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AI Integration and Digital Communication: The Cognitive Power of Brand Equity in the Jordanian Banking Industry

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Abstract: This paper investigates how brand equity mediates the association between digital marketing communication and the adoption of AI technologies by consumers in the banking industry in Jordan. A self-administered online questionnaire was used to collect data on 203 bank customers. Partial least squares structural equation modeling (PLS-SEM) was used to assess the effects of six latent constructs. The results show that brand equity mediates the effects of digital marketing channels, i.e., email marketing (EM), online advertising (OA), and mobile marketing (MM) on AI adoption in the financial services industry. The difference was statistically significant ($b = 0.113$, $t = 3.195$, $p = 0.001$; $b = 0.064$, $t = 2.318$, $p = 0.028$; $b = 0.054$, $t = 2.412$, $p = 0.018$). These findings indicate that brand equity is a strategic factor in enhancing the effectiveness of digital marketing and promoting the adoption of AI. The research has provided a contribution not only to theory but also to practice, especially in emerging markets like Jordan. It implies that, with the help of brand equity, the banks can maximize digital transformation strategies and increase customer engagement through AI-based financial services.

Keywords: digital communication, artificial intelligence (AI), digital marketing, brand equity, applications in finance, banking sector

1. Introduction

The advancement in technology is continuing at a dizzying pace, and it has brought numerous changes to contemporary society, affecting both business and people. Technology has been considered one of the greatest economic stimulants in the 21st century. Automation, robotics, Artificial Intelligence (AI), and Business Intelligence (BI) are innovative technologies that have transformed how businesses are conducted, making them more productive, efficient, profitable, and better at making decisions. Closely related to this is the combination of AI and BI, which helps organize data, recognize important trends in the market, and make sound decisions to gain a competitive advantage [1–3].

This leads us to the financial sector, where AI has the status of a revolutionary and transformative tool for companies, customers, and revenues alike. Today, the globalized financial institutions are using AI to cut costs, increase the speed of operations, and enhance customer relations [4–6]. Likewise, BI helps firms manage and analyze data in a way that improves productivity within the organization and makes new opportunities in the marketplace visible. In essence, these technologies are rapidly changing the face of banking.

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Recently, the Jordanian government has become a strong supporter of AI implementation, especially in the governmental and financial sectors, to improve services, boost innovation, and achieve economic advantages. In this regard, Jordan seeks to develop the country into a regional AI hub for research, innovation, and the application of AI in the financial, transport, and telecommunication sectors [7]. However, to fill this gap in knowledge, there is still a demand for further research on what drives the adoption of AI, especially in relation to consumers and the importance of marketing. In a similar vein, prior literature has established the effects of using digital marketing tools in influencing consumers' buying behavior, with such findings receiving attention, especially within the financial services sector. As highlighted by Khatri [8] and Upadhyay et al. [9], digital marketing media such as email marketing, social media marketing, and others influence consumers' tendency toward adoption of artificial intelligence technologies. Additionally, brand equity also has a significant impact on consumer perception and choice of brand. Furthermore, the concept of brand equity has been observed to significantly affect consumer decision-making and brand perception, which, in turn, increases adoption rates among clients, as noted by Brunner et al. [10]. According to Ebrahim [11], digital marketing communication channels also improve brand equity, thus changing consumers' behavior.

This study will address these gaps and show how brand equity affects how people process information from digital marketing and their

willingness to adopt internet technology (IT) solutions, particularly AI applications, in the Jordanian banking sector. Hence, it offers recommendations for effective use of digital marketing strategies that can help build brand equity and promote AI in an emerging market. Thus, the study findings contribute both theoretically and practically by enhancing our knowledge of the relationship between digital marketing, brand equity, and AI adoption behavior. Furthermore, the study offers practical implications to guide banking professionals in Jordan on how to assign resources effectively to digital marketing related to the artificial intelligence technologies in a way that increases brand association and equity. Through this analysis, the research contributes to enriching the literature on financial services in terms of AI adoption, not only by delivering theoretical understanding but also by providing practical suggestions for firms aiming to improve marketing performance using these technologies in emerging economies. This study ultimately emphasizes the importance of integrating digital marketing and brand equity strategies to fully leverage AI technologies, improve customer experiences, and support the dynamic relationship between brands and customers in a new era of digital marketing.

2. Literature Review

2.1. Digital marketing channels

Digital marketing now plays a vital role in Jordan, particularly in recent years. More often than not, marketers utilize this modern marketing approach to enhance the sales of products and services. The development of digital marketing has changed how businesses and organizations leverage digital technology and platforms, in particular for marketing [12, 13]. The effectiveness of digital marketing campaigns continues to grow as digital spending is increasingly incorporated into marketing strategies and lifecycles. This change is driven by consumers increasingly going digital, using digital devices instead of physical stores [14, 15].

Digital marketing includes electronic communications (such as tweets, websites, emails, and social networks) utilized by the marketers to successfully keep consumers informed about their products or services. Additionally, it involves the buying and selling of information, products, and services through computer networks [16]. Regardless of the strategies of promotion, such channels as email marketing, online advertising, social media, and mobile marketing can be employed to effectively target segments of customers and deliver the intended message.

2.2. Email marketing

Email marketing is a key digital marketing strategy, which involves sending promotional or personalized mail to the right customer at the right time. This approach allows companies to communicate according to the needs of their customers [17]. Email marketing, as an instrument of direct marketing, powers services or products to a specific customer niche [18]. It comprises all types of emails sent to potential or existing customers to deliver value through personal and relevant communications [19]. Email marketing is one of the key tools that allow businesses to effectively communicate their brand values [20]. Building on this, it also acts as a platform for consumer feedback in terms of preferences, opportunities, and needs for businesses [21]. To maximize its usage, businesses also utilize personalized emails to send successful promotional email messages. This customization, in addition to having the knowledge of customer preferences, makes advertisements online more desirable, which consequently increases engagement, which in turn improves outcomes [4]. However, too much reliance on large-scale campaigns may cause damage to trust.

2.3. Online advertising

The delivery of information through online advertisements greatly affects the purchasing behavior of customers because of its engaging content [22]. Through the internet, this technique targets website visitors while sending marketing content precisely to selected viewers [23]. A fundamental advantage of this technology is that it enables businesses to market their products past national boundaries [24]. Online advertising is one of the key digital marketing tools used by businesses to deliver specific advertising content to a variety of platforms to increase brand visibility and generate revenues [22]. Companies are able to easily update their product information using this method since it comes with flexible capabilities [25]. Businesses achieve customer loyalty through online advertising, which provides quick and efficient service for marketing various products and services [26]. The use of online advertising in Jordan has proven successful in influencing consumer shopping behavior, specifically among those who have positive attitudes toward this marketing approach. The system provides consistency of user interaction as it runs around the clock to maximize its advertising power.

2.4. Social media marketing

Through social media, businesses now have a strong platform to target different customers in different places. It includes using social media platforms to advertise a company and its products [27]. Social media marketing is an extension of online marketing, as it complements promotional efforts compounded, such as email newsletters and online advertising campaigns [28]. This approach drives the innovation behind the creation and enhancement of outreach channels for businesses. Social media analytics tools provided by Facebook, Twitter, LinkedIn, and YouTube are increasingly used by marketers to better understand the expressed behavior of people [29]. Social media brings real-time interactions between brands and consumers, enhancing engagement and encouraging brand loyalty [30]. Baber and Baber [31] emphasize that these platforms are built on the Web 2.0 paradigm, where users can create, share, and interact with content easily. It is a dynamic environment that allows businesses to connect to audiences effectively and develop long-term relationships.

2.5. Mobile marketing

Mobile marketing is an up-to-date and essential digital marketing channel. It is considered one of the fastest, most cost-expensive, and most current platforms to reach a consumer. By allowing users to access product information, search for details about product features, and make payments without physically visiting a store, mobile marketing offers significant convenience [32].

This marketing approach employs strategies that facilitate customers' personal and interactive engagement through mobile devices and networks [33]. Mobile marketing has become a vital and dynamic communication channel, driving business activities and enabling interactions with target audiences.

2.6. Consumers in Jordan

The online user adoption rate in Jordan is projected to grow to 92.5% by the year 2025. The advanced internet penetration of the country, combined with the increasing popular demand for its use, is increasing the demand for online services, particularly in the financial sector [34], Sheth et al. [35] define a consumer as an individual who buys goods or services for personal use, and a market is defined as a collection of consumers. Consumer buying behavior is the choice taken by individuals based on their likes and interests in buying, purchasing,

and using products. The never-ending efforts of marketing to customers in Jordan result in the growth of sales in this sector [36]. Businesses and online users receive improved opportunities to access the product and service information due to this trend, which has influenced their purchasing choices [31].

2.7. Brand equity

Brand value stems from customer interactions that create positive brand associations based on how customers perceive the products provided by the brand. Through the combination of these elements, companies can achieve their optimum competitive position, which is pricing, quality, packaging, market share, and profitability [37]. Brand equity is ranked by consumers according to key factors such as perceived quality, brand awareness, and customer loyalty, which have a direct impact on the decision to purchase [38]. Consumer preference is usually in favor of recognized brands when these products provide the customer with what they expect in terms of reliability and value [39].

Brand equity is mainly based on the recall and recognition of a given brand by consumers in various activities. Through the creation of brand knowledge among several consumer groups, a company expands its visibility and helps consumers gain confidence in their purchasing decisions [39]. Brand association is a supplement to brand awareness, such as the symbolic meaning, feelings, and experiences that relate to a brand [11]. Brand association is a supplement to brand awareness, including the symbolic meanings, emotions, and experiences concerning a brand. Brand associations that lead to trust in banking AI services and satisfaction in customer support build value for the brands by making clear market distinctions [31].

Empirical research proves the interrelatedness of the elements of brand equity. For example, positive associations with brands and high awareness may help expedite the adoption of AI technologies by consumers, especially in categories where people have reason to distrust, such as banking. Specifically, in the competitive landscape of Jordan, the sustainable use of AI by banks by tuning marketing strategies to brand equity-building initiatives, such as targeted marketing campaigns aimed at reliability and innovation, is better positioned to capitalize on the use of AI [4]. The relations between awareness, association, and quality are dynamic and important in emerging markets, where the consumers' trust serves as the prerequisite and the result of the technological integration [2]. This section relates theories to practices, showing the impact of brand equity on digital engagement and adoption of AI, which is a dominant theme of this study, especially when it comes to the banking sector in Jordan, as presented in the following section.

2.8. Intention to use artificial intelligence applications (online shopping)

AI refers to a combination of computational systems that resemble human cognitive functions to deliver effective and innovative inputs [40]. Nevertheless, conceptual roots were present in the 1950s, and their spread led to the emergence of AI through the use of more data, sophisticated algorithms, and enhanced computational capabilities [41]. AI cuts down the payment processes in e-commerce, provides recommendations with a personalized feel, making the recommendations look more like sales upselling, and makes price comparison tools possible to improve consumer experience with the help of chatbots and predictive analytics.

AI fintech innovations are helping facilitate seamless transactions as well as providing tailored services, like fraud detection and credit scoring systems, within Jordan's banking sector [42, 43]. Shopping intention here represents a consumer's willingness to use AI tools for transactional or informational tasks. The initial decision to embrace an AI-based system depends on three key aspects, namely benefit-driven features, privacy measures, and personal experience with AI-driven solutions [44–46]. As an illustration, AI customer service responsiveness, or personalized recommendations, may assist in building trust and greatly enhance user satisfaction, resulting in repeat customer interactions and promotion [22]. AI functions as a solution that unites human design with modern technology to improve economic gains and foster beneficial business operational shifts. The need for transparency in data practices arises among the unwilling adopters in the developing markets, which currently lack digital literacy, such as Jordan.

2.9. Critical synthesis and situational understanding

The literature review is developed, and it is stronger in situations when the results are not just described but also critically compared. Khatri [47] argued for the major role of email and social media marketing in consumer adoption of AI. In contrast, Upadhyay et al. [9] indicated the more entrepreneurial connotations of the digital tools and mentioned that their impact on the direct consumer behavior was limited. Likewise, Garanti and Kissi [48] highlighted the influence of social media as a source of brand equity in the banking industry. However, Nemati et al. [49] also revealed that advertising performance had more potential for consumer loyalty in the Islamic banking industry. This comparison shows that while the literature is extensive, it is inconsistent and sometimes contradictory.

As the above argument suggests, digital marketing is a set of tools designed to provide organizations oversight of major communication issues. At a border level, it reflects the type of digitalization provided by firms as a new framework within which companies compete. Given that, we are concerned with the strategic tools financial institutions use, this paper's focus is on digital marketing tools influence on AI adoption mediated by brand equity. Because of this, AI adoption is an increasingly important part of the strategic process. Financial institutions' values are more likely to increase. Additionally, effective use and direct-setting efforts by managers contribute positively to a bank's performance. At its core, AI adoption is concerned with identifying ways to ensure security (especially trust issues) are made effectively and that they facilitate a bank's efforts to achieve a competitive advantage. Previous studies (e.g., researches by Dwivedi et al. [31] and Flavián et al. [42]) show that financial institutions perform better when different security issues are met.

As noted earlier, data privacy is of concern to countries as well as to financial institutions. We consider the Jordanian financial market for data privacy and its relationship with digital marketing tools and brand equity as a lens for this study. The three forces, namely digital marketing, branding, and AI adoption, are emphasized in this study. Essentially, this paper focuses on the interaction of the above trinity in Jordan. In part, this shows the main gap of this research, which suggests that digitalization used in Jordan is slower than the level of digital literacy. Closing our argument, digital marketing tools are of consideration of the need for these mechanisms to encourage and support AI adoption in financial institutions.

3. Conceptual Framework and Development of Hypotheses

Drawing on the literature gaps recognized in prior studies, this research proposes a new conceptual model that focuses on the impact of digital marketing communication mediums, namely, email marketing, online advertising, mobile marketing, and social media, on the intentions to adopt AI within Jordan's banking industry. Key to this framework is the mediating variable of brand equity, which serves as the link between digital marketing and consumption of AI technologies. The following hypotheses are formulated based on the concepts and

constructs from the literature review of consumer behavior, digital marketing, and AI literature.

3.1. Direct effects of digital marketing channels on AI adoption intentions

H1: Email marketing has a positive impact on AI adoption intention.

This is because email marketing promotes personalized, timely, and relevant content within the consumer's context, thus enhancing consumer trust in AI-based services [50]. The individual communication aligned with the communication style will decrease the perceived risks and increase the willingness of consumers to use AI technologies [51]. For Jordanian banks, the perceived utilitarian benefits of AI segmented email campaigns will increase intentions to adopt AI.

H2: Online advertising has a positive impact on AI adoption intention.

Technological communication tools, such as the internet, offer a platform for increasing people's awareness of AI operations, such as chatbots and predictions. In essence, through the use of dynamic ad targeting based on user behavior [52], it is possible to capture the bank audience's attention and persistently remind them about the benefits of using AI to save time and protect money. Such targeted advertising with the bank in a highly competitive market in Jordan reduces the number of hurdles in decision-making and may therefore offer a better line of sight into the direction of usage.

H3: Mobile marketing has a positive impact on AI adoption intention.

Jordan has a high likelihood that its population uses smartphones; mobile marketing employs a remarkably effective means of marketing the AI-related services. Mobile messages, both in the form of text messages and application notifications, are effective in conveying time-sensitive messages related to location and solving key customer pain–such as security concern alerts during transactions. Thus, tackling such issues, mobile marketing aligns with the goals of promoting the utilization of AI-based technologies directly [44].

H4: Social media marketing has a positive impact on AI adoption intention.

Social network tools provide an opportunity to demonstrate the efficiency of AI technologies by sharing personal and other people's testimonials, presentations of the technologies in action, and success stories [30]. For example, platforms like Facebook help familiarize consumers with AI by sharing specific narratives, such as stories of the customers who have been assisted by the bank's chatbots, which eliminate fear and apprehension. Such feelings of community and transparency create a positive mood in the context of embracing AI.

3.2. Direct effects of digital marketing channels on brand equity

H5: Email marketing has a positive impact on brand equity.

Segmented emails enhance perceived brand credibility and customer confidence by meeting customer expectations [29]. Various applications, such as frequent updates on customer-oriented financial solutions or anti-fraud services, improve two key factors of brand equity: perceived quality and customer loyalty [53].

H6: Online advertising has a positive impact on brand equity.

The focus on AI boosts the reliability of brands by facilitating and improving the processes related to financial security. The use of animated stories on topics such as fraud reduction or enhanced customer experience shares positive impressions that set banks in Jordan's financial industry apart [54].

H7: Mobile marketing has a positive impact on brand equity.

An excellent solution to enhancing brand awareness and loyalty is a mobile marketing campaign advising people on the use of AI, including mobile banking, mobile alerts, or real-time customer support. The mobile environment is regarded as providing immediate and convenient interaction that resonates with and appeals to consumers [55]. It is also considered a platform enabled by AI tools that simplify transactions and improve the level of customer experience.

H8: Social media marketing has a positive impact on brand equity.

Social media's interactive nature facilitates real-time engagement, which allows banks to humanize their AI. Live Q&A sessions on AI services, such as credit scoring systems, help build consumers' trust and enhance an emotional impact. The result of these efforts is that a sense of transparency and community contributes to the rise of brand equity [31].

3.3. Mediating role of brand equity

H9: Brand equity has a positive impact on AI adoption intention.

The social media has such an inherent capability of live interaction and therefore is a powerful tool of real time one to one communication. This feature gives the financial institutions the capability of providing specific content to their customers. The importance of AI in this regard is that it has the potential to react immediately to questions, give credit facts and offer other tasks hence building stronger confidence between the banks and their customers. Finally, brand equity is the best channel for implementing this trust.

3.4. H10–H13: brand equity as a mediator

H10: Brand equity mediates the relationship between email marketing and adoption of AI.

H11: Brand equity mediates the relationship between online advertising and AI adoption.

H12: Brand equity mediates the relationship between mobile marketing and AI adoption intentions.

H13: Brand equity mediates the relationship between social media marketing AI adoption.

3.5. Theoretical basis for mediation

This results in a framework based on Baron and Kenny's [56] mediation criteria. Digital marketing channels (X) directly affect the AI adoption intentions (Y). Digital marketing channels help develop brand equity (M), X ➔ M. AI adoption intention is positively affected by brand equity (M ➔ Y).

This framework is built on previous literature. For instance, Singh and Manohar [57] confirmed that brand equity mediated the relationship between marketing strategies and purchase intentions, which is similar to this study's focus on AI adoption.

3.6. Summary of research hypotheses

H1: Email marketing has a positive impact on AI adoption intention.

H2: Online advertising has a positive impact on AI adoption intention.

H3: Mobile marketing has a positive impact on AI adoption intention.

H4: Social media marketing has a positive impact on AI adoption intention.

H5: Email marketing has a positive impact on brand equity.

H6: Online advertising has a positive impact on brand equity.

H7: Mobile marketing has a positive impact on brand equity.

H8: Social media marketing has a positive impact on brand equity.

H9: Brand equity has a positive impact on AI adoption intention.

H10: Email marketing has a positive impact on AI adoption intention.

H11: Online advertising has a positive impact on AI adoption intention.

H12: Mobile marketing has a positive impact on AI adoption intention.

H13: Social media marketing has a positive impact on AI adoption intention.

4. Conceptual Model

This framework positions brand equity as the link between digital marketing activities such as email, online advertising, mobile, and social media and the users' intentions to adopt AI. It is a good embodiment of the realities of emerging markets such as Jordan, where consumer confidence plays a pivotal role in addressing uncertainty about the adoption of new technologies. This framework points out the connections between digital involvement and brand equity as well as providing an overarching vision of embracing AI in the banking industry in Jordan.

Figure 1 shows the conceptual model of the research with brand equity as the mediator of the relationship between digital marketing channels (email marketing, online advertising, mobile marketing, and social media marketing) and the intention of consumers towards the adoption of AI applications.

Visual mapping of the hypothesized relationships is also done by having one directional arrow in the figure representing each of the hypotheses H1–H13. With this explicit labeling, readers (even those unfamiliar with the conventions of SEM) can just look at the whole model logic and relate the visual structure to the list of hypotheses.

5. Methodology

This research adopted a quantitative research methodology, consistent with the positivist paradigm (see article by Kaplan [58]), to thoroughly evaluate the suggested hypotheses. Structured questionnaires were administered targeting customers who either had bank accounts or used banking services. Subsequently, the hypotheses were analyzed through the use of the statistical software SmartPLS3. Earlier, it was clearly discussed that the main objective of this research was to establish the causal relationship of three major constructs, namely: digital marketing incorporating four dimensions (social media marketing, email marketing, online advertising, and mobile marketing), with the intent of adopting AI applications and brand equity.

In this study, a cross-sectional research design was used, enabling researchers to analyze participants' characteristics at a certain point in time. The quantitative method of data collection was a survey of a large population of respondents, which created an effective dataset to conduct statistical analysis. The data were collected from a targeted sample of customers of Jordanian banks using the random clustered sampling method.

Descriptive statistics followed by inferential ones were used to reveal the comprehensive results of this study. Researchers started with several techniques to clean, organize, and check the validity of the data; these techniques included normality, reliability, and dependability checks using SPSS software. Structural equation modeling (SEM) was used with Smart PLS3.

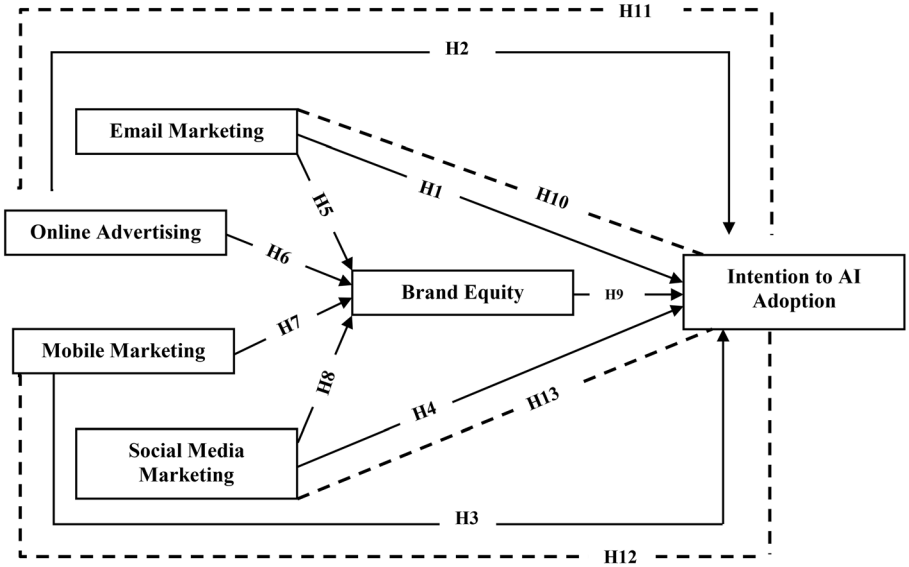
Before that, all the variables, their dimensions, and items were adopted from the literature. These were screened through validity and reliability filtration to ensure their precision and accuracy. The results received were reviewed and discussed to provide helpful conclusions for both researchers and managers.

6. Results

The respondents to the questionnaires were distributed through a specific channel of distribution, which yielded 230 satisfactory responses among the consumers, with a response rate of 81%. The study concluded with 210 valid responses, as twenty participants returned invalid questionnaires due to incomplete surveys. Further analysis was possible due to the adequate number of collected valid questionnaires, even after the reduction in responses.

Most of the valid responses were male (92%) compared to female (8%). The research asked respondents to indicate their current age through multiple-choice selection. The study revealed all participants were thirty years old or older. The participant age groups consisted

Figure 1
The conceptual framework of the study



of 7% within 30–39 years, 66% within 40–49 years, 17% within 50–59 years, and 10% aged 60 years or older. The survey data showed that married respondents made up 76% of the total group, whereas unmarried respondents represented 24% of the sample.

Out of the participants, 5% had a high school certificate, 11% were diploma holders, 56% were Bachelor's degree holders, 27% were Master's degree holders, and only 1% were Ph.D. holders. The research participants disclosed their years of professional experience across five categories: less than 5 years (13%), 6–10 years (19%), 11–15 years (28%), 16–20 years (29%), and 21 years or more (11%).

The median response was used to fill in the data gaps because they constituted a small percentage. The variable scores, ranging between −2.391 and 2.351, did not indicate any univariate outliers since they remained within the acceptable range of ±4. The distribution statistics for variables fell within the acceptable ranges of ±2 and ±7, with values recorded between −0.568 and 0.060 for skewness and −1.009 and −0.455 for kurtosis. Based on these statistical results, the research data aligned satisfactorily with a normal distribution.

An analysis of the unrotated factor variance for all sixty items revealed that a single general factor explained only 39% of the total variance. This finding indicates that common method bias did not significantly impact the study results. The statistics affirm that CMV did not have a significant impact on the results.

The study assessed central tendency through constructing mean levels, and these means had values above the midpoint of three. The average scores of most of the participants were above three, which means that they were above the average ratings. E-mail marketing achieved the highest mean score of 3.430, as data revealed 3.056 as the lowest mean score among all constructs for artificial intelligence applications in financial services. Table 1 below reveals the descriptive statistics for the study's variables.

6.1. Assessment of the measurement model

First-order construct measurements enabled the calculation of AVE and CR for second-order constructs based on Becker's methods [59]. This study analyzed six different variables, including mobile marketing, social media, email marketing, and internet advertising as individual components. The research analysis used brand equity as a mediating variable to examine artificial intelligence adoption in financial services.

Researchers run different assessments to determine the validity of variables' convergence. As advised by the literature (e.g., Hair et al. [60]), factor loadings should be checked against AVE evolution and CR. Metric calculations were used to generate an accurate measurement model that represented each theoretical concept.

6.2. Measurement model of CFA

To confirm that the relationships exist between items (indicators) of observed variables and factors (latent variables), Confirmatory Factor Analysis (CFA) was used. Hair et al. [60] suggest a benchmark of 0.70 or more for a good fit. Table 2 shows that all factor loadings were greater than this threshold. On the other hand, Hair et al. [60] recommend a threshold of 0.50 for construct validity. The data scores are high on this scale, as shown in Table 2. Composite reliability (CR), internal consistency (Cronbach's Alpha), and Average Variance Estimation (AVE) scored >0.90, >0.80, and >0.60, respectively. This suggests a good measure of fit for model [60].

6.3. Discriminant validity

To ensure that constructs are distinct from each other, the Heterotrait–Monotrait Ratio (HTMT) was used. The items of the different constructs had values less than 0.85, which demonstrates adequate discriminant validity [61]. Table 3 presents these results.

6.4. Assessment of the structural model

6.4.1. Direct effects of the variables

The researchers utilized Partial Least Squares (PLS) along with bootstrapping featuring 1000 replications to determine the structural model and verify research hypotheses. The assessment involved running five distinct tests to determine the R^2 value, F^2 value, Q^2 value, Goodness of Fit (GoF), and Variance Inflation Factor (VIF), as well as the *p*-values of the inner model [60].

The research tested the relationships between digital marketing approaches—EM, OA, SMM, and MM—as external variables and the endogenous variables UIBS and BE through structural model analysis (H1 to H8) as shown in Figure 2 and Table 4. Furthermore, the research identified a statistically significant relationship ($p < 0.05$, one-tailed) between BE and IAAI (H9).

The study results indicated EM significantly affects IAAI, as the *t*-value reached 4.969, the standardized beta (β)-value equaled 0.343, and the *p*-value was 0.000, thereby confirming H1 to be valid. Similarly, the research outcomes indicated that OA strongly affects IAAI, as the t-value reached 2.297, the β-value was 0.129, and the *p*-value equaled 0.002, thus confirming H2.

The results failed to support H3; instead, the relationship between SMM and IAAI was weak and statistically insignificant. The statistical values in H3 included a *t*-value of 2.032, a β-value of −0.095, and a *p*-value of 0.043. The analysis found a positive relationship between MM and IAAI where the *t*-value was 3.110, the β-value was 0.189, and the *p*-value 0.002, thus validating H4.

The analysis investigated the impact of digital marketing channels on brand equity (BE). The research results revealed that EMP has a statistically significant relationship with BE, with a *t*-value reaching 4.829, a β equal to 0.388, and a *p*-value amounting to 0.000, confirming the sixth hypothesis (H6) regarding the connection of OA to BE was supported by the analysis, showing a t-value of 3.274, a β = 0.223, and a *p*-value = 0.002. The study rejected the seventh hypothesis (H7) about SMM's influence on BE because the analysis illustrated a

Table 1
Results of descriptive statistic for variables

Constructs	Mean	Standard deviation	Minimum	Maximum
E-Mail Marketing (EM)	3.430	1.076	1.2	4.8
Online Advertising (OA)	3.374	1.223	1.2	5
Social Media Marketing (SMM))	3.271	0.961	1	5
Mobile Marketing (MM)	3.252	0.942	1.2	5
Brand Equity (BE)	3.120	0.693	1.8	4.5
Intention to Adopt Artificial Intelligence Applications (IAAI)	3.056	0.818	1.3	4.8

Table 2
Convergent validity results for the model

Construct/First order	Item	Factor loading	CR	AVE	Cronbach's alpha
E-Mail Marketing	EM 1	0.889	0.947	0.780	0.930
	EM 2	0.875			
	EM 3	0.867			
	EM 4	0.873			
	EM 5	0.912			
Online Advertising	OA 1	0.854	0.923	0.705	0.895
	OA 2	0.853			
	OA 3	0.833			
	OA 4	0.827			
	OA 5	0.832			
Social Media Marketing	SMM 1	0.873	0.946	0.778	0.957
	SMM 2	0.953			
	SMM 3	0.838			
	SMM 4	0.788			
	SMM 5	0.948			
Mobile Marketing	MM 1	0.806	0.918	0.692	0.889
	MM 2	0.840			
	MM 3	0.854			
	MM 4	0.839			
	MM 5	0.819			
Brand Equity	BE 1	0.839	0.904	0.702	0.858
	BE 2	0.870			
	BE 3	0.847			
	BE 4	0.792			
	BE 5	0.853	0.909	0.714	0.866
	BE 6	0.860			
	BE 7	0.867			
	BE 8	0.797			
	BE 9	0.839	0.901	0.695	0.854
	BE 10	0.856			
	BE 11	0.840			
	BE 12	0.798			
	BE 13	0.806	0.872	0.630	0.803
	BE 14	0.825			
Intention to Adopt Artificial Intelligence Applications	IAAI 1	0.835	0.923	0.750	0.889
	IAAI 2	0.884			
	IAAI 3	0.890			
	IAAI 4	0.855			

weak negative relationship with a t-value of 2.652, a β of −0.167, and a p-value of 0.008. Conversely, the study established that MM relates to BE, as backed by H8, with a t-value of 2.573, $\beta = 0.185$, and a p-value = 0.003.

The association between BE and IAAI, as quantified in H9, was supported, with a t-value of 4.473, a $\beta = 0.295$, and a p-value = 0.001. The study findings determine that BE has a significant positive relationship with IAAI. Generally, all hypotheses regarding direct effects (H1, H2, H4, H5, H6, H8, H9) received statistical support from the research, while hypotheses H3 and H7 failed to gain backing from the data.

6.4.2. Analysis of the mediating effects of brand equity

The study examined how different variables affect each through brand equity as a mediator, based on the method suggested by Preacher

Table 3
HTMT results

	EM	OA	SMM	MM	BE	IAAI
EM						
OA	0.784					
SMM	0.776	0.761				
MM	0.651	0.639	0.792			
BE	0.799	0.682	0.228	0.734		
IAAI	0.231	0.764	0.694	0.792	0.572	

and Hayes [62]. The bootstrapping technique was employed to evaluate mediation effects, which are displayed in Table 5 and comprehensively explained in detail in the text below.

Brand equity functions as a mediating element between email marketing (EM) and online advertising (OA), along with social media marketing (SMM) and mobile marketing (MM), to affect the dependent variable, which is the application of artificial intelligence in financial services (IAAI). This investigation evaluates how BE functions as a mediating factor between independent variables. The mediating effects of these hypotheses (H10 through H13). The findings reveal the following:

Analysis of the indirect relationship between EM and IAAI, which passes through BE revealed statistical significance at 0.05 with a β of 0.113, a t-value of 3.195, and a p-value of 0.001. Results show evidence supporting H10 because the bias-corrected confidence interval (CI) did not include zero (0) with a lower level (LL) of 0.047 and an upper level (UL) of 0.184.

The results demonstrated that H11 is significant regarding the relationship between OA and IAAI through BE at the 0.05 significance level, showing a β of 0.064 and a t-value of 2.381, yielding a p-value of 0.019. The bias-corrected confidence interval did not include zero, thus confirming H11 because it produced results between 0.023 and 0.126. A statistically significant −0.049 β value with a 2.200 t-value and a p-value of 0.028 determined the indirect relationship between SMM and IAAI through BE at $p < 0.05$. The support for hypothesis H12 is confirmed by the findings, showing bias-corrected CI values of −0.087 and −0.002 that did not include zero. MM indirectly affected IAAI through BE in a statistically significant positive manner at the 0.05 level, with a β of 0.054 and $t = 2.412$ and $p = 0.016$. The bias-

Figure 2
PLS algorithm result

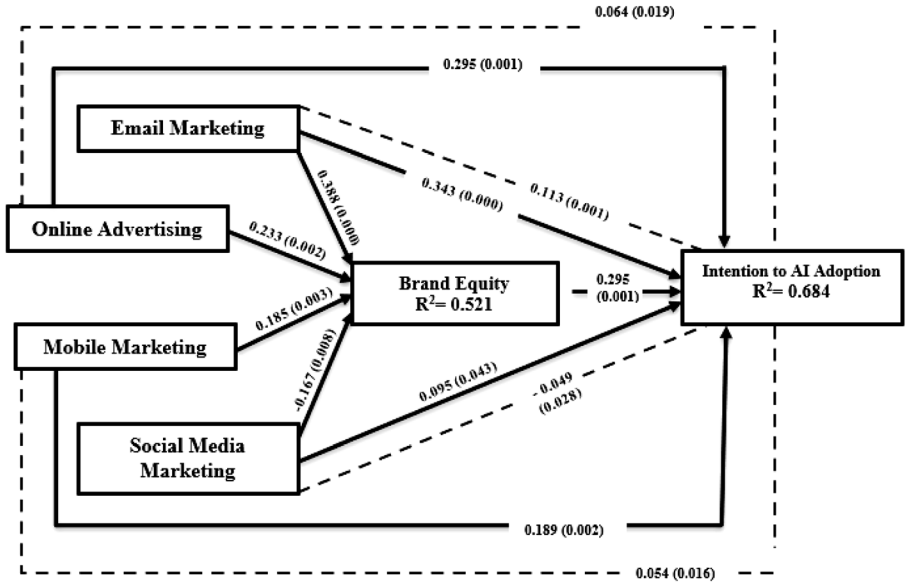


Table 4
Direct effect bootstrapping result

Path	*S. B*	*SD*	*t*-value	*p*-value	R^2	F^2	Q^2	VIF	Decision
EM → IAAI	0.343	0.069	4.969	0.000	0.684	0.108	0.321	3.465	Accepted
OA → IAAI	0.129	0.056	2.297	0.002		0.021		2.512	Accepted
SMM → IAAI	0.095	0.047	2.032	0.043		0.026		1.127	Not accepted
MM→ IAAI	0.189	0.061	3.11	0.002		0.050		2.247	Accepted
EM → BE	0.388	0.080	4.829	0.000	0.521	0.098	0.241	3.156	Accepted
OA → BE	0.223	0.067	3.274	0.002		0.041		2.412	Accepted
SMM → BE	−0.167	0.063	2.652	0.008		0.053		1.070	Not accepted
MM → BE	0.185	0.071	2.573	0.003		0.032		2.178	Accepted
BE→ IAAI	0.295	0.065	4.473	0.001		0.131		2.050	Accepted

Table 5
Results of hypotheses testing for the mediation effect of brand equity

Path	*S. B*	*SD*	*t*-value	*p*-value	UL	LL	Decision
EM → BE → IAAI	0.113	0.035	3.195	0.001	0.047	0.184	Supported
OA → BE → IAAI	0.064	0.027	2.381	0.019	0.023	0.126	Supported
SMM → BE → IAAI	−0.049	0.022	2.200	0.028	0.087	0.002	Not supported
MM → BE → IAAI	0.054	0.022	2.412	0.016	0.018	0.103	Supported

corrected CI between 0.018 and 0.103, except 0.00, was found, thus verifying H13's validity.

6.4.3. Effect sizes (F^2) influence

Though all reported relationships are statistically significant, the values of the effect size further explain the strength of each predictor. As an example, email marketing on AI adoption ($F^2 = 0.108$) and brand equity on AI adoption ($F^2 = 0.131$) show small-to-moderate, though significant, effects. Online advertising ($F^2 = 0.021$), social media marketing ($F^2 = 0.026$), and mobile marketing ($F^2 = 0.050$) do not have strong effects, indicating that these predictors, though significant, do not affect the variance explained. The same can be said about the predictors of brand equity (EM $F^2 = 0.098$, OA $F^2 = 0.041$, MM $F^2 = 0.032$, SMM $F^2 = 0.053$), which are small to almost moderate. This indicates that email marketing and brand equity are relatively strong drivers, but the rest of the channels have supplementary roles in explaining the adoption of AI.

7. Discussion

The rejection of propositions on social media marketing is a remarkable new addition to the literature. The preceding literature has largely placed social media in a predominant role in improving the intention to adopt AI, as well as brand equity, especially in the service sectors. The current results, however, defy this consensus in the Jordanian banking industry. The adverse or less important effect of social media marketing implies that the service of the bank, in contrast to consumer goods, needs more credibility, privacy, and professionalism, which does not necessarily coincide with the informal and entertaining character of social media. This points to the context-specific weakness of the social media strategies in their implementation in extremely regulated and trust-based industries.

Culturally speaking, it can also be assumed that Jordanian consumers might attribute a lower degree of reliability to social media campaigns than to emails or mobile communication that they view as safer and more personal.

Regulations also play a role in reducing the use of social media in financial services. Neither banks nor customers are ready yet to unleash the power of social media. Probably this is due to the sensitive nature of financial information.

This provides another merit to the current study, as it shows that digital marketing channels fluctuate across sectors and cultures. The data indicate that these tools have varying importance and levels worldwide, and thus, picking the best bundle among them is determined by the culture, regulations, and digital literacy. Thus, we advise banks in Jordan to rely more on AI-customized campaigns and limit the use of social media to a minimum.

Modern technological progress increases business competition; thus, companies must use artificial intelligence applications throughout all sectors, including financial services. The banking sector in Jordan maintains reduced market shares due to numerous banks operating with limited customer numbers. The banking industry uses AI-based services for financial operations to achieve improved service quality while building market differentiation capabilities. However, AI applications present difficulties for Jordanian banks in financial services operations, necessitating additional research into their development.

A study model was created through reviewing financial services literature, focusing on major variables involving AI application roles. Loyalty patterns, shopping behaviors, and brand awareness were studied in relation to email marketing, online advertising management, mobile marketing, and social media platforms, while their interrelationships were analyzed. The research study validated several essential relationships, which aligned with previous scholarly findings. However, as validated by Kumar and Kumar [26] and Tamta and Banoth [53], email marketing enables the formation of beneficial connections that push up the acceptance rates of AI applications in the financial services sector. Studies by Castillo et al. [63] and Cooper et al. [51] confirmed the positive relationship between online advertising and the adoption of AI applications in financial services. In addition, the studies by Cooper et al. [51], Ahmad and Mustafa [64], Chen et al. [65], and Hassan and Albayari [66] confirmed that there is a positive relationship between mobile marketing and the adoption of AI, and digital marketing platforms serve as tools which help organizations generate multiple digital marketing brands and use them to drive customer acceptance of AI-based financial services.

Two studies from Frimpong et al. [67] and Ünvan et al. [68] show that financial services benefited from the implementation of email marketing strategies. According to Garanti and Kissi [48] and Nemati et al. [49], online advertising is a valuable tool for improving brand equity in banking operations. In addition, Augusto and Torres [69], Lee and Chen [70], Nemati et al. [49], and Yashkina et al. [71] reached similar conclusions. Furthermore, the results of the current study showed a positive relationship between brand equity and both mobile marketing and social media marketing, as supported by studies [62, 72]. Brand equity was found to be a robust mediator that strengthened the intention to utilize AI applications in the financial services industry.

The results of the study suggest that brand equity enhances, mediates, and promotes digital tools. These findings might be of great importance in the banking industry. Thus, we conclude that digital marketing tools are significant in reaching customers and promoting financial services to them. If banks strengthen this use by enhancing the adoption of AI, this will give them a competitive edge.

8. Conclusion

Such a study attempts to fill a gap in the existing body of literature on the mediatory part of brand equity of the nexus between clients of Jordanian banking organizations and online marketing tools, in the context of adopting the AI application in the financial services environment. It outlines the influence of the digital marketing channel on the adoption of AI and highlights the critical role of brand equity in such a volatile and nascent market as the one that Jordan occupies. The study integrates two theoretical perspectives the resource-based view (RBV) and the theory of contingency, to show how the banking organizations can use environmental capabilities to yield better marketing results. Furthermore, it augments the discussion by contrasting the digital

marketing theory with brand equity constructs, which helps to have a more detailed understanding of the trade-offs the accelerated adoption of sophisticated AI-driven financial services must bring.

The research hypotheses, as well as the relationships between different dimensions of digital marketing channels (social media marketing, email marketing, online advertising, and mobile marketing) and the adoption of AI applications in the financial services sector of Jordanian firms, were assessed using PLS-SEM (version 3.2.8) path coefficients. The findings indicated that all the dimensions of digital marketing channels had positive and significant effects on the adoption of AI applications in financial services. The study also found that digital marketing channels and the adoption of AI applications are positively related through brand equity.

This implies the importance of brand equity for its positive impact on marketing performance. In a highly competitive business environment, diversification in the use of digital marketing channels, such as social media marketing, email marketing, online advertising, and mobile marketing, can significantly enhance brand equity and, in turn, support the adoption of AI-powered financial services. This study, therefore, contributes empirical evidence by quantifying the interaction between the use of digital marketing channels, brand equity, and AI adoption simultaneously, shedding light on the state of affairs of Jordanian banks and other financial institutions aiming to leverage such channels to improve their competitive position in the increasingly dynamic financial services industry.

9. Contributions of the Study

This study contributes to the field of digital marketing and its relationship with artificial intelligence (AI) applications in financial services.

9.1. Theoretical contribution

As explained above, a brand equity-mediating role to promote a bank's AI adoption can enhance a brank's strategic competitiveness and increase its returns. In general, the results of this provide that the combined power of marketing, branding, and AI adoption is strong and therefore effective, such as in countries where financial institutions have a significant amount of digital marketing practices to make strategic decisions. Such integrated framework allows a bank to manage its connections with clients more successfully rather than using one element model. Thus, this study encourages managers to develop a united model that demonstrates a concern for the new digital financial environment. The complexity of competition in emerging markets, especially, in Jordan increases the need for the use of such a model.

Previous research discusses these tools separately. No surprisingly though, most studies show their importance. This study is different as it provides one comprehensive model that banks can use to create more value. We analyzed this model at the level of the Jordanian banking sector. However, results suggest that using a perfect blend of digital marketing tools, brand equity, and AI is the competitive engine driving many banks' performance in the local competitive landscape. Banks in Jordan should capitalize on this untapped strategy.

9.2. Practical contribution

The findings revealed several strategic insights. These patterns require management attention. Email marketing proves to be an effective way to enhance customer engagement. This, combined with AI, resulted in good banking services efficiency. Banks should stretch beyond generic applications and adopt advanced level of personalization and segmentation to realize their poetical.

Banks operating in Jordan must make secure sensitive decisions when using AI. Increasingly, AI affects all aspects of how banks work and as such, the AI functions that they chose to adopt. Trust is the basis of AI and its application. Currently, AI is a critical organizational resource and an increasingly valuable source of competitive edge.

As long as campaigns are carefully considered according to the profile of the individual customers and presented in the right moment, they do not only promote products; they establish the trusting relationships and create a positive and long-lasting relationship between the institution and its customers. Research findings suggest that Email marketing influences the bank's ability to achieve high performance and earn high returns.

10. Future Research and Limitations

Future studies should take into account several methodological limitations of the present research. One of the most remarkable imbalanced distributions is the difference of gender between male and female (92%–8%) moreover, the balance of age is imbalanced too (most of the sample are those for the age group 40–49). The sample cannot use technology like younger people can. Addressing these demographic differences would enhance the work significantly going forward helping them more profoundly investigate the connections among digital marketing practice, brand strategy and its application to artificial intelligence.

Another important weakness of this study is the contextual dimension of this research to the Jordanian banking industry. Thus, the outside validity of the outcomes may restrict to the values regarding the culture and regulations, and to the current rates. Testing the model on other sectors in Jordan would be a beneficial exercise in the application of theoretical propositions and their robustness. Such sectors would include hospitality. The same could be done for healthcare, telecom, and tourism. Additionally, testing the same model on other like-markets in other countries could prove challenging yet beneficial.

Participants who hold active accounts are members of a sub-group. Any extension of the sample (also banking employees, new customers, non-bank users, etc.) will anyway test the frontiers of questioning. The use of an array of methodological tools such as qualitative case studies, mixed methods designs and sophisticated statistical methods, will surely shed further light on the topic of study, thus providing alternative perspectives through which one could question the dynamic processes.

Although the present study makes a valuable contribution, future works should extend to other mediators and moderators in the context of digital banking. The growing challenges of consumer trust, data privacy and digital literacy are becoming critical factors in influencing brand equity as well as willingness to use AI services. It is important that we include these factors in the modern-day discussions on financial technology to ensure safety, openness, and accessibility.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by any of the authors.

Conflicts of Interest

The authors declare that they have no conflicts of interest to this work.

Data Availability Statement

Data are available from the corresponding author upon reasonable request.

Author Contribution Statement

Ahmed Alamro: Conceptualization, Methodology, Validation, Writing – original draft, Writing – review & editing, Supervision. **Jassim Al-Gasawneh:** Conceptualization, Methodology, Software, Validation, Formal analysis, Data curation, Writing – original draft. **Abdullah Al Sokkar:** Conceptualization, Methodology, Software, Formal analysis, Investigation, Writing – review & editing, Visualization, Supervision, Project administration. **Mohammed Otair:** Investigation, Resources, Data curation, Writing – review & editing, Visualization. **Mohammed Binkhamis:** Validation, Resources, Data curation, Writing – original draft. Raed Momani: Software, Investigation, Resources. **Mohammad Alshinwan:** Data curation, Writing – original draft, Writing – review & editing, Visualization.

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