PLS 4 software

Fig 7: Impact Analysis of Blockchain Dimensions Together in Digital Marketing

Conclusion

Blockchain technology is revolutionizing digital marketing by focusing on consumer behavior in the digital space through the security features offered by blockchain. By enabling secure data exchange, enhancing trust, and improving personalization, blockchain creates new opportunities for both brands and consumers.

Empirical evidence, supported by impact and regression analyses in this study, reveals a multifaceted strong impact, emphasizing the importance of blockchain dimensions in enhancing digital marketing practices. As adoption grows, integrating blockchain technology into marketing strategies will pave the way for a more efficient, ethical, and trustworthy advertising ecosystem in the virtual world.

The benefits of blockchain in digital marketing are significant, as it allows customers to have more control over their data, enabling personalized and targeted marketing strategies that enhance customer satisfaction. However, implementing blockchain in digital marketing may face challenges and limitations. Despite these, blockchain holds great promise for the future of digital marketing, particularly in enhancing the positive customer experience and fostering trust in digital consumer behavior.

As artificial intelligence continues to evolve, further research and exploration will be needed to fully understand the implications of blockchain and optimize its implementation in digital marketing. By adopting blockchain technology, we suggest that Qi Company improve the system of its virtual stores within the app by creating a more transparent, secure, and customer-focused marketing ecosystem. Additionally, enhancing the design of the store interfaces, increasing privacy and security through

complete encryption, and providing instant alerts for any suspicious activity could further improve the customer experience.

In conclusion, this study provides a valuable knowledge contribution on blockchain technology and digital marketing, by highlighting the critical role of blockchain technology and its dimensions and their impact on digital marketing within a new digital domain. By highlighting the crucial role of blockchain technology, its dimensions and their impact on digital marketing for a new digital field represented by the (Qi-Card) application, which is considered, according to the researcher's knowledge, the first digital field through which our current study was applied, Furthermore, the findings of the study enrich existing theories and emphasize that virtual stores must seriously implement blockchain dimensions in order to survive and compete in the digital world, especially in light of the growing global interest in artificial intelligence technologies.

Reference

1. Abdel Hamid S. New methods in advertising. Giza, Egypt: Atlas for Publishing and Distribution; 2018.
2. Acceptance. The International Journal of Business Management.
3. Ali MG. Blockchain-based distributed database management technology. Muthanna J Pure Sci (MJPS). 2022;9(2).
4. Alkhateeb YM. Blockchain implications in the management of patient complaints in healthcare. J Inf Secur. 2021;12:212-223.
5. Bahga A, Madisetti VK. Blockchain platform for industrial internet of things. J Softw Eng Appl. 2016;9(10):533-546.
6. Boukis A. Exploring the implications of blockchain technology for brand-consumer relationships: a future research agenda. J Prod Brand Manag. 2020;29(3):307-320.
7. Chen C, Wu J, Lin H, Chen W, Zheng Z. A secure and efficient blockchain-based data trading approach for internet of vehicles. IEEE Trans Veh Technol. 2019;68(9):9110-9121.
8. Chotisarn N, Phuthong T. Mapping the landscape of marketing technology: trends, theories and trajectories in ecosystem research. Cogent Bus Manag. 2025;12(1):2448608.
9. Clack CD. Smart contract templates: foundations, design landscape and research directions. arXiv preprint arXiv:1608.00771. 2016.
10. Diamond S. Digital marketing all-in-one. United States of America: John Wiley & Sons Inc; 2019.
11. Duggal K. Uncovering the best practices in digital marketing. Int J Sci Technol Manag. 2015;4(1):180-183.
12. Fahmideh M, Grundy J, Ahmed A, Shen J, Yan J, Mougouei D, *et al.* Software engineering for blockchain-based software systems: foundations, survey, and future directions. ACM Comput Surv. 2022;55(6):Article 110, pp.1-44.
13. Frizzo-Barker J, Chow-White PA, Adams PR, Mentanko J, Ha D, Green S. Blockchain as a disruptive technology for business: a systematic review. Int J Inf Manag. 2020;51:102029.
14. Ghani RF, Kamal ZA. A proposed authentication method for document in blockchain-based e-government system. Iraqi J Comput Commun Control Syst Eng. 2022;22(4).
15. Ghiselli R, Ma J. Restaurant social media usage in China: a study of industry practices & consumer preferences. World Hosp Tour Themes. 2015;7(3):251-265.
16. Jaoude JA, Saade R. Blockchain factors for consumer acceptance.
17. Rampton J. 10 effective strategies to leverage social media for new customers. 2017.
18. Jones T, Patel S. Regulatory considerations and legal implications of blockchain adoption in digital marketing. J Digit Bus. 2023;21(3):123-140.
19. Hassan JM, Chalak SA. Review study of e-voting system based on smart contracts using blockchain technology. Iraqi J Sci. 2023;64(4):2001-2022.
20. Kannan PK. Digital marketing: a framework, review and research agenda. Int J Res Mark. 2017;34(1):22-45.
21. Khan M. Impact of digital content marketing (DCM) on customers' online purchasing behavior. Oulu, Finland: University of Oulu, Department of Marketing, Oulu Business School; 2019.
22. Kindiy M, Oklander M. Digital technologies as drivers in marketing and logistics strategies changes. DSpace UzhNU. 2023.
23. Lee J, Kim S. Enhancing transparency and trust in digital marketing through blockchain technology. J Consum Behav. 2021;25(4):567-584.
24. Li Q, Johnson P, Patel R. Addressing scalability issues in blockchain implementation for digital marketing. Int J Blockchain Res. 2022;5(2):78-95.
25. Li X, Jiang P, Chen T, Luo X, Wen Q. A survey on the security of blockchain systems. Future Gener Comput Syst. 2020;107:841-853.
26. Lui V, Chong WK, Shafaghi M, Woollaston C. B2B E-marketplace: an E-marketing framework for B2B commerce. Mark Intell Plan. 2010;28(3).
27. Lunenburg FC. Communication: The process, barriers, and improving effectiveness. Sci Res Acad Publ. 2010;1(1):1-11.
28. Mahmoud AB, Kumar V, Berman A, Elhajjar S, Fuxman L. Knowledge, attitude, and practice towards blockchain potential for digital marketing: scale development and validation. Eur J Mark. 2025.
29. Martínez-López FJ, Anaya-Sánchez R, Fernández Giordano M, Lopez-Lopez D. Behind influencer marketing: key marketing decisions and their effects on followers' responses. J Mark Manag. 2020;36(7-8):579-607.
30. Nakamoto S. Bitcoin: a peer-to-peer electronic cash system. 2008.
31. Nusir OM. Fostering transparency and trust in digital advertising through a unified blockchain framework. Int J. 2024;5(12):2030-2036.
32. Philip K, Hermawan K, Iwan S. Marketing 5.0: Technology for humanity. 2021.
33. Rahman MS, Islam MA, Uddin MA, Stea G. A survey of blockchain-based IoT eHealthcare: applications, research issues, and challenges. Internet Things. 2022;19:100551.
34. Ramlakan AP, Gupta R. Quantum marketing and disruptive technologies: shaping customer purchase intentions through social media. In: Real-World Applications of Quantum Computers and Machine Intelligence. IGI Global Scientific Publishing; 2025. p.

277-320.
35. Stokes R. E-Marketing: the essential guide to marketing in a digital world. Quirk; 2013.
36. Saberi S, Cruz JM, Sarkis J, Nagurney A. A competitive multiperiod supply chain network model with freight carriers and green technology investment option. Eur J Oper Res. 2018;266(3):934-949.
37. Salman SA, Al-Janabi S, Sagheer AM. A review on e-voting based on blockchain models. Iraqi J Sci. 2022;63(3):1362-1375.
38. Seijas PL, Thompson S, McAdams D. Scripting smart contracts for distributed ledger technology. Cryptol ePrint Arch. 2016.
39. Simmons GJ. I-Branding: developing the internet as a branding tool. Mark Intell Plan. 2007;25(6).
40. Smith A, Johnson B, Davis C. The impact of digital transformation on managerial roles. J Manag Innov. 2021;42:57-78.
41. Stallone V, Wetzels M, Mahr D, Klaas M. Enhancing digital advertising with blockchain technology. J Interact Mark. 2024;59(1):76-98.
42. Sunny J, Undralla N, Pillai VM. Supply chain transparency through blockchain-based traceability: an overview with demonstration. Comput Ind Eng. 2020;150:106895.
43. Swami YK. Why every business needs a digital marketing strategy. Int J Multidiscip Res. 2023;5(1).
44. Szabo N. Formalizing and securing relationships on public networks. First Monday. 1997;2(9).
45. Tan KC, Yu Q, Heng CM, Lee TH. Evolutionary computing for knowledge discovery in medical diagnosis. Artif Intell Med. 2003;27(2):129-154.
46. Tan KC, Yu Q, Heng CM, Lee TH. Evolutionary computing for knowledge discovery in medical diagnosis. Artif Intell Med. 2003;27(2):129-154.
47. Teo TSH, Tan JS. Senior executives' perceptions of business-to-consumer (B2C) online marketing strategies: the case of Singapore. Internet Res Electron Netw Appl Policy. 2002;12(3):258-275.
48. Teo TSH. Usage and effectiveness of online marketing tools among business-to-consumer (B2C) firms in Singapore. Int J Inf Manag. 2005;25:203-213.
49. UNCTAD. Harnessing blockchain for sustainable development - prospects and challenges: issues paper. Geneva, Switzerland; 2021.
50. Wang Y, Singgih M, Wang J, Rit M. Making sense of blockchain technology: how will it transform supply chains? Int J Prod Econ. 2019;211:221-236.
51. Zheng Z, Xie S, Dai HN, Chen X, Wang H. Blockchain challenges and opportunities: a survey. Int J Web Grid Serv. 2018;14(4):352-375.
52. Tan ST, Kwan AT, Rodríguez-Barraquer I, Singer BJ, Park HJ, Lewnard JA, Sears D, Lo NC. Infectiousness of SARS-CoV-2 breakthrough infections and reinfections during the Omicron wave. Nature Medicine. 2023 Feb;29(2):358-365.
53. Jumaa SS. Studying Electricity Load Forecasting and Optimizing User Benefits with Smart Metering. Journal of Applied Data Sciences. 2023 Dec 11;4(4):490-503.
54. Flores R. Observando observadores: una introducción a las técnicas cualitativas de investigación social. Ediciones UC; 2014 Oct 13.
55. John NA. The age of sharing. John Wiley & Sons; 2017 Sep 5.