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Digital Business Transformation in Advertising: Effects on E-services Revenue

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Abstract: In this heyday of the digital economy, digital advertising has emerged as a powerful means for businesses to engage with consumers. Despite its vital role in the microeconomy by helping companies to grow, there is still limited empirical evidence on how digital advertising expenditures influence revenue generation at the macro level, particularly within the e-services sector in the Middle East and North Africa (MENA) region. To address this gap, this study investigates the long- and short-term effects of digital media market revenue and total digital ad spending on e-services revenue across five MENA economies: Qatar, the UAE, Saudi Arabia, Egypt, and Iraq. Using annual panel data from 2018 to 2023, an era shaped by the accelerating digital shift triggered by the COVID-19 pandemic, and applying an Autoregressive Distributed Lag model, the analysis reveals that both variables have no significant short-term impact but produce a positive and statistically significant effect on e-services revenue in the long run. The study offers actionable insights for business leaders and policymakers, emphasizing the need for robust data governance, sustained digital advertising strategies, artificial intelligence-integrated marketing strategies, and supportive digital infrastructure to accelerate economic transformation in emerging markets.

Keywords: digital business transformation, e-services revenue, digital media, MENA countries, digital marketing strategy, advertising effectiveness, ARDL model

1. Introduction

In keeping with the traditional management principle "money follows customers," increasing service companies are reallocating their marketing resources from traditional approaches to online platforms [1]. Due to the ease of access to online platforms, the growing interconnectedness of consumers across the globe has contributed heavily to cross-border e-commerce [2]. This kind of commerce, which can be referred to as international digital commerce or cross-border e-commerce, consists of international transactions performed via digital platforms, such as brand-owned websites and global online marketplaces [3].

Research highlights that digital transformation extends beyond mere technological shifts, profoundly influencing various facets of business operations [4, 5]. An essential aspect of this shift involves incorporating artificial intelligence (AI) to optimize the efficiency and efficacy of digital advertising by utilizing advanced data analytics, personalization, and automation. This study will adopt the concept of digital business transformation (DBT), referred to as "the application of technology to build new business models, processes, software, and systems that result in more profitable revenue, greater competitive advantage, and higher efficiency" [6]. In light of this definition, businesses increasingly invest in digital media and advertising, underscoring the necessity of understanding how these investments influence business performance. The COVID-19 crisis has significantly strengthened the link between digital technology and advertising or digital marketing. The pandemic has notably altered firm and consumer relationships, compelling companies to modify their marketing strategies through extensive digital technologies to protect competitiveness [7].

Prior research has focused on specific areas, such as the influence of digital advertising on consumer behavior [8] and the impact of digital mobile advertising on purchase intention [9]. Additionally, the literature has highlighted the positive effects of digital marketing on small and medium enterprises and brand empowerment [10, 11]. However, there is a lack of quantitative research examining the precise short- and long-term impacts of digital advertising investments on revenue in the e-services sector.

This study tackles these gaps by concentrating on the Middle East and North Africa (MENA) area, particularly Qatar, the United Arab Emirates, Saudi Arabia, Egypt, and Iraq. Extant literature has documented that these countries invest significantly in digital infrastructure [12, 13], but empirical evidence on digital returns remains scarce. The MENA region presents a distinctive environment characterized by rapid digital adoption, a youthful population, and strategic initiatives such as Saudi Vision 2030 and the UAE's innovation agenda, which create a conducive atmosphere for digital transformation; however, it also encounters challenges pertaining to regulation, infrastructural inequality, and trust issues [14, 15].

To address this gap, this study aims to quantitatively assess the effect of digital media market growth and ad spending in digital advertising on revenue in the e-services sector in the MENA region. Accordingly, this study's high-level research question is: How do digital media market growth and ad spending in digital advertising, as part of DBT, influence revenue in the e-services sector?

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The subsequent sections of this study are organized as follows. Section 2 delineates the theoretical framework, encompassing essential principles pertinent to DBT, digital marketing strategies, and the MENA area's promises and challenges associated with e-services. Section 3 delves into the methodology, specifying the data sources, variable definitions, and the Autoregressive Distributed Lag (ARDL) model employed for analysis. Section 4 presents the empirical findings, encompassing stationarity assessments, long-term and short-term estimations, and diagnostic evaluations. Lastly, sections 5 and 6 examine the management and policy ramifications of the results.

2. Theoretical Background: Digital Business Transformation in the MENA Region

2.1. Digital business transformation

The realm of digital transformation has experienced swift development, with research interest notably increasing since 2014 [16]. This trend is reflected in the increasing number of publications from 2015 onward, when annual publication numbers climbed from 50 in 2015 to more than 800 by 2022 [17]. Three core aspects of digital technologies – digital artifacts, digital platforms, and digital infrastructures [18] – provide a modular layered architecture for strategy researchers, leaving firms with the strategic option of pursuing a digital innovation strategy. Digital transformation has significantly influenced how value is created, delivered, and captured across various industries. The adoption of digital technologies has revolutionized industry operations, leading to concepts such as "Industry 4.0" or the "smart factory" [19]. These advancements have facilitated the development of digital platforms, created new business ecosystems, and altered the dynamics of value networks. Furthermore, digital transformation has instigated fundamental changes in business and societal practices, encouraging new models like the circular and sharing economy [20].

Besides its technological underpinnings, DBT includes organizational reconfiguration, cultural evolution, and the cultivation of new competencies. To further DBT, [21] presents a guiding framework that distinguishes four key dimensions: transformation context, content, process, and strategy. This model links DBT to both organizational change and strategic planning, emphasizing that successful transformation involves more than adopting technology. It requires aligning strategic intent with internal processes and structures. In addition, scholars like [22] emphasize that successful DBT requires investment in digital tools and the alignment of leadership vision, employee competencies, and change management processes. DBT is increasingly studied through a multidisciplinary lens, incorporating insights from information systems, strategic management, marketing, and innovation studies.

2.2. Digital marketing strategies and frameworks

Paul Smith's 5S online marketing model, introduced in the 2000s, serves as a comprehensive framework for analyzing the benefits of digital marketing across five key areas: selling, speaking, sourcing, saving, and sizzling. Selling focuses on increasing overall sales volume through both digital and offline channels by implementing new product pricing strategies, expanding the client base, and enhancing customer value via a robust digital presence and feedback integration. Speaking emphasizes improving customer communication and engagement by maintaining continuous dialogue through forums, chats, and other digital communication methods to foster active and close interactions. Sourcing involves gathering and processing customer data to develop effective digital marketing strategies that understand customer demographics and behavior while ensuring sensitive information is respected. Saving highlights the cost-saving benefits of digital marketing, such as reducing expenses on paper, ink, and traditional advertising, as well as utilizing digital storage and self-service options to enhance operational efficiency. Finally, sizzling refers to attracting customer attention and loyalty by offering unique and appealing products or services, maintaining a strong online brand presence, and delivering real value without making unrealistic promises [23].

A well-known marketing strategy introduced by [24] outlines the 4Ps framework: product, price, place, and promotion. This framework has since been widely applied in digital marketing contexts [25]. The idea of product in digital marketing has a fast expiration time as newer digital technologies render core product value obsolete, for instance, cars with GPS and autonomous driving. Airbnb and Uber are examples of digital platforms that make it easier for individuals to rent things. On the other hand, IoT technologies let electronic devices and people connect in new ways. Pricing policies in digital marketing should vary according to market dynamics like supply and demand**.** Effective e-pricing strategies utilize data to meet consumer expectations, regularly adapting prices based on competitors' offerings and integrating various data sources to tailor prices to different market segments [26]. In the context of digital marketing, the concept of e-place refers to the digital distribution of goods and services through online platforms. Reference [27] describes e-place using indicators such as information on shipping methods and prices, online store ratings, and logistics provider evaluations, highlighting how these elements shape consumer trust and purchase decisions in e-commerce environments. Digital marketing comprises strategies for speeding up the sales process as part of its promotion. Reference [28] states that e-promotion is vital for both digital and conventional marketing. Companies may utilize websites and social media to market their products, for example, by giving free samples. Electronic apps make it easier to get data from specific databases, get customer feedback, and promote products or services in a more targeted way. Personal selling means buyers and sellers talk to each other directly, improve marketing strategies, get quick feedback, and persuade customers to buy [29].

2.3. Challenges and opportunities for e-services in the MENA region

The term MENA is widely used in fields such as academic research, military strategy, disaster response, media broadcasting, and business communications (e.g., Reference [30]). In the MENA region, the adoption and integration of e-services are pivotal to the broader DBT agenda. Over the course of the last ten years, the MENA area has experienced a considerable increase in the number of people who have access to the internet and the digital infrastructure, which has laid the foundation for a thriving e-services industry (refer to Table 1). The region is undergoing a dramatic shift as a result of steps taken by the government to digitalize the region as well as investments made by the private sector in areas such as fintech, e-commerce, and online education. The development of e-services in the MENA setting, on the other hand, is influenced by a distinct combination of socioeconomic dynamics, regulatory variety, and various degrees of digital maturity among nations. Although these advancements create great prospects for innovation and service delivery, they also highlight considerable obstacles linked to infrastructure, trust, inclusion, and sustainability. Despite this, they present opportunities that are promising. This section examines the promise as well as the obstacles that are defining the path that e-services will take in the MENA area.

Table 1
Mobile connectivity and economic contribution in the MENA region (2023–2030)

Unique mobile subscribers (million)		Mobile internet users (million)		Smartphones (% of connection)		Mobile's contribution to GDP ($BN)	
2023	2030	2023	2030	2023	2030	2023	2030
427M	517M	327M	422M	81%	90%	$66BN	$88BN

Note: This table presents projections of mobile subscribers, internet users, smartphone adoption, and GDP contribution for the MENA region. Adapted from The Mobile Economy: Middle East & North Africa 2024 [31].

2.3.1. Challenges

First, regulatory and legal matters are a significant challenge since regulatory structures in MENA nations will inevitably differ considerably and usually fall behind technological progress. Businesses might struggle to handle intricate regulations, which can function as an adoption barrier for emerging technologies.

Second, establishing secure and effective payment systems continues to be a key issue for MENA e-commerce. Making the systems secure and reliable is at the heart of establishing customer trust [32].

Third, for e-commerce to succeed, there have to be dependable logistics and last-mile delivery capabilities. Reference [33] asserts they are tied to order fulfillment operations like product confirmation and assortment, availability and status condition on the inventory management front, delivery information and options, forwarding and handling fees, delivery, and last-mile-order tracking, followed by procedures, preparation, options, refunds, and handling for returns management.

Fourth, digital system security and safety must also be guaranteed in building public trust and increasing usage of e-services [34]. The region has been facing increasing cyberattacks, online fraud, and disinformation. For instance, [35] cites an increasing trend for banks in the region to publish cybersecurity information, with disclosure rates going up from 17% in 2019 to 19.6% in 2021.

Fifth, [36] presents three main characteristics of globalization: the revolution in technology, communication across regions, and cultural diversity, which propel business expansion. They stress that cultural variability needs to be understood in order to allow leaders to achieve significant outcomes through the effective preparation of employees to achieve organizational goals.

Lastly, the remaining issues that [37] identified as challenges include technological upgradation, returns and refund complexities, and the availability of counterfeit products. These issues are particularly applicable in the MENA region, where even across a given country, the development of digital infrastructure is skewed, posing obstacles to adopting available technologies in e-commerce.

2.3.2. Opportunities

First, the young populations in the MENA region offer a large customer base for e-services since the youth are more likely to adopt digital technologies and shop online. The International Organization for Migration states that the MENA region is among the world's youngest regions with a median age of 22, which is lower than the world average of 28[1].

This is a trend that can be expected to persist, with 60% of the population aged below 25 years, which represents a rapidly increasing portion of the population.

The COVID-19 pandemic era has hastened digitalization in the direction of the online delivery of services, presenting e-commerce websites with new possibilities for expansion into conventionally offline services such as career guidance, education, architecture, and mental health support [38].

Third, the MENA region's strategic position between Europe, Asia, and Africa makes it an ideal center for cross-border e-commerce. This benefit guarantees international trade and market access.

Fourth, the MENA region is rapidly embracing cloud computing, blockchain, and AI, among other emerging cutting-edge technologies. Reference [39] explores the use of AI and cloud computing in MGA-MENA, the Middle East's top telecom operator, and verifies that the technologies enhanced operational efficiency, product quality, and customer satisfaction.

Fifth, there are different government plans in the MENA region that try to encourage e-services and digitalization. For instance, Saudi Arabia's Vision 2030[2] seeks to diversify the economy and make it less reliant on oil by investing in digital infrastructure and encouraging innovation. Likewise, in the UAE National Innovation Strategy,[3] actions are being undertaken so as to encourage digital services and infrastructures, and the UAE is one of the most innovative nations. These actions provide an enabling environment for the development of e-services through policy support, investment, and the improvement of infrastructure.

Finally, under digital shops and social commerce enterprises, e-commerce provides food businesses in rural areas an opportunity to go beyond geographical closeness, hence reaching national and even international markets, promoting their online presence, and increasing consumer engagement [40].

Some MENA countries have launched national programs for leading digital transformation with emphasis on digital infrastructure, AI, smart government, and innovation. Table 2 presents a summary of major institutional initiatives in the five countries included in this research. These reflect the region's firm determination to spur e-services and DBT through enabling policy and investment regimes.

3. Methodology

3.1. Data description

This study adopted a quantitative research approach to examine the effects of DBT in marketing on e-services revenue within the MENA region. The study concentrates on five principal nations: Qatar, the UAE, Saudi Arabia, Egypt, and Iraq. There were a few reasons why these countries were picked: First of all, they are some of the most economically significant countries in the MENA area

[1] https://mena.iom.int/youth-empowerment

[2] https://www.vision2030.gov.sa/en

[3] https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/strategies-plans-and-visions/strategies-plans-and-visions-untill-2021/national-innovation-strategy

Table 2
Key national digital transformation initiatives in selected MENA countries

Country	National strategy or initiative	Responsible institution	Focus area
UAE	UAE National AI Strategy 2031	Ministry of AI, Digital Economy & Remote Work Applications	AI, smart government, digital services
Qatar	Qatar National Vision 2030 & TASMU Smart Qatar	Ministry of Communications and Information Technology	Smart transportation, smart logistics, smart healthcare, smart environment
Iraq	Iraq E-Government Project (in cooperation with UNDP)	Ministry of Communications	E-services, public sector digitization
Egypt	Digital Egypt Strategy	Ministry of Communications and Information Technology	Digital Egypt e-Platform (public services), electronic signature, digital upskilling, digital innovation, ICT infrastructure
Saudi Arabia	Vision 2030	Digital Government Authority (DGA), Ministry of Communications and IT (MCIT)	E-government, vibrant society, thriving economy, ambitious nation

Note: This table summarizes key national strategies, responsible institutions, and focus areas for digital transformation and AI adoption in selected MENA countries. Compiled by the author based on official national strategy documents and institutional websites.

since they have made large investments in digital infrastructure and e-services. With its large population, Egypt presents a substantial market potential for e-services, while Iraq offers unique insights into the challenges and opportunities in a post-conflict economy. Second, the chosen nations have diverse levels of digital adoption and maturity, which allows for a thorough examination of the many stages of digital transformation and how they affect e-service. Third, they have launched significant government initiatives promoting digital transformation. Fourth, these nations constitute considerable case studies for understanding regional patterns and how they affect e-services because of their geopolitical relevance.

Cross-sectional annual data from 2017 to 2023 were obtained from Statista, a publicly available source. This period was considered in an attempt to catch the acceleration of digital transition during and after the COVID-19 pandemic, which had essentially transformed digital consumption behaviors and, consequently, business models in the MENA region. DBT in marketing is measured using two independent variables:

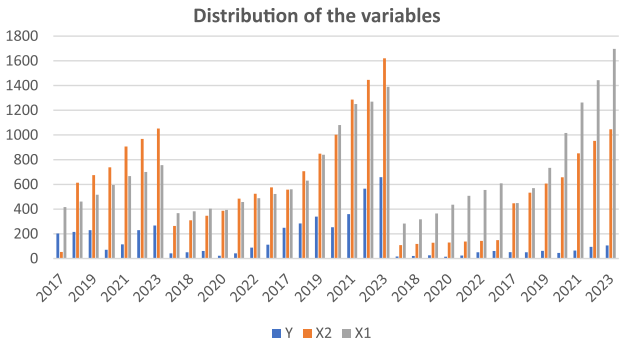
Digital media market revenue (in million USD): This variable comprises revenues from the video games market, video-on-demand, e-publishing, and digital music **(X1)**.

Total ad spending in digital advertising (in million USD): This variable includes spending on audio advertising, banner advertising, classifieds, influencer advertising, in-app advertising, search advertising, social media advertising, and video advertising **(X2)**.

The dependent variable is the revenue of the e-services market (in million USD), which includes revenues from event tickets, dating services, online education, and online gambling.

The variables were chosen based on their conceptual congruence with the literature on DBT and the availability of data across the selected nations. The revenue of the digital media industry illustrates the progression of content-oriented digital services, which are important in altering the manner in which companies interact with customers via platforms and digital ecosystems. Total advertising spending in digital advertising reflects companies' strategic investments in client acquisition, brand exposure, and personalized engagement, essential components of the digital marketing revolution. E-services revenue was chosen as the dependent variable because it aggregates monetized digital services consumed online, making it a meaningful metric for platform-based business models. These measures provide a practical yet theory-informed lens to assess how marketing-oriented digital transformation contributes to economic outcomes in the e-services domain.

Figure 1
Trends in e-services revenue, digital ad spending, and digital media revenue in selected MENA countries (2017–2023)



Note: X1 = digital media market revenue; X2 = total ad spending in digital advertising; Y = e-services revenue. Data aggregated across Qatar, the UAE, Saudi Arabia, Egypt, and Iraq.

To illustrate the selected data, Figure 1 presents the temporal trends in e-services revenue (Y), digital media market revenue (X1), and total ad spending in digital advertising (X2) across the study period. This visualization enhances clarity by highlighting both the growth trajectory and the relative scale of the independent and dependent variables.

3.2. Data analysis

To analyze the impact of DBT on e-services revenue, this study employs the ARDL model. The ARDL model is particularly suitable for examining the relationship between variables that are integrated at different orders, such as I (0) and I (1).

Before estimating the ARDL model, testing the stationarity of the variables involved is essential. Several tests were used for this purpose, including [41] and [42].

Table 3
Descriptive statistics for key variables (2017–2023)

Descriptive statistics					
Variables	N	Minimum	Maximum	Mean	Std. deviation
Y	35	14.97	658.40	147.04	153.82
X2	35	53.50	1,620.50	610.55	402.47
X1	35	283.16	1,696.55	696.85	368.59

Note: Y = e-services revenue; X1 = digital media market revenue; X2 = total ad spending in digital advertising. Values are in million USD.

The ARDL (p, q, q, q, q, ...) model is specified as follows:

$$Y_{it} = \sum_{j=1}^{p} \alpha Y_{it-1} + \sum_{j=0}^{q} \beta_{ij} X_{it-j} + Y_i + \varepsilon_{it}$$

Where:

Dependent variable (Y_{it}): This represents the variable being studied, which in this study is the e-services revenue for each country at a given time.

Lagged dependent variable ($\sum_{j=1}^{p} \alpha Y_{it-1}$): This term accounts for the dependent variable's past values, capturing its own past's influence on its current value.

Lagged independent variables ($\sum_{j=0}^{q} \beta_{ij} X_{it-j}$): This term includes the past values of the independent variables, which in this study are the total ad spending in digital advertising and digital media market revenue, accounting for their influence over time.

Country-specific fixed effect (Y_i): This captures the unique characteristics of each country that could influence the dependent variable, controlling for country-specific factors that do not vary over time.

Error term (ε_{it}): This represents the unexplained variation in the dependent variable, capturing the influence of all other factors not included in the model.

The short-run dynamics of the ARDL model are captured using the error correction model specification as follows:

$$\Delta Y_t = \emptyset_0 + \sum_{i=1}^{p} \beta_i \Delta Y_{t-i} + \sum_{j=0}^{q1} \beta_j \Delta X_{1,t-j} + \sum_{k=0}^{q2} \beta_k \Delta X_{2,t-k} + \partial ECT_{t-1} + \mu_t$$

Where:

ΔY_t: First difference of the dependent variable (e-services revenue)

$\emptyset_0$: Intercept term

βi: Short-run coefficients for the lagged changes in Y

ΔYt−i: Lagged first differences of e-services revenue

βj: Short-run coefficients for the lagged changes in X1 (digital media market revenue)

$\Delta X_{1,t-j}$: Lagged first differences of digital media revenue

βk: Short-run coefficients for the lagged changes in X2 (digital ad spending)

$X_{2,t-k}$: Lagged first differences of digital ad spending

ECT_{t-1}: Error correction term lagged one period (captures deviation from long-run equilibrium)

∂: Speed of adjustment parameter (expected to be negative and significant)

μ_t : White noise error term

4. Results

4.1. Descriptive statistics

The statistical descriptions provide an outlook on the distribution and variation of the key variables, as presented in Table 3. The e-services market revenue (Y) shows substantial variation across the sample, with a mean of 147.04 million USD. The total ad spending in digital advertising (X2) and digital media market revenue (X1) also exhibit significant variability, with 610.55 million USD and 696.85 million USD, respectively. These variations highlight the diverse nature of DBT and its impact on e-services revenue across the studied countries in the MENA region.

4.2. Multicollinearity diagnostics

To ensure the robustness of the regression analysis, multicollinearity among the independent variables was assessed using the variance inflation factor (VIF) via SPSS software. The VIF value was found to be 2.855, which is well below the common threshold of 10, indicating that multicollinearity is not a significant concern in this study (see Table 4).

Table 4
Multicollinearity diagnostics: Tolerance and VIF values

Model		Collinearity statistics	
		Tolerance	VIF
1	(Constant)		
	X2	0.350	2.855
	X1	0.350	2.855
a. Dependent Variable: Y			

Note: X1 = digital media market revenue; X2 = total ad spending indigital advertising; Y = e-services revenue (dependent variable). VIFvalues below 10 indicate that multicollinearity is not a concern

4.3. Stationarity test

To determine the stationarity of the variables, we performed the Levin, Lin & Chu (LLC) and Breitung t-stat tests. These tests are used to check for the presence of a unit root in the panel data. The results of the stationarity tests for both the level (I (0)) and first difference (I (1)) are presented in Table 5. The null hypothesis for these tests is that the series has a unit root, indicating non-stationarity.

For the digital media market revenue (X1), the Levin, Lin, & Chu (LLC) test indicates stationarity at the level (I (0)) with a significant result at the 1% level, while the Breitung t-stat does not indicate significance. Both tests confirm stationarity at the first difference

Table 5
Panel unit root test results for stationarity at level and first difference

Test of stationarity at the first level				
	Null: Unit root (assumes common unit root process)			
Variables	I (0)		I (1)	
	Levin, Lin, & Chu	Breitung t-stat	Levin, Lin, & Chu	Breitung t-stat
Y	–1.29434	0.06881	–4.315	–2.47922
X1	–4.17358	–0.78039	–4.52367	–1.22875
X2	–16.2314	–1.21585	–9.67552	–1.99587

Note: I (0) = test at level; I (1) = test at first difference. The null hypothesis assumes the presence of a unit root (i.e., non-stationarity). Y = e-services revenue; X1 = digital media market revenue; X2 = total ad spending in digital advertising.

(I (1)) with significant results. Similarly, for the total ad spending in digital advertising (X2), the LLC test shows stationarity at the level (I (0)) with a significant result at the 1% level, whereas the Breitung t-stat does not. Both tests confirm stationarity at the first difference (I (1)), with significant results for the LLC test at the 1% level and the Breitung t-stat at the 5% level. This indicates that both X1 and X2 are stationary at the level according to the LLC test and remain stationary after first differencing.

The dependent variable (Y) is integrated of order one (I (1)), meaning it is non-stationary at the level but stationary at the first difference. On the other hand, the independent variables, digital media market revenue (X1) and total ad spending in digital advertising (X2), are integrated of order zero (I (0)), meaning they are stationary at the level. This mixed order of integration justifies the use of the ARDL model, which is suitable for analyzing relationships between variables with different integration orders.

4.4. Long-run and short-run results

The results of the ARDL model examining the impact of DBT in marketing on e-services revenue are summarized in the table. The ARDL model was applied via Eviews software to explore the long-run and short-run relationships between the variables. The model selection was based on the Akaike Information Criterion (AIC), and the selected specification is ARDL (1,1,1), indicating one lag for the dependent variable and one lag for each independent variable.

The optimal lag structure for the ARDL model was determined using the AIC, which balances model fit and parsimony. After testing several lag combinations, the ARDL (1,1,1) specification was chosen since it had the lowest AIC value among the competing models. The use of AIC is a standard practice in time series econometrics and is particularly appropriate in small-sample settings like this study [43].

The long-run interpretation as shown in Table 6:

X1 (digital media market revenue): The coefficient of 0.182975 is also positive and highly significant (p-value = 0.0000), suggesting that higher digital media market revenue significantly boosts long-run revenue.

X2 (total ad spending in digital advertising): The coefficient of 0.13118 is positive and significant (p-value = 0.0391), indicating that an increase in ad spending positively impacts the long-run revenue of e-services.

The short-run interpretation as shown in Table 6:

COINTEQ01: The error correction term (ECT) coefficient is −0.396336 and significant (p-value = 0.0188), indicating that approximately 39.63% of the disequilibrium is corrected each period. The negative and significant coefficient confirms the stability of the long-term relationship between the variables.

- **D(X2) (change in total ad spending in digital advertising):** The coefficient is −0.048126 but is not significant (p-value = 0.8956), implying no significant short-term effect on e-services revenue.
- **D(X1) (change in digital media market revenue):** The coefficient is -0.292750 and not significant (p-value = 0.5012), indicating no significant short-term impact on e-services revenue

5. Managerial Implications

The positive and significant long-run impact of total ad spending in digital advertising on e-services revenue suggests that businesses in the MENA region should strategically enhance their investment in digital advertising channels. This involves utilizing different channels such as social media, search engines, and video advertising. The insignificance of the short-run impact may point to the fact that such investments are not immediately rewarding, but this sidesteps the implication of the importance of having a continuous, long-term advertising campaign for it to grow revenue substantially. Therefore, managers are encouraged to allocate resources toward continuous and strategic digital advertising initiatives to achieve long-term results.

The pandemic caused by COVID-19 acted as a stress test for digital infrastructure, bringing to light the significance of durable and scalable advertising ecosystems and diverse digital media portfolios. This momentum should be used by managers not as a temporary adjustment but rather as a driver for persistent change to integrate digital preparedness into fundamental business processes.

Moreover, digital media revenues' significance and positive effect on e-services revenue underscore firms' need to allocate resources toward and improve their digital media offerings. Companies should investigate and broaden their range of digital media offerings, such as video-on-demand, e-publishing, and digital music, to appeal to a wider client demographic and enhance total market earnings. Businesses can substantially contribute to expanding the e-services sector by broadening and improving their digital media offerings.

It is imperative for enterprises to actively support and engage in the establishment of regional legislation like the General Data Protection Regulation (GDPR) implemented in Europe. These regulations can potentially improve data security and confidentiality, which in turn can build consumer confidence and provide a more secure digital landscape. This would empower enterprises to operate more assuredly and adhere to global benchmarks, promoting seamless cross-border transactions and cooperation.

Recognizing the strategic significance of data in driving digital transformation is vital for firms since data is widely regarded as the new oil. Companies should hire a Chief Data Officer (CDO)

Table 6
ARDL estimation results for the impact of digital business transformation on e-services revenue

Dependent Variable: D(Y)				
Method: ARDL				
Date: 07/14/24 Time: 22:18				
Sample: 2018 2023				
Included observations: 30				
Maximum dependent lags: 1 (automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Dynamic regressors (1 lag, automatic): X1 X2				
Fixed regressors:				
Number of models evaluated: 1				
Selected Model: ARDL (1,1,1)				
Note: The final equation sample is larger than the selection sample.				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
Long Run Equation				
X1	0.182975	0.031905	5.735031	0.0000
X2	0.131180	0.058959	2.224935	0.0391
Short Run Equation				
COINTEQ01	–0.396336	0.153559	–2.580992	0.0188
D(X1)	–0.292750	0.426453	–0.686477	0.5012
D(X2)	–0.048126	0.361701	–0.133053	0.8956
Mean dependent var	21.41167	S.D. dependent var		61.51120
S.E. of regression	44.07890	Akaike info criterion		7.658310
Sum squared resid	34973.09	Schwarz criterion		8.413764
Log likelihood	–117.0204	Hannan-Quinn criter.		7.919092

Note: Dependent variable = first difference of e-services revenue (D(Y)). ARDL model specification: ARDL (1, 1, 1) selected using AIC. X1 = digital media market revenue; X2 = total ad spending in digital advertising. ECT = error correction term. *p-values below .05 indicate statistical significance

who would be responsible for supervising data management, governance, and strategy [44]. The CDO has the ability to guarantee that data assets are utilized efficiently to stimulate innovation, streamline operations, and improve decision-making processes.

Also, the integration of AI into business operations has intensified the need for ethical considerations. The board of directors, therefore, should include an ethics officer who oversees ethical implications regarding data use and AI applications. This position should address privacy, fairness, explainability, and safety issues to ensure that AI systems' development and deployment are credible. Placing ethics at the core of their AI strategies will help businesses win the trust and avert risky consequences from using AI technologies.

These management insights correspond with the tenets of Paul Smith's 5S digital marketing paradigm. The enduring effect of digital advertising expenditure on e-services revenue underscores the significance of "Selling," utilizing digital platforms to enhance sales via a more robust online presence and pricing methods. The importance of digital media income underscores "Sizzling," as organizations must deliver captivating content and distinctive value to attract and keep customers. Furthermore, the recommendation to invest in data infrastructure and appoint CDOs directly relates to "Sourcing," ensuring customer data is harnessed for strategic marketing. By adopting a 5S-informed strategy, managers can maximize the return on digital investments and align their marketing efforts with broader DBT goals.

6. Policy Implications

For policymakers, the results underscore the critical need for continued investment in digital infrastructure within the MENA region. The positive impact of digital media market revenue on e-services revenue highlights the importance of having a robust and reliable digital infrastructure. Governments must ensure high-speed internet development, data centers, and any such infrastructure needed by the digital commerce transformation. These are crucial for enabling efficient DBT. Furthermore, it is critical that these investments prioritize sustainability and carefully assess their environmental impact. Implementing eco-friendly data centers that employ energy-efficient technologies and renewable energy sources can significantly diminish the carbon emissions associated with digital infrastructure. These approaches fulfill environmental targets, like sustainable development goals, and support the long-term sustainability of these transformation projects.

Moreover, creating and implementing explicit regulatory frameworks for digital advertising is requisite. By safeguarding consumer interests and promoting fair competition, these frameworks can improve the legitimacy and efficacy of digital advertising. The regulatory measures must be able to address the issues of data privacy and security to their proper conclusion, concerning consumers' personal information that flows across the digital marketplace. Establishing laws similar to the GDPR in Europe will be beneficial in allowing online businesses to feel secure and

confident. In this respect, the recent legislation of Europe, such as the Digital Services Act (DSA) and Digital Markets Act (DMA), might be emulated in the MENA region. The DSA focuses on creating a safer digital space where users' fundamental rights are protected, and the DMA aims to ensure fair competition and more choices for consumers by preventing large online platforms from abusing their market power. Implementing similar regulations in the MENA region can enhance the digital ecosystem by ensuring transparency, accountability, and fairness in digital markets.

Fiscal policy should catalyze and speed up changes in the digital industry. To encourage DBT, the government could offer financial incentives like tax cuts, financial aid, and subsidies. One way to get the digital industry to grow and come up with new ideas is to give tax breaks to companies that invest in digital infrastructure, do more research and development on digital technologies for safe marketing, make metrics that stakeholders can use, and set up training programs for employees. Governments may create public–private partnerships to pay for and help with digital transformation projects. This will ensure that digital advancement's benefits are shared fairly across all parts of the economy.

Governments should enhance collaborations between universities and companies to ensure students acquire practical skills and theoretical education, especially in the age of AI and generative AI. Such collaborations can include internships, joint research projects, and co-developed curricula that focus on real-world applications of AI technologies. This approach will help bridge the gap between current educational capabilities and the demands of a digitally transformed business environment, ensuring the workforce is prepared for the evolving digital landscape.

The policy proposals align with Wilson's 4Ps approach from a strategic marketing standpoint. Investment in digital infrastructure enhances "Place," facilitating seamless digital service delivery to customers across various locations. Regulatory rules governing digital advertising improve "Promotion," establishing equitable and secure conditions for marketing techniques. Incentives for content development and digital innovation promote product variety ("Product") and adaptive pricing strategies ("Pricing") that fit customer expectations. Consequently, connecting digital transformation policies with marketing theory may assist policymakers in ensuring that e-service ecosystems are both technologically advanced and strategically competitive.

7. Conclusion

This study contributes to the growing body of knowledge on DBT by providing empirical evidence on the significant role of digital advertising and media in driving e-services revenue in the MENA region. The insights derived from this research can guide managerial decisions and policy formulations, fostering a conducive environment for the region's digital business growth and economic development.

Despite its contributions, the study has several limitations. It relies on secondary data and focuses on a subset of MENA countries, limiting generalizability. It depends on secondary data and concentrates on a subset of MENA nations, hence restricting generalizability. Subsequent studies should broaden their reach to encompass more nations and incorporate more detailed firm-level data. Furthermore, the evolving aspects of digital transformation, like generative AI, digital trust, and cross-border data governance, warrant examining their impact on company performance within platform economies. Longitudinal qualitative research might enhance this approach by elucidating the strategic decision-making processes that inform digital marketing spending.

Ethical Statement

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

Conflicts of Interest

The author declares that he has no conflicts of interest to this work.

Data Availability Statement

The data that support this work are available upon reasonable request to the corresponding author.

Author Contribution Statement

Ahmad Haidar: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Supervision, Project administration.

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